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Block ownership and firm-specific information

Paul Brockman *, Xuemin (Sterling) Yan

Department of Finance, Robert J. Trulaske, Sr. College of Business, University of Missouri, Columbia, MO 65211, USA

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ABSTRACT

This study examines the impact of block ownership on the firm's information environment. Previous research shows that stock price efficiency depends on the cost of acquiring private information, as well as on the precision of this information. Blockholders have a clear advantage over diffuse, atomistic shareholders in terms of the precision and acquisition cost of their private information. We hypothesize that this informational advantage will manifest itself primarily in the firm-specific component of stock returns. Our empirical findings confirm that blockholders increase the probability of informed trading and idiosyncratic volatility, and decrease the firm's stock return synchronicity. These results hold for both inside and outside blockholders, but are insignificant for blocks controlled by employee stock ownership plans (ESOPs). Overall, our findings support the contention that ownership structure plays a significant role in shaping the firm's information environment.

1. Introduction

The distribution of ownership rights across competing interests can alter both the incentive structure and information environment of the firm. One characteristic of the modern corporation is that strategic decision-making rights are separate from residual cash flow rights. This separation of ownership from control, while solving a coordination problem, introduces an incentive problem. Blockholders can mitigate this incentive problem because of their monitoring advantage over diffuse shareholders. A second characteristic of corporations is the prevalence of information asymmetry between informed blockholders and diffuse shareholders. Numerous studies have investigated the effect of block ownership on managerial incentives and decision-making.[1] In contrast, there is considerably less research examining the impact of block ownership on the firm's information environment, in spite of the fact that block ownership represents a large and increasing segment of publicly-traded firms. The purpose of this paper is to examine the impact of blockholders on the firm's information environment by using a large, standardized database of block ownership.

Previous research illustrates the potential channels through which block ownership can impact the level of firm-specific information impounded into stock prices. Grossman and Stiglitz (1980) argue that stock prices are not perfectly efficient in the presence of costly information acquisition and arbitrage. This argument suggests that stock price efficiency is inversely related to the costs of acquiring firm-specific information. "When information is very inexpensive, or when informed traders get very precise information, then equilibrium exists and the market price will reveal most of the informed traders' information (p. 404)." As a group, blockholders tend to have access to more precise, firm-specific information at lower costs than do non-blockholders. One testable implication is that the degree to which firm-specific information is impounded into stock prices will increase with block ownership.

Piotroski and Roulstone (2004) argue that different market participants possess different types of information advantages; that is, firm-specific, industry-wide, and market-wide information. They show that market participants can "influence the firm's information environment, but the type of price-relevant information conveyed by their activities depends on each party's relative information advantage (p. 1119)." Their analysis suggests that block ownership is more likely to impact the firm-specific component of stock prices, as opposed to industry- or market-wide components, because of blockholders' knowledge of firm-specific information.

Moreover, Shleifer and Vishny (1997) show that professional arbitrage is typically conducted by a relatively small number of highly specialized investors using other people's capital. Because of their reliance on outside capital, professional arbitrageurs

* Corresponding author. Tel.: +1 573 884 1562; fax: +1 573 884 6296.
E-mail addresses: brockmanp@missouri.edu (P. Brockman), yanx@missouri.edu (X. (Sterling) Yan).

[1] See, for example, Demsetz and Lehn (1985), Holderness and Sheehan (1988), Mikkelson and Partch (1989), Shivdasani (1993), Mehran (1995), Denis et al. (1997), Ang et al. (2000), Ryan and Wiggins (2001), Singh and Davidson (2003) and Cremers and Nair (2005). See also Holderness (2003) for additional information on the block ownership literature.

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"might bail out of the market when their participation is most needed (p. 37)" – greatly reducing their ability to impound fundamental values into market prices. This particular agency problem, therefore, leads to the limits of arbitrage. While these limits can be reduced by investors using their own resources, such investors usually lack the requisite knowledge. Blockholders, however, represent a unique group of investors who possess both the knowledge and the resources to conduct arbitrage operations. To the extent that blockholders act as arbitrageurs, stock prices will reflect more firm-specific information and the limits of arbitrage will be narrowed.

In addition to their role as potential arbitrageurs, blockholders also reduce agency costs between insiders and outside (minority) shareholders by monitoring corporate managers. Morck et al. (2000) show that outside investors are more likely to engage in informed risk arbitrage when their ownership rights are well protected. Large blockholders can mitigate the risk of managerial expropriation through their monitoring role. If blockholders are perceived to be effective monitors, then their presence will encourage additional risk arbitrage.[2]

Based on the above analysis, we posit that blockholders will increase the amount of firm-specific information in stock prices relative to market- and industry-level information. Blockholders have an informational advantage over less-informed and diffusely-distributed stockholders and this advantage should reveal itself in the firm-specific (or idiosyncratic) component of stock returns. In addition to assessing the information role of total block ownership, our database also allows us to test for differences between inside blockholders (managers, directors, and affiliated entities) and outside blockholders. While inside blockholders generally have an informational advantage over outside blockholders, insiders might also be more constrained from trading on this information relative to outsiders.[3] Consequently, the relative impact of inside and outside blockholders is an open empirical question.[4]

Previous empirical studies that investigate block ownership often suffered from biased or insufficient data. Dlugosz et al. (2006) show that the widely-available Compact Disclosure database contains a large number of mistakes that tend to overstate the level of reported block ownership. The hand-collected alternative leads to a lack of standardization and, because of the time required to clean such data on a firm-by-firm basis, relatively small sets of data both in terms of the number of firms and years that are covered. We overcome these potential shortcomings by using the standardized database that Dlugosz et al. (2006) have recently made available. This database covers six calendar years (1996–2001) and contains over 1900 unique firms.

In addition to clean blockholder data, our empirical analysis requires a proxy for firm-specific information. We use three measures; the probability of informed trading, idiosyncratic volatility, and stock return synchronicity (henceforth synchronicity). Our first measure, the probability of informed trading, captures the likelihood of trading against an informed trader in possession of superior firm-specific information, as opposed to market- or industry-wide information (Easley et al., 1996).[5] If ownership structure impacts the firm's information environment as we hypothesize, then there should exist a positive relation between the level of block ownership and the probability of informed trading.

Our second proxy, idiosyncratic volatility, measures the firm-specific component of stock returns after controlling for market and industry factors. Consistent with our information environment hypothesis, we posit a positive relation between the level of block ownership and the firm's idiosyncratic volatility. Informed blockholders enhance the quality and quantity of firm-specific information which, in turn, leads to higher idiosyncratic volatility. Our third measure, synchronicity, captures the proportion of total stock return variation attributable to market- and industry-level factors (Morck et al., 2000). Synchronicity, or R^2, has been used in numerous studies to separate the firm-specific component from the combined market and industry components of stock returns.[6] The higher the firm's synchronicity, the less firm-specific information is impounded into the firm's stock price (Roll, 1988; French and Roll, 1986). We therefore expect an inverse relation between block ownership and synchronicity.[7]

Our empirical findings support the hypothesis that block ownership plays a significant role in the secondary market by impounding firm-specific information into stock prices. After controlling for market-, industry-, and firm-level variables, we find that the presence of blockholders increases the probability of informed trading. This positive and significant relation holds for both inside and outside blockholders, but is insignificant for blocks controlled by employee stock ownership plans (ESOPs). The latter result makes it clear that it is not blockholding, per se, that causes an increase in the probability of informed trading, but blockholding by owners with the information and incentive to trade on that information.

Our idiosyncratic volatility and synchronicity results are also supportive of the hypothesized relation between block ownership and firm-specific information. Block ownership increases idiosyncratic volatility and reduces synchronicity after controlling for market-, industry-, and firm-level factors. The positive and significant relation between block ownership and idiosyncratic volatility holds for both inside and outside blockholders, and is insignificant for blocks controlled by ESOPs. The negative relation between block ownership and synchronicity exhibits the same pattern; it is significant for both inside and outside blockholders and insignificant for ESOPs.

We perform additional tests to check for consistency across time and to address endogeneity issues. We find that the relation between block ownership and firm-specific information is persistent throughout our sample period. We also show that our main empirical findings are unaltered using lagged block ownership values, a change-in-variables model, and a firm fixed effects model.

Overall, our study investigates the information role of block ownership in the capital markets. While previous studies provide mixed results on the relation between institutional holdings and the firm-specific component of stock returns, we find a robust relation between block ownership and the amount of firm-specific

[2] Although most agency models require blockholder intervention, or the credible threat thereof, to have any impact on pricing efficiency, Edmans (2007) shows that blockholders can affect stock prices even when their ownership interest is too small to implement disciplinary actions against management. Edmans' model focuses on informed trading, rather than managerial intervention. Because blockholders have an advantage in the collection of costly information, "blockholders should be associated with more efficient prices (p. 30)."

[3] See Huang and Xu (forthcoming) for a discussion of the effects of trading restrictions.

[4] It is relatively straightforward to rank our blockholding groups according to their access to firm-specific information (i.e., insiders are first, followed by outsiders and ESOPs). Besides their access to information, it might also be useful to divide our blockholders into active versus inactive groups. Although such a partition can be difficult for insiders and outsiders, ESOPs most certainly constitute an inactive group. We therefore expect ESOPs to contribute little to stock price informativeness.

[5] The probability of informed trading (PIN) model, and its variants, has been widely used in empirical studies that require a measure of private information. See, for example, Easley et al. (1997), Easley et al. (1998) and Easley et al. (2002).

[6] See, for example, Wurgler (2000), Durnev et al. (2003), Durnev et al. (2004), Li et al. (2004) and Jin and Myers (2006).

[7] Our second and third proxies for firm-specific information are motivated by Durnev et al. (2003), who show that greater idiosyncratic volatility and lower return synchronicity are related to more firm-specific information impounded into stock prices. Although the second and third firm-specific information proxies are not independent measures, idiosyncratic volatility is an absolute measure while synchronicity is a relative measure (i.e., firm-specific volatility as a percent of total volatility).

information incorporated into prices. Inside and (especially) outside blockholders increase the firm-specific information, while passive blockholders (i.e., ESOPs) have no impact on the firm-specific component of stock returns. These results are robust across different measures of firm-specific information, including the probability of informed trading, idiosyncratic volatility, and synchronicity. Our results support the contention that ownership structure plays a significant role in shaping the firm's information environment.

Our study is related to Piotroski and Roulstone (2004) and Heflin and Shaw (2000). Piotroski and Roulstone (2004) show that insider trading has a significant impact on the firm-specific component of stock returns while analyst forecasts have a significant impact on the industry component of returns. They do not find a consistent relation between institutional holdings and stock return synchronicity, nor do they analyze the role of blockholders. Heflin and Shaw (2000) provide indirect evidence on the relation between concentrated ownership and the firm-specific component of stock returns. They document an inverse relation between block ownership and firm-level liquidity; that is, higher levels of ownership concentration are associated with wider bid-ask spreads, thinner depths, and larger adverse selection components. These liquidity results are suggestive of a link between blockholding and firm-specific information.

The paper proceeds as follows. In the next section, we describe our data and methods of analysis. In Section 3, we present our empirical findings and discuss various robustness tests. In Section 4, we summarize and conclude our study.

2. Data and methods of analysis

Our sample includes the six-year period beginning in 1996 and ending in 2001. We require data from several sources for this study. The block ownership data are from the blockholding database constructed by Dlugosz et al. (2006). The probability of informed trading (PIN) measures are from Soeren Hvidkjaer's website, and the Fama–French 48 industry returns are from Kenneth French's website.[8] We use the I/B/E/S database to find the number of analysts covering each firm, and the CRSP database to obtain such firm characteristics as stock returns, share prices, number of shares outstanding, trading volume, and SIC codes.

We use Compustat to construct additional firm characteristics including the volatility of the firm's earnings, the correlation of the firm's earnings with industry-level earnings, and the industry concentration of the firm's primary business. We define STDROA as the standard deviation of return on assets over the previous 12 quarters; ROACORR is the correlation between industry-average return on assets and the firm's return on assets over the previous 12 quarters; and HINDEX is the Herfindahl index for industry concentration based on sales (see Morck et al., 2000).

The objective of our research design is to measure the effect of blockholder ownership on firm-specific information. We use three dependent variables to proxy for firm-specific information; the probability of informed trading, idiosyncratic volatility, and synchronicity. The probability of informed trading is defined as

$$\frac{\alpha\mu}{(\alpha\mu + 2\varepsilon)}, \tag{1}$$

where α is the probability of an information event, μ represents the order arrival of informed traders, and ε corresponds to the order arrival of uninformed traders. This probability measure is derived from a trading model that represents informed and uniformed order arrivals as a combined Poisson process (see Easley et al., 2002).

We construct the idiosyncratic volatility and synchronicity measures by regressing weekly stock returns on contemporanous and lagged market returns, as well as contemporanous and lagged industry returns. We estimate calender-year regressions for each firm in our sample as follows:[9]

$$\mathrm{RET}_{i,t} = \gamma_0 + \gamma_1 \mathrm{MKTRET}_t + \gamma_2 \mathrm{MKTRET}_{t-1} + \gamma_3 \mathrm{INDRET}_t + \gamma_4 \mathrm{INDRET}_{t-1} + \varepsilon_{i,t}. \tag{2}$$

Our industry classification is based on Fama and French's (1997) 48 industry scheme. Our idiosyncratic volatility (IVOL) measure is the standard deviation of the firm's residuals ($\varepsilon_{i,t}$) from the above regression.

We follow Morck et al. (2000) and define the firm's synchronicity as

$$\mathrm{SYNCH}_{i,t} = \log\left(\frac{R^2}{1 - R^2}\right), \tag{3}$$

where R^2 is the firm's coefficient of determination from Eq. (2). The purpose of the log transformation is to replace a bounded dependent variable ($0 \leqslant R^2 \leqslant 1$) with an unbounded continous variable. We estimate these three firm-specific variables for each firm-year in our sample. The probability of informed trading and idiosyncratic volatility measures are positively related to price informativeness, while the synchronicity measure is negatively related to price informativeness (Durnev et al., 2003). While IVOL provides an absolute measure of firm-specific volatility, SYNCH provides a relative measure of firm-specific volatility.

We isolate the effect of blockholding on firm-specific information by including several control variables that have been used as information proxies in previous research (Morck et al., 2000; Heflin and Shaw, 2000; Piotroski and Roulstone, 2004; Jin and Myers, 2006). We include firm attributes such as size (MKTCAP), turnover (TURN), and return-on-asset volatility (STDROA). Firm size is frequently used as a control variable for the information environment of the firm. Because there tends to be more publically-available information for larger firms, we expect a lower probability of informed trading and less firm-specific information for larger firms (Easley et al., 2002). Turnover is a measure of the firm's trading activity. An actively-traded firm is more likely to impound both market- and firm-specific information into its prices. We include asset return volatility to control for the firm's operating efficiency.

Next, we control for the the firm's external environment by including the number of analysts following the company (ANALYST), an indicator variable for S&P 500 Index membership (S&P 500), and a second indicator variable for regulated-industry membership (REG).[10] Piotroski and Roulstone (2004) show that the firm's information environment is influenced significantly by industry-level information. We include the Herfindahl index for the firm's primary business (HINDEX), the number of firms in the industry (NIND), and the correlation of the firm's earnings with industry-wide earnings (ROACORR), following Piotroski and Roulstone (2004) and Morck et al. (2000). Piotroski and Roulstone (2004) find that the number of analysts following a firm significantly affects intra-industry information transfers.

3. Empirical results

3.1. Descriptive statistics

We report descriptive statistics in Table 1 for the firm-specific information measures, block ownership variables, and control

[8] Our empirical analysis uses merged databases of Dlugosz et al. (2006) and Hvidkjaer. Since Hvidkjaer's PIN data do not include Nasdaq firms, our merged data set is limited to NYSE and AMEX firms.

[9] We include lagged market and industry returns to account for possible non-synchronous trading (Dimson, 1979).

[10] A firm is in a regulated industry if its beginning two-digit SIC code is 49 or 62.

Table 1
Descriptive statistics for block ownership and control variables

	1996	1997	1998	1999	2000	2001
Panel A: Descriptive statistics by year						
Block ownership variables						
Block ownership (%)	21.45	21.36	23.68	24.02	25.37	24.93
Number of block holders	2.09	2.11	2.33	2.37	2.53	2.49
Block ownership – insiders (%)	5.26	5.09	5.65	5.41	5.57	5.65
Block ownership – ESOP (%)	1.46	1.51	1.07	1.09	1.25	1.19
Block ownership – outsiders (%)	14.52	14.76	16.97	17.52	18.56	18.09
Price informativeness variables						
Probability of informed trading (%)	15.71	13.84	13.23	12.95	13.13	14.17
Idiosyncratic volatility (% per week)	3.42	3.38	4.76	5.19	5.79	4.94
R^2 (%)	31.77	32.33	39.98	27.52	31.32	36.62
Control variables						
Market capitalization ($ billion)	4.38	5.04	5.81	6.62	5.96	6.99
Turnover (% per year)	80.41	86.97	98.85	102.22	117.47	127.23
Number of analysts	11.73	11.46	11.34	11.41	9.94	9.02
REG	0.13	0.13	0.11	0.12	0.11	0.11
NIND	281.18	286.34	295.79	286.29	279.64	256.84
ROACORR	0.20	0.20	0.17	0.19	0.20	0.19
STDROA (%)	1.26	1.08	1.22	1.35	1.38	1.33
HINDEX (%)	6.21	5.98	5.75	6.02	6.42	6.98
Number of stocks	870	803	1019	930	883	835
	Block ownership portfolios					
	0%	<10%	<15%	<25%	<50%	>50%
Panel B: Descriptive statistics by block ownership						
Block ownership variables						
Block ownership (%)	0.00	6.97	12.65	19.82	35.03	62.25
Number of block holders	0.00	1.00	1.64	2.38	3.53	3.97
Block ownership – insiders (%)	0.00	0.94	1.89	2.23	8.04	23.14
Block ownership – ESOP (%)	0.00	0.89	1.46	1.58	1.67	1.23
Block ownership – outsiders (%)	0.00	5.14	9.30	16.01	25.31	37.88
Price informativeness variables						
Probability of informed trading (%)	11.14	12.19	12.97	13.36	14.86	18.79
Idiosyncratic volatility (% per week)	3.17	3.94	4.48	4.74	5.13	5.21
R^2 (%)	44.07	38.80	36.68	32.56	28.77	22.89
Control variables						
Market capitalization ($billion)	16.49	7.43	6.72	4.46	2.76	1.40
Turnover (% per year)	83.81	107.56	116.68	114.68	104.27	67.46
Number of analysts	15.37	13.14	12.26	11.01	8.80	5.59
REG	0.37	0.21	0.12	0.08	0.03	0.01
NIND	305.42	290.93	280.86	284.47	270.80	267.43
ROACORR	0.24	0.20	0.21	0.19	0.18	0.14
STDROA (%)	0.92	1.04	1.22	1.33	1.42	1.49
HINDEX (%)	4.84	5.66	6.16	6.30	6.87	6.72

This table presents the descriptive statistics for block ownership and control variables. Block ownership data are from Dlugosz et al. (2006). The sample period is from 1996 to 2001. Our sample includes only NYSE and AMEX stocks. Market capitalization, share price, turnover, and SIC codes are from CRSP. The data on probability of informed trading are from Soren Hvidkjaer's website. Idiosyncratic volatility and R^2 are calculated using weekly returns from regression equation (2). The number of analysts covering each firm is from I/B/E/S. REG is a dummy variable for regulated industries that takes the value of 1 if the firm's first two-digit SIC code is 49 or 62. NIND is the number of firms in each industry by the Fama–French 48 industry classification. STDROA is the standard deviation of the return on asset over the past 12 quarters. ROACORR is the correlation between industry-average return on asset and firm's return on asset over the past 12 quarters. HINDEX is the Herfindahl index for industry concentration based on sales.

variables. We observe in Panel A that total block ownership ranges from an average of 21.36% of shares outstanding in 1997 to 25.37% in 2000, while the average number of blockholders varies from 2.09 in 1996 to 2.53 in 2000. Inside blockholders account for 5.09–5.65%t of total block ownership, and ESOPs hold between 1.07% and 1.51% of shares outstanding. Outside blockholders, on the other hand, own between 14.52 and 18.56% of shares outstanding, roughly three times the percentage held by insiders. Overall, block ownership represents a large and increasing segment of publicly-traded firms. These figures actually understate the significance of block ownership since the sample is weighted toward larger firms.

The average probability of informed trading reaches its highest value (15.71%) in 1996 and its lowest value (12.95%) in 1999. These estimates indicate that 13–16% of all trades originate from informed traders. Idiosyncratic volatility reaches a low of 3.38% (per week) in 1997 and a high of 5.79% in 2000. Our synchronicity measure of firm-specific information shows considerable variation from a low of 27.52% in 1999 to a high of 39.98% in 1998, implying that firm-specific information drives 60–72% of stock return variation. Although idiosyncratic volatility and synchronicity are related measures, they capture different aspects of the firm-specific information.[11]

[11] Idiosyncratic volatility is a measure of firm-specific risk, while synchronicity measures the relation between firm-specific variation and total variation. Idiosyncratic volatility reaches its highest (lowest) value in 2000 (1997), while synchronicity reaches its lowest (highest) value in 1999 (1998). These asynchronous results confirm that each measure captures a different aspect of firm-specific information.

In Panel B, we report descriptive statistics for block ownership portfolios. For each portfolio, we calculate the time-series mean of six yearly cross-sectional averages. The first column includes firms with no blockholding. The next five columns include firms with 5–10%, 10–15%, 15–25%, 25–50%, and greater than 50% blockholding, respectively. These preliminary results are consistent with our hypothesized relation between block ownership and firm-specific information. The probability of informed trading increases monotonically from 11.14% for the lowest blockholding category to 18.79% for the highest blockholding category. Idiosyncratic volatility follows the same pattern across blockholding categories ranging from a low of 3.17% to a high of 5.21%. Synchronicity is inversely related to blockholding, as expected. We find the highest level of synchronicity (44.07%) in the zero block ownership category. Synchronicity values fall monotonically with increasing levels of block ownership.

Most of our control variables display distinct patterns across the blockholding categories. There is an inverse relation between block ownership and firm size, number of analysts, regulated industry membership, number of firms in the industry, and the correlation between firm and industry asset returns. There is a positive relation between block ownership and the return on asset volatility, as well as between block ownership and industry concentration. Turnover, in contrast, displays an inverted U shape across the blockholding categories.

3.2. Block ownership and firm-specific information

Next, we examine the impact of block ownership on our three measures of firm-specific information, the probability of informed trading, idiosyncratic volatility, and synchronicity. Specifically, we estimate the following regression model:

$$\begin{aligned}\text{FirmSpecificInformation}_{i,t} = {} & \alpha + \beta \times \text{BlockOwnership}_{i,t} \\ & + \sum_{j=1}^{N} \delta_j \times \text{FirmSpecificControls}^{j}_{i,t} \\ & + \sum_{k=1}^{M} \gamma_k \times \text{IndustryControls}^{k}_{i,t} \\ & + \sum_{l=1}^{5} \lambda_l \times \text{YearDummy}^{l}_{i,t} + \varepsilon_{i,t}, \qquad (4)\end{aligned}$$

where i represents the firm and t represents the year. FirmSpecificInformation is the probability of informed trading (PIN), idiosyncratic volatility (IVOL), or synchronicity (SYNCH). We normalize

Table 2
Regressions of probability of informed trading, idiosyncratic volatility, and stock return synchronicity on block ownership

	Dependent variable					
	PIN	PIN	IVOL	IVOL	SYNCH	SYNCH
Intercept	0.277	0.279	−4.055	−3.887	−3.780	−3.802
	(32.17)	(29.64)	(−46.62)	(−43.07)	(−18.57)	(−16.30)
BLKIN	0.008	0.007	0.083	0.056	−0.046	−0.022
	(7.64)	(7.00)	(10.17)	(7.10)	(−2.45)	(−1.19)
BLKESOP	0.001	0.001	0.001	0.001	−0.002	−0.005
	(0.95)	(0.99)	(0.05)	(0.08)	(−0.08)	(−0.25)
BLKOUT	0.008	0.007	0.082	0.049	−0.072	−0.048
	(11.68)	(10.30)	(10.02)	(6.53)	(−4.13)	(−2.72)
Log MKTCAP	−0.013	−0.01	−0.095	−0.110	0.256	0.274
	(−15.22)	(−15.68)	(−9.61)	(−12.07)	(10.46)	(11.56)
Log TURN	−0.004	−0.005	0.365	0.314	0.016	0.063
	(−2.98)	(−3.79)	(26.47)	(24.27)	(0.50)	(1.98)
S&P 500	−0.002	−0.003	−0.009	−0.021	0.053	0.043
	(−1.42)	(−1.60)	(−0.42)	(−1.09)	(1.02)	(0.85)
Log ANALYST	−0.010	−0.010	−0.078	−0.052	0.238	0.205
	(−6.82)	(−6.40)	(−5.10)	(−3.56)	(6.28)	(5.45)
Log STDROA	−0.001	−0.001	0.044	0.050	−0.090	−0.108
	(−2.14)	(−1.99)	(6.84)	(8.02)	(−5.46)	(−6.48)
REG		−0.006		−0.284		0.187
		(−2.67)		(−9.11)		(2.47)
Log NIND		0.002		0.072		−0.119
		(2.27)		(6.64)		(−4.55)
ROACORR		0.003		−0.008		0.153
		(2.01)		(−0.48)		(3.63)
Log HINDEX		0.001		0.053		−0.073
		(1.06)		(3.16)		(−1.75)
Year dummies	Included	Included	Included	Included	Included	Included
Coefficient tests						
BLKIN = BLKESOP	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p = 0.30$
BLKOUT = BLKESOP	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p = 0.01$
BLKIN = BLKOUT	$p = 0.65$	$p = 0.55$	$p = 0.75$	$p = 0.24$	$p = 0.11$	$p = 0.12$
Adj. R^2	0.52	0.52	0.57	0.62	0.38	0.40

This table presents the results for regressions of probability of informed trading, idiosyncratic volatility, and stock return synchronicity on block ownership. Block ownership data are from Dlugosz et al. (2006). The sample period is from 1996 to 2001. Our sample includes only NYSE and AMEX stocks. The dependent variable in Panel A is probability of informed trading (PIN), which are obtained from Soren Hvidkjaer's website. Idiosyncratic volatility (IVOL) and stock return synchronicity (SYNCH) are calculated using weekly returns from regression equation (2). BLKIN is the total ownership by inside block holders, which include officers, directors, and affiliates. BLKOUT is the ownership by outside block holders. BLKESOP is the ownership by employee stock option plans. Block ownership variables are normalized each year by their respective cross-sectional standard deviations. Market capitalization (MKTCAP), turnover (TURN), SIC codes, returns are from CRSP. The number of analysts covering each firm is from I/B/E/S. SP500 is a dummy variable for S&P 500 index membership. REG is a dummy variable for regulated industries that takes the value of 1 if the firm's first two-digit SIC code is 49 or 62. NIND is the number of firms in each industry by the Fama–French 48 industry classification. STDROA is the standard deviation of the return on asset over the past 12 quarters. ROACORR is the correlation between industry-average return on asset and firm's return on asset over the past 12 quarters. HINDEX is the Herfindahl index for industry concentration based on sales. Numbers in parentheses are t-statistics based on Rogers (1993) robust standard errors.

the block ownership variables by their respective cross-sectional standard deviations in each year. This allows us to make meaningful comparisons across the coefficients for different types of block ownership. To account for clustering by firm, we estimate the standard errors of regression coefficients by using the Rogers (1993) clustered standard errors.

Table 3
Probability of informed trading, idiosyncratic volatility, stock return synchronicity, and block ownership – year-by-year results

	1996	1997	1998	1999	2000	2001
Panel A: Probability of informed trading						
Intercept	0.295	0.208	0.222	0.273	0.243	0.309
	(21.72)	(12.60)	(16.82)	(22.25)	(16.42)	(23.15)
BLKIN	0.007	0.010	0.008	0.007	0.009	0.007
	(5.75)	(6.97)	(6.80)	(6.79)	(6.54)	(6.03)
BLKESOP	0.000	0.001	0.002	0.000	−0.001	−0.001
	(0.33)	(0.68)	(1.69)	(0.30)	(−0.58)	(−0.38)
BLKOUT	0.008	0.009	0.008	0.006	0.008	0.007
	(6.81)	(6.43)	(6.85)	(5.24)	(5.96)	(5.47)
Log MKTCAP	−0.018	−0.010	−0.011	−0.014	−0.011	−0.016
	(−11.73)	(−5.58)	(−7.75)	(−10.98)	(−7.34)	(−11.87)
Log TURN	−0.004	0.001	−0.002	−0.008	−0.002	−0.008
	(−1.71)	(0.59)	(−1.03)	(−4.49)	(−0.89)	(−4.14)
S&P 500	−0.002	−0.013	−0.000	−0.002	−0.001	0.002
	(−0.67)	(−3.46)	(−0.12)	(−0.59)	(−0.20)	(0.66)
Log ANALYST	−0.004	−0.006	−0.011	−0.008	−0.015	−0.013
	(−1.68)	(−2.19)	(−4.86)	(−3.58)	(−5.77)	(−5.53)
Log STDROA	−0.001	−0.002	−0.003	−0.001	0.001	−0.002
	(−1.19)	(−1.31)	(−2.80)	(−0.88)	(0.73)	(−1.47)
Adj. R^2	0.54	0.40	0.43	0.55	0.47	0.64
Panel B: Logarithm idiosyncratic volatility						
Intercept	−4.089	−4.461	−4.170	−4.082	−3.741	−2.852
	(−32.47)	(−33.59)	(−32.72)	(−30.67)	(−27.99)	(−17.81)
BLKIN	0.100	0.089	0.094	0.083	0.079	0.059
	(8.70)	(7.92)	(8.41)	(7.03)	(6.49)	(4.08)
BLKESOP	0.005	0.004	−0.011	−0.022	0.014	0.013
	(0.49)	(0.42)	(−1.02)	(−2.05)	(1.25)	(0.87)
BLKOUT	0.060	0.086	0.087	0.079	0.088	0.074
	(5.35)	(7.83)	(7.93)	(6.78)	(7.27)	(5.07)
Log MKTCAP	−0.096	−0.053	−0.078	−0.055	−0.093	−0.172
	(−6.75)	(−3.58)	(−5.78)	(−4.05)	(−7.03)	(−10.37)
Log TURN	0.392	0.391	0.409	0.409	0.354	0.271
	(20.04)	(19.23)	(20.77)	(20.07)	(17.18)	(11.49)
S&P 500	−0.033	−0.008	−0.038	−0.026	−0.015	0.031
	(−1.08)	(−0.26)	(−1.23)	(−0.77)	(−0.44)	(0.75)
Log ANALYST	−0.087	−0.112	−0.071	−0.117	−0.051	−0.036
	(−3.90)	(−4.68)	(−3.14)	(−5.07)	(−2.20)	(−1.28)
Log STDROA	0.050	0.031	0.031	0.049	0.034	0.065
	(5.08)	(2.98)	(3.12)	(4.76)	(3.26)	(5.05)
Adj. R^2	0.57	0.51	0.50	0.50	0.44	0.47
Panel C: Stock return synchronicity						
Intercept	−3.980	−3.843	−3.230	−4.116	−4.079	−3.200
	(−12.79)	(−10.27)	(−10.56)	(−10.50)	(−10.02)	(−8.25)
BLKIN	−0.090	−0.094	0.015	−0.043	−0.025	−0.045
	(−3.17)	(−2.96)	(0.55)	(−1.25)	(−0.68)	(−1.28)
BLKESOP	0.018	0.029	0.000	−0.015	−0.040	−0.013
	(0.68)	(1.00)	(0.02)	(−0.48)	(−1.17)	(−0.38)
BLKOUT	−0.121	−0.115	0.018	−0.076	−0.087	−0.072
	(−4.40)	(−3.73)	(0.68)	(−2.22)	(−2.36)	(−2.02)
Log MKTCAP	0.302	0.279	0.190	0.244	0.308	0.241
	(8.62)	(6.66)	(5.87)	(6.14)	(7.66)	(6.00)
Log TURN	0.016	−0.064	0.091	−0.003	−0.054	0.102
	(0.33)	(−1.12)	(1.92)	(−0.04)	(−0.86)	(1.79)
S&P 500	0.161	−0.003	−0.098	0.042	0.176	0.099
	(2.15)	(−0.04)	(−1.32)	(0.43)	(1.73)	(1.00)
Log ANALYST	0.154	0.249	0.217	0.307	0.243	0.195
	(2.80)	(3.70)	(3.99)	(4.52)	(3.43)	(2.89)
Log STDROA	−0.104	−0.135	−0.089	−0.099	−0.116	0.017
	(−4.28)	(−4.63)	(−3.78)	(−3.28)	(−3.67)	(0.55)
Adj. R^2	0.48	0.40	0.24	0.34	0.38	0.32

This table presents the results for regressions of probability of informed trading, idiosyncratic volatility, and stock return synchronicity on block ownership. Block ownership data are from Dlugosz et al. (2006). The sample period is from 1996 to 2001. Our sample includes only NYSE and AMEX stocks. BLKIN is the total ownership by inside block holders, which include officers, directors, and affiliates. BLKOUT is the ownership by outside block holders. BLKESOP is the ownership by employee stock option plans. Block ownership variables are normalized each year by their respective cross-sectional standard deviations. The data on probability of informed trading (PIN) are from Soren Hvidkjaer's website. Market capitalization (MKTCAP), turnover (TURN), SIC codes, returns are from CRSP. Idiosyncratic volatility (IVOL) and stock return synchronicity (SYNCH) are calculated using weekly returns from regression equation (2). The number of analysts covering each firm is from I/B/E/S. SP500 is a dummy variable for S&P 500 index membership. STDROA is the standard deviation of the return on asset over the past 12 quarters. Numbers in parentheses are *t*-statistics.

Table 4
Probability of informed trading, idiosyncratic volatility, stock return synchronicity, and lagged block ownership

	Dependent variable		
	PIN	IVOL	SYNCH
Intercept	0.275	−3.652	−2.787
	(27.97)	(−33.39)	(−12.08)
Lagged BLKIN	0.008	0.066	−0.039
	(7.16)	(7.21)	(−1.91)
Lagged BLKESOP	0.000	−0.004	−0.010
	(0.56)	(−0.37)	(−0.42)
Lagged BLKOUT	0.007	0.074	−0.086
	(9.34)	(8.62)	(−4.78)
Log MKTCAP	−0.013	−0.118	0.273
	(−13.86)	(−10.05)	(10.02)
Log TURN	−0.006	0.327	0.013
	(−4.27)	(20.64)	(0.37)
S&P 500	−0.003	0.031	−0.009
	(−1.47)	(1.29)	(−0.16)
Log ANALYST	−0.011	−0.059	0.236
	(−6.99)	(−3.41)	(5.86)
Log STDROA	−0.001	0.051	−0.084
	(−1.17)	(6.92)	(−4.60)
Year dummies	Included	Included	Included
Adj. R^2	0.52	0.50	0.44

This table presents the results for regressions of probability of informed trading, idiosyncratic volatility, and stock return synchronicity on lagged block ownership. Block ownership data are from Dlugosz et al. (2006). The sample period is from 1996 to 2001. Our sample includes only NYSE and AMEX stocks. BLOCK is the total block ownership. BLKIN is the total ownership by inside block holders, which include officers, directors, and affiliates. BLKOUT is the ownership by outside block holders. BLKESOP is the ownership by employee stock option plans. Block ownership variables are normalized each year by their respective cross-sectional standard deviations. The data on probability of informed trading (PIN) are from Soren Hvidkjaer's website. Market capitalization (MKTCAP), turnover (TURN), SIC codes, returns are from CRSP. Idiosyncratic volatility (IVOL) and stock return synchronicity (SYNCH) are calculated using weekly returns from regression equation (2). The number of analysts covering each firm is from I/B/E/S. SP500 is a dummy variable for S&P 500 index membership. STDROA is the standard deviation of the return on asset over the past 12 quarters. Numbers in parentheses are *t*-statistics based on Rogers (1993) robust standard errors.

Table 5
Changes in probability of informed trading, idiosyncratic volatility, stock return synchronicity, and changes in block ownership

	Dependent variable		
	ΔPIN	ΔIVOL	ΔSYNCH
Intercept	0.009	−0.195	0.311
	(5.77)	(−16.56)	(7.98)
ΔBLKIN	0.076	0.381	−0.352
	(7.27)	(4.59)	(−1.71)
ΔBLKESOP	0.030	−0.048	0.095
	(1.36)	(−0.24)	(1.70)
ΔBLKOUT	0.059	0.279	−0.324
	(8.51)	(5.46)	(−2.14)
ΔLog MKTCAP	−0.012	−0.135	0.291
	(−9.66)	(−13.18)	(10.18)
ΔLog TURN	0.002	0.343	−0.119
	(0.86)	(24.79)	(−2.99)
ΔS&P 500	−0.004	0.029	0.115
	(−1.46)	(1.21)	(1.82)
ΔLog ANALYST	−0.012	−0.082	0.246
	(−6.47)	(−5.53)	(5.76)
ΔLog STDROA	−0.002	0.037	−0.003
	(−2.44)	(5.06)	(−0.14)
Year dummies	Included	Included	Included
Adj. R^2	0.29	0.47	0.27

This table presents the results for regressions of changes in probability of informed trading, idiosyncratic volatility, and logarithm R^2 on changes in block ownership. Block ownership data are from Dlugosz et al. (2006). The sample period is from 1996 to 2001. Our sample includes only NYSE and AMEX stocks. BLOCK is the total block ownership. BLKIN is the total ownership by inside block holders, which include officers, directors, and affiliates. BLKOUT is the ownership by outside block holders. BLKESOP is the ownership by employee stock option plans. The data on probability of informed trading (PIN) are from Soren Hvidkjaer's website. Market capitalization (MKTCAP), turnover (TURN), SIC codes, returns are from CRSP. Idiosyncratic volatility (IVOL) and stock return synchronicity (SYNCH) are calculated using weekly returns from regression equation (2). The number of analysts covering each firm is from I/B/E/S. SP500 is a dummy variable for S&P 500 index membership. STDROA is the standard deviation of the return on asset over the past 12 quarters. Numbers in parentheses are *t*-statistics based on Rogers (1993) robust standard errors.

3.2.1. Panel regression results

We report regression results for the probability of informed trading (PIN) and block ownership in the first two columns of Table 2. We divide total block ownership into inside, outside, and ESOP block ownership. The coefficient for inside block ownership (0.008) is positive and significant, the coefficient for ESOP block ownership (0.001) is insignificant, and the coefficient for outside block ownership (0.008) is positive and significant. Both inside and outside block ownership increase the probability of informed trading even after controlling for alternative sources of firm-specific information, while ESOP ownership has no measurable effect on informed trading. We find similar results after including additional industry-related control variables (in the second column). The coefficient for inside block ownership (0.007) is positive and significant, the coefficient for ESOPs (0.0001) is insignificant, and the coefficient for outside block ownership (0.007) is positive and significant.

We report test results for equivalence among the block ownership coefficients at the bottom of Table 2. We expect both inside and outside blockholders to contribute more to the probability of informed trading than ESOP block ownership. We also expect that the higher trading activity of outside blockholders will impact the probability of informed trading by more than the restrictive trading activity of insider blockholders.[12] Consistent with expectations, both inside and outside block ownership are both significantly different from ESOP block ownership. However, outside block ownership is not significantly different from inside block ownership.

We report regression results for idiosyncratic volatility (IVOL) and block ownership in the middle two (i.e., third and forth) columns of Table 2. In the third column, the coefficient for inside block ownership (0.083) is positive and significant, as is the coefficient for outside block ownership (0.0082). The coefficient for ESOP block ownership (0.001) is slightly positive but still insignificant. Similar to the probability of informed trading regressions, both inside and outside block ownership increase the amount of firm-specific information in stock prices while ESOP ownership has no measurable effect. We confirm these results in the forth column after including additional industry-related control variables.[13] The coefficients for inside and outside block ownership (0.056 and 0.049, respectively) are positive and significant, while the ESOP coefficient (0.001) is insignificant.

Our tests for equivalence among the IVOL coefficients at the bottom of Table 2 show that inside and outside block ownership are significantly different from ESOP block ownership. We do not find significant differences between inside and outside block ownership. These are the same results that we obtained for the PIN coefficients.

We turn now to our third measure of firm-specific information, synchronicity. In the fifth column of Table 4, the coefficient for inside block ownership (−0.049) is negative and significant, the coef-

[12] Our data confirm that trading by outside blockholders is roughly five times more active than trading by inside blockholders.

[13] Our IVOL results are also robust to the inclusion of systematic volatility, defined as either market volatility or total volatility minus idiosyncratic volatility, as an additional control variable.

Table 6
Probability of informed trading, idiosyncratic volatility, stock return synchronicity, and block ownership – fixed effects models

	Dependent variable		
	PIN	IVOL	SYNCH
BLKIN	0.007	0.033	−0.075
	(4.45)	(2.88)	(−2.04)
BLKESOP	0.001	0.001	0.015
	(0.64)	(0.16)	(0.59)
BLKOUT	0.009	0.020	−0.017
	(8.99)	(2.81)	(−0.74)
Log MKTCAP	−0.012	−0.190	0.240
	(−7.87)	(−17.75)	(6.83)
Log TURN	0.005	0.306	−0.120
	(3.02)	(24.59)	(−2.94)
S&P 500	−0.002	0.023	−0.007
	(−0.66)	(1.05)	(−0.10)
Log ANALYST	−0.010	−0.098	0.174
	(−5.24)	(−7.31)	(3.97)
Log STDROA	−0.001	0.022	0.004
	(−0.97)	(3.45)	(0.17)
Year dummies	Included	Included	Included
Stock dummies	Included	Included	Included
Adj. R^2	0.72	0.86	0.70

This table presents the results for regressions of probability of informed trading, idiosyncratic volatility, and logarithm R^2 on block ownership using fixed-effects models. Block ownership data are from Dlugosz et al. (2006). The sample period is from 1996 to 2001. Our sample includes only NYSE and AMEX stocks. BLOCK is the total block ownership. BLKIN is the total ownership by inside block holders, which include officers, directors, and affiliates. BLKOUT is the ownership by outside block holders. BLKESOP is the ownership by employee stock option plans. Block ownership variables are normalized each year by their respective cross-sectional standard deviations. The data on probability of informed trading (PIN) are from Soren Hvidkjaer's website. Market capitalization (MKTCAP), turnover (TURN), SIC codes, returns are from CRSP. Idiosyncratic volatility (IVOL) and stock return synchronicity (SYNCH) are calculated using weekly returns from regression equation (2). The number of analysts covering each firm is from I/B/E/S. SP500 is a dummy variable for S&P 500 index membership. STDROA is the standard deviation of the return on asset over the past 12 quarters. Numbers in parentheses are *t*-statistics based on Rogers (1993) robust standard errors.

ficient for outside block ownership (−0.072) is negative and significant, while the coefficient for ESOP block ownership (−0.002) is insignificant. We obtain similar results in the sixth column after including industry-related control variables, except that the coefficient for inside block ownership (−0.022) is no longer significant at conventional levels. The coefficient for outside block ownership (−0.048) is negative and significant, while the coefficient for ESOP block ownership (−0.005) remains insignificant. Our tests for equivalence among the SYNCH coefficients are similar to those for PIN and IVOL. Overall, the results in Table 2 provide strong evidence in favor of our hypothesis that block ownership increases the degree to which prices reflect firm-specific information.

3.2.2. Year-by-year results

In Table 3, we report annual regression coefficients for each of our firm-specific information proxies. Panel A shows that the level of inside and outside block ownership significantly increases the probability of informed trading in every year from 1996 to 2001. The inside blockholding coefficients vary from 0.007 to 0.010, and the outside blockholding coefficients range from 0.006 to 0.009. Each of the 12 individual coefficients (i.e., six inside and six outside) is statistically significant. We find no discernable time-series pattern. Also consistent with our previous results, ESOP ownership is not significant in any year.

In Panel B of Table 3, we find a similar pattern between idiosyncratic volatility and blockholding. Inside and outside blockholding coefficients are positive and significant in every year. The inside blockholding coefficients vary from 0.059 to 0.100, and the outside blockholding coefficients range from 0.060 to 0.088, with no discernable time-series pattern. The ESOP ownership coefficient is negative and significant in one of the six years (1999).

In Panel C, the results exhibit more variation than the Panel A and B findings. The inside blockholding coefficients are negative and significant in two of the six years, while the outside blockholding coefficients are negative and significant in five of the six years. None of the inside or outside coefficients is positive and significant. The inside and outside coefficients vary from −0.094 to 0.015 and from −0.121 to 0.018, respectively. Consistent with Panels A and B, the ESOP ownership coefficients are insignificant in all sample years. Taken together, our year-by-year results in Table 3 confirm the existence of a persistent relation between blockholding and firm-specific information.

3.3. Robustness tests

In this subsection, we address issues related to endogeneity. It is possible, for example, that a third (unidentified) variable could drive both block ownership and firm-specific information. In this case, block ownership and firm-specific information would be jointly determined by this omitted variable. Another potential concern is reverse causality. Instead of block ownership causing the level of firm-specific information as we claim, it is possible that firm-specific information causes block ownership. Although this issue is always a potential problem, reverse causality is unlikely to drive our results. It is not at all obvious why block owners would be attracted to stocks with higher probabilities of informed trading, higher idiosyncratic volatility, and lower stock return synchronicity. Nevertheless, we conduct three additional tests to address these concerns.

In Table 4, we regress the firm-specific information proxies on lagged block ownership values. Although it is unlikely that reverse causality explains our earlier results, it is even less likely that *contemporanous* firm-specific information (PIN, IVOL or SYNCH) would cause *lagged* block ownership. In the first column, with PIN as the dependent variable, we find a positive and significant coefficient for lagged inside block ownership (0.008), a zero coefficient for lagged ESOP ownership, and a positive and significant coefficient for lagged outside block ownership (0.007). We find similar results in the second column for the IVOL regression. The lagged inside and outside block ownership coefficients (0.066 and 0.074, respectively) are positive and significant, and the lagged ESOP ownership coefficient (−0.004) is insignificant. We find similar, confirmatory evidence for the SYNCH regression in column three.

In Table 5, we regress the changes in the firm-specific information proxies on changes in the explanatory variables. The change-in-variables, or first differencing, approach explicitly considers how changes in block ownership over time affect changes in firm-specific information over the same time period. This model specification reduces concerns about omitted variables in our previous (levels) specification.[14] In the first (second) column of Table 5 based on ΔPIN (ΔIVOL) as the dependent variable, we find a positive and significant coefficient of 0.076 (0.381) for changes in inside block ownership, an insignificant coefficient of 0.030 (−0.048) for changes in ESOP ownership, and a positive and significant coefficient of 0.059 (0.279) for changes in outside block ownership. We find a similar yet weaker pattern in the third column with ΔSYNCH as the dependent variable.

In Table 6, we report our third set of robustness tests using a firm fixed effects model. A fixed effects model is an alternative to the first difference model estimated in Table 5. Although both

[14] According to Wooldridge (2006, p. 475), "differencing panel data over time, in order to eliminate a time-constant unobserved effect, is a valuable method for obtaining causal effects."

models generate unbiased estimators, the fixed effects model is more efficient as long as any omitted variables are serially uncorrelated. Since it is difficult to test for serial correlation in omitted variables, we estimate and compare both models.

The results of our fixed effects model in Table 6 confirm the results of our first difference model in Table 5. For our PIN regression reported in the first column, the inside and outside block ownership coefficients (0.007 and 0.009, respectively) are positive and significant, while the ESOP ownership coefficient (0.001) is insignificant. For our IVOL regression, the inside and outside block ownership coefficients (0.033 and 0.020, respectively) are again positive and significant, while the ESOP ownership coefficient (0.001). For our SYNCH regression, the inside block ownership coefficients (−0.075) is negative and significant, the ESOP ownership coefficient (0.015) is positive and insignificant, and the outside block ownership coefficient (−0.017) is negative but insignificant.

4. Summary and conclusions

The primary purpose of this study is to expand the blockholder literature by analyzing the impact of concentrated ownership on firm-specific information. We hypothesize that blockholders will increase the amount of firm-specific information impounded into stock prices. Both inside and outside blockholders have an informational advantage over uninformed, diffuse stockholders. We expect this informational advantage to reveal itself in the firm-specific (or idiosyncratic) component of stock returns. We construct three firm-specific information proxies using a standardized database and test the impact of block ownership on the firm's information environment.

Our empirical findings strongly support the hypothesis that block ownership has a significant impact on the firm-specific component of stock returns. After controlling for market-, industry-, and firm-level variables, we find that the presence of blockholders increases the probability of informed trading and idiosyncratic volatility. Our synchronicity measure, as expected, is negatively related to block ownership. These significant relationships hold for both inside and outside blockholders, but are insignificant for blocks controlled by employee stock ownership plans (ESOPs). The latter result clarifies that it is not blockholding, per se, that generates firm-specific information, but blockholding by owners with the information and incentive to trade on that information. We confirm these same empirical results for each year in our sample period, as well as for alternative models based on lagged block ownership, changes in block ownership, and firm fixed effects.

Overall, our study contributes to the literature by showing that the firm's ownership structure influences its information environment by increasing the amount of firm-specific information impounded into stock prices. One implication is that ownership concentration can affect the firm's cost of capital through its impact on the probability of trading against an informed trader (Easley et al., 2002) or idiosyncratic volatility (Ang et al., 2006). A second implication is that ownership concentration can affect cross-sectional or time-series variations in R^2 through its impact on stock return synchronicity (Jin and Myers, 2006).

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