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Abstract

This paper examines the association between block ownership and market liquidity. Blockholders are believed to have access to private, value-relevant information via their roles as monitors of firms' operations. Consistent with this, we find that firms with greater blockholder ownership, either by managers or external entities, have larger quoted spreads, effective spreads, adverse selection spread components, and smaller quoted depths.

I. Introduction

We examine the relation between large block ownership and market liquidity. Blockholders, entities holding at least 5% of a firm's outstanding shares, are thought to monitor a firm's operations (Morck, Shleifer, and Vishny (1988)), reducing agency costs and increasing firm value (see e.g., McConnell and Servaes (1990), Barclay and Holderness (1991), and Bethel, Liebeskind, and Opler (1998)). However, blockholder ownership is potentially costly, because their monitoring might provide blockholders with access to private, value-relevant information. Prior research suggests market makers mitigate losses to informed traders by charging wider spreads and reducing the number of shares they offer in response to increases in the probability of informed trading.[1] If blockholders obtain superior information about firm value, potential benefits from blockholder monitoring might be partially offset by reduced liquidity attributable to wider spreads and lower depths.

Examination of block ownership is complicated by the fact that managers, who also are believed to possess private, value-relevant information, sometimes hold large blocks in the firms they manage. We partition total block ownership

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[1]Analytical and empirical research on spreads includes, among others, Amihud and Mendelson (1980), Stoll (1978), (1989), Copeland and Galai (1983), Glosten and Milgrom (1985), Madhavan (1992), Lin, Sanger, and Booth (1995), Madhavan and Smidt (1993), Lee, Mucklow, and Ready (1993), and Huang and Stoll (1997). Lee, Mucklow, and Ready (1993) and Heflin and Shaw (forthcoming) provide empirical evidence regarding the risk of informed trading and depths.

into the percentage of outstanding shares held in large blocks by managers and the percentage held in large blocks by non-managers, allowing us to examine whether both internal *and* external blockholders contribute to information asymmetry and reduced liquidity. Our tests also examine whether aggregate managerial ownership, where no individual manager owns a large block, contributes to reduced liquidity.

Our findings are as follows. We document strong positive relations between the percentage of outstanding shares held by blockholders and i) total quoted (relative) spreads, ii) total effective spreads, and iii) the informed trading component of the effective spread. We also document a strong negative relation between the percentage of outstanding shares held by blockholders and total quoted depths. All of our results hold for both manager and non-manager blockholders, suggesting that both internal and external blockholders contribute to reduced liquidity. Additionally, the results suggest aggregate managerial ownership, even where no individual manager owns a large block, is associated with reduced liquidity.

Our evidence is important in understanding the full impact of ownership structure. Though existing research suggests ownership by blockholders reduces agency costs and increases firm value, our results suggest blockholder ownership is associated with reduced market liquidity.

II. Data

A. Sample

We begin with 349 firms included in the 1988–1989 *Report of the Corporate Information Committee* (CIC) of the Financial Analysts Federation (FAF).[2] A total of 314 firms have transaction data available in the 1988 *Institute for the Study of Securities Markets* (ISSM) database. We collect ownership data directly from proxy statements, deleting two firms for which we cannot locate proxy statements. We delete four more firms, trading as American Depository Receipts, whose proxy statements do not disclose details on share ownership. Since our interest is in blockholders likely to monitor management and possibly trade profitably on superior information, we delete 45 firms whose blocks are held entirely by either employee stock ownership plans, charitable foundations, or trusts. To ensure sufficient observations to yield meaningful variables, we eliminate three firms with less than 100 days of ISSM data, yielding a final sample of 260 firms (259 trading on the New York Stock Exchange and one trading on the American Stock Exchange).

B. Dependent Variables

We eliminate each day's opening transaction (which occurs in a call auction), trades and quotes with reported times outside normal trading hours, non "best bid and offer" quotes, and trades the ISSM reports as other than "regular." Remaining trades and quotes are used to compute dependent variables as follows. The relative

[2]Inclusion in the CIC reports is not germane to this study (we selected the firms first for use in another project), and we address possible selection biases in Section II.D.

bid-ask spread is the ask price minus the bid price, divided by the average of the bid and ask prices. Since many trades occur at prices within quoted bid and ask prices, we measure the effective spread as twice the absolute value of the difference between a transaction price and the midpoint of the bid and ask quotes in effect at the time of the transaction.[3] We delay quotes five seconds relative to transactions to reduce time-stamping errors (Lee and Ready (1991)). Total quoted depth is the sum of the number of shares quoted at the ask and bid prices. Relative and effective spreads and quoted depths are averaged across each firm day and then across each firm's daily means to yield one observation per firm.

Recent research attempts to partition the total effective spread into informed trading, order processing, and inventory holding cost components. To the extent spread decomposition models successfully isolate the informed trading component of the spread, analyses employing an estimated informed trading component should be more powerful than those employing total spreads. We employ Lin, Sanger, and Booth (1995) and Huang and Stoll (1997) estimates, hereafter denoted as LSB and HS, respectively. We obtain LSB adverse selection spread component estimates from estimating the following regression for each firm using ordinary least squares,

$$(1) \qquad \Delta \log[M_{i,t}] \quad = \quad \phi_i(\log[\text{PRICE}_{i,t-1}] - \log[M_{i,t-1}]) + e_{i,t},$$

where Δ denotes a change from the previous quote (prior to a transaction), $M_{i,t}$ is the quoted spread midpoint at time t for firm i, $\text{PRICE}_{i,t-1}$ is the transaction price prior to the quoted spread at time t for firm i, and $e_{i,t}$ is an error term. The coefficient ϕ_i is the LSB estimate of the percentage of the effective spread attributable to informed trading for firm i. The LSB estimate of firm i's adverse selection spread is ϕ_i times the firm's average effective spread.[4]

We obtain HS adverse selection spread component estimates from estimating the following firm-specific regression using ordinary least squares,

$$(2) \qquad \Delta\text{PRICE}_{i,t} \quad = \quad \beta_{1,i}Q_{i,t} + \beta_{2,i}Q_{i,t-1} + \beta_{3,i}Q_{A,t-1} + e_t,$$

where Δ denotes a change from the previous retained trade and $Q_{i,t}$ equals 1 (-1) if the trade at time t was a sell (buy). We classify trades at prices above the prevailing quote midpoint as market maker sells ($Q_{i,t} = 1$) and trades at prices below the prevailing quote midpoint as market maker buys ($Q_{i,t} = -1$). Following HS, trades at the quote midpoint are excluded, and only the last trade in each five-minute interval is employed in constructing the variables in equation (2).[5] We use an "aggregate" buy/sell indicator, $Q_{A,t-1}$, which equals 1 (-1, 0) if the sum of $Q_{i,t-1}$ across all sample stocks is positive (negative, zero) to capture market-wide

[3]Though unreported, we obtain qualitatively similar results when we deflate effective spreads by share price.

[4]All results are qualitatively unchanged when we use the percentage of the effective spread due to adverse selection rather than multiplying this variable by effective spreads.

[5]We also estimated equation (2) by employing a tick test (Lee and Ready (1991)) to classify trades at the spread midpoint. Trades at a price greater than the price at $t-1$ are assigned $Q_{i,t} = 1$ and trades at a price less than price at $t-1$ are assigned $Q_{i,t} = -1$. The correlation between the adverse selection component estimates produced by this method and the estimates we employ exceeds 0.98.

pressure on market makers' inventory levels.[6,7] As formulated in equation (2), the estimate of $\beta_{1,i}$ is one-half the estimated effective spread, and the estimated HS adverse selection component equals $2(\beta_{2,i} + \beta_{1,i})$.

C. Independent Variables

We collect ownership data directly from 1988 proxy statements on Lexis-Nexis Online. These statements disclose ownership by blockholders (owners of at least 5% of outstanding shares) and managers (officers and directors). We use the list of managerial owners to identify blockholders who are also managers, and compute the total percentages of outstanding shares held by each of the non-manager and manager blockholder groups. In addition, we collect the aggregate percentage ownership by managers who each individually hold less than 5% of the total outstanding shares (i.e., non-blockholding managers).

Prior research suggests share price, return volatility, firm size, and trading activity as control variables in our regressions (see e.g., Hanley, Kumar, and Seguin (1993) and Corwin (1999)). Price is the average of the bid and ask prices, and return volatility is the standard deviation of daily close-to-close returns. We use the average daily number of trades and average trade size to measure trading activity. Firm size is the natural log (to reduce its skewness) of the firm's market value of common equity.

D. Descriptive Information

Table 1 presents descriptive statistics. The average firm has a market capitalization of $3.389 billion, an average price of $39.08 per share, and experiences about 77 trades per day, with an average trade size of 1,698 shares. The average relative spread is about 0.88% of share price, the average effective spread is 16.5¢ per share, and the average total quoted depth is about 11,350 shares. Our sample on these measures is comparable to other microstructure studies that sample different firms over the same time period (see e.g., Lin, Sanger, and Booth (1995), Madhavan, Richardson, and Roomans (1997), and Lee, Mucklow, and Ready (1993)). Median adverse selection spreads from the LSB (HS) method are about 6.75¢ (6.04¢) per share. This corresponds to average adverse selection estimates of about 38 and 33% of effective spreads, respectively, for the two methods, similar to estimates found in prior studies (e.g., Stoll (1989), Affleck-Graves, Hedge, and Miller (1994), Lin, Sanger, and Booth (1995), and Krinsky

[6]Sometimes large trades are broken up and reported as multiple smaller trades. In some of their tests, HS employ a "bunching" technique, where trades occurring at the same price with the same quote as the trade up to five minutes earlier are aggregated and considered one trade. We do not bunch trades, since, as HS indicate, employing only one trade every five minutes helps mitigate this problem as it is less likely two trades five minutes apart are actually one order. In addition, their results suggest the bunching technique increases the estimated adverse selection component. To be conservative, and possibly more accurate, we employ the smaller estimates obtained without bunching.

[7]HS also develop a method employing an estimated trade reversal probability instead of an aggregate buy/sell indicator. We chose the aggregate buy/sell method because HS's results suggest the trade reversal method is prone to producing negative adverse selection component estimates. Neither in their sample nor ours did the aggregate buy/sell indicator method produce any adverse selection component estimates less than 0 or greater than 1.0.

and Lee (1996)). Finally, our sample firms span over 30 different industries, including manufacturing, service, and financial institutions, and we find no evidence of industry clustering. Though our sample selection is non-random, we find no evidence suggesting sample selection bias drives our results.

TABLE 1

Descriptive Statistics

Variable	Min	*Q*1	Median	Mean	*Q*3	Max
Firm size	43.83	678.9	1,639	3,389	3,393	69,693
Share price	2.97	24.79	32.38	39.08	45.19	335.65
Trades per day	4	28	52	77	97	618
Trade size	213	1,234	1,576	1,698	2,063	4,998
Return volatility	0.009	0.015	0.017	0.018	0.020	0.049
Relative spread %	0.146	0.553	0.772	0.875	1.022	4.208
Effective spread	0.090	0.131	0.157	0.165	0.183	0.763
Total quoted depth	504	5,592	8,530	11,346	12,081	186,260
LSB adverse selection	0.002	0.038	0.057	0.0675	0.084	0.451
HS adverse selection	0.001	0.031	0.052	0.0604	0.075	0.510
Total block ownership %	0	0	7.0	12.3	17.6	81.38
Non-manager block %	0	0	5.04	8.05	14.1	81.38
Manager block %	0	0	0	3.80	0	60.70
Non-block manager %	0	0.89	1.79	2.80	3.50	20.20

The sample consists of 260 firms with quote, price, and trade data on the 1988 ISSM database and share ownership data available in proxy statements. Each firm contributes one observation.

Firm size (in $millions) equals share price times number of common shares outstanding, share price is the average of the quote midpoints, trades per day is the average number of trades per day rounded to the nearest whole number, trade size is the average number of shares traded in a transaction rounded to the nearest whole number, and return volatility is the standard deviation of daily returns (computed using the change in close to close share prices). Relative spread % is the ask price minus the bid price, divided by the average of the bid and ask prices. Effective spread (in cents per share) is twice the absolute value of the difference between a transaction price and the midpoint of the bid and ask quotes in effect at the time of the transaction. LSB (HS) adverse selection is the amount (in cents per share) of the effective spread due to adverse selection, estimated using the Lin, Sanger, and Booth (1995) ((Huang and Stoll (1997)) technique. Total quoted depth is the number of shares quoted at the ask price plus the number of shares quoted at the bid price.

Blockholders are entities holding at least 5% of a firm's outstanding common shares. Total block ownership % is the percentage of outstanding common shares held by blockholders. Manager (non-manager) block % is the percentage of outstanding common shares held by entities who are (are not) also officers or directors of the firm in which they hold a block. Non-block manager % Is the percentage of outstanding shares held in total by officers and directors, where no individual manager holds 5% or more of the firm's outstanding shares.

Blockholder ownership varies considerably: 87 firms in our sample have no blockholders; 118 firms have only non-manager block owners; and 55 firms have a manager who is also a blockholder. The mean total block ownership is 12.3% of shares outstanding, and non-manager (manager) blockholders own, on average, about 8 (3.8%) of shares outstanding.[8] In aggregate, managers who individually do not own blocks own an average (mean) of 2.8% of the firm's stock. Thus, the mean percentage of shares held *in total* by all managers is about 6.4% (3.8% + 2.8%). The mean and median number of blockholders (in the set of 173 firms with blockholders) is two, and the maximum number of blockholders in a single firm is seven.

[8]The average for manager block ownership is less than 5.0 because only 55 firms have a manager owning 5% or more of the firm's stock.

III. Empirical Results

A. Univariate Evidence

If block ownership provides access to value-relevant information and places market makers at an informational disadvantage, we expect spreads (depths) to be higher (lower) for firms with block owners than for firms with no block owners. Evidence in Table 2, which presents means for firms with and without blockholders, supports this. Relative spreads (effective spreads) average 0.68% of stock price (14.7¢ per share) for firms without blockholders (column 2) and 0.97% of stock price (17.3¢ per share) for firms with blockholders (column 4). Adverse selection spreads also increase with block ownership, averaging about 5¢ per share for firms with no blockholders (column 2) and about 6–7¢ per share for firms with blockholders (column 4). The p-values (column 3) indicate the mean spread measures for firms with block owners are significantly greater (0.01 level) than the means for firms without block owners. Total quoted depth is higher for firms without block owners, where depth averages 12,698 shares, than for firms with block owners, where depth averages 10,666 shares, though this difference in means is significant at only the 0.18 level.[9]

TABLE 2

Univariate Analyses of Block Ownership and Market Liquidity

1 Variable	2 Mean for Firms without Blockholders ($N = 87$)	3 p-Value for Two-Tailed t-Test of Difference between (2) and (4)	4 Mean for Firms with $\geq$ 1 Blockholder ($N = 173$)
Non-manager block %	n/a	n/a	12.85
Manager block %	n/a	n/a	5.64
Non-block manager %	2.20	0.037	3.10
# of blockholders	n/a	n/a	2.02
Relative spread	0.678	0.001	0.974
Effective spread	0.147	0.001	0.173
LSB adverse selection	0.050	0.000	0.076
HS adverse selection	0.045	0.007	0.068
Total quoted depth	12,698	0.180	10,666

The sample consists of 260 firms with quote, price, and trade data on the 1988 ISSM database, and share ownership data available in proxy statements. Each firm contributes one observation.

Relative spread % is the ask price minus the bid price, divided by the average of the bid and ask prices. Effective spread (in cents per share) equals twice the absolute value of the difference between a transaction price and the midpoint of the bid and ask quotes in effect at the time of the transaction. LSB (HS) adverse selection is the amount (in cents per share) of the effective spread due to adverse selection, estimated using the Lin, Sanger, and Booth (1995) (Huang and Stoll (1997)) technique. Total quoted depth is the number of shares quoted at the ask price plus the number of shares quoted at the bid price.

Blockholders are entities holding at least 5% of a firm's outstanding common shares. Manager (non-manager) block % is the percentage of outstanding common shares held by entities who are (are not) also officers or directors of the firm in which they hold a block. Non-block manager % is the percentage of outstanding shares held in total by officers and directors, where no individual manager holds 5% or more of the firm's outstanding shares.

[9]One of the firms in the group with at least one blockholder has an average quoted depth of more than 186,000 shares, which is over 15 times the mean value of depth for the sample. When we delete this one firm, the mean depth for the 172 remaining firms reported in column 4 is 10,417 shares, and the difference from the mean reported in column 2 is significant at the 0.06 level.

If managerial ownership provides access to value-relevant information, regardless of whether any individual manager holds a large block of shares, we expect spreads (depths) to increase (decrease) in the level of non-block managerial ownership. To assess this, we partition the 205 sample firms that do not have manager blockholders into groups below (column 2 of Table 3) or above (column 4 of Table 3) median total manager ownership.

Results in Table 3 suggest liquidity is lower for firms with high managerial ownership, even if no individual manager owns a large block. Relative spreads average 0.726% of stock price and effective spreads average 14.9¢ per share for firms with managerial ownership below the median, while they average 0.911% of stock price and 16.3¢ per share, respectively, for firms with managerial ownership above the median. LSB (HS) adverse selection spreads average 5.1¢ (4.6¢) among firms with below median managerial ownership and 6.9¢ (5.9¢) among firms with above median managerial ownership. Average total quoted depth is higher for firms with below median managerial ownership (14,370 shares) than for firms with above median managerial ownership (10,178 shares). All differences between means in columns 2 and 4 of Table 3 are significant at the 0.05 level or better. These results are consistent with the notion that managers who own stock, even when no individual manager owns a large block, pose informed trading risk to market makers.[10]

B. Multivariate Evidence

To examine the relation between blockholdings and market liquidity while controlling for other factors, we estimate various forms of the following cross-sectional regression,

$$(3) \quad \text{LIQ} = \alpha_0 + \alpha_1(\text{non-manager block }\%) + \alpha_2(\text{manager block }\%) + \alpha_3(\text{non-block manager }\%) + \alpha_4(\text{share price}) + \alpha_5(\text{return volatility}) + \alpha_6(\text{trade size}) + \alpha_7(\text{trades per day}) + \alpha_8(\text{size}) + \epsilon,$$

where LIQ is either relative spread, effective spread, LSB adverse selection spread, HS adverse selection spread, or depth. Manager block % (non-manager block %) is the percentage of outstanding shares held by blockholders who are (are not) managers of the firm. Non-block manager % is the aggregate percentage of shares owned by managers who each individually own less than 5% of the firm's shares.[11] Share price is the average of the quoted bid and ask prices, return volatility is the standard deviation of returns computed from the last best bid and offer quoted midpoint of each day, trade size is average trade size per transaction, trades per day is the average number of trades per day, and size is the average market value of common equity. We compute these variables over all available

[10]Additional evidence regarding liquidity and managerial ownership can also be found in Sarin, Shastri, and Shastri (1999), Chiang and Venkatesh (1988), and Glosten and Harris (1988). These studies do not address whether block vs. non-block managerial ownership is associated with market liquidity.

[11]For example, if managers, in total, own 20% of a firm's shares, and two of the managers each own 7%, non-block manager % is 6%.

TABLE 3

Univariate Analyses of Non-Block Managerial Ownership and Market Liquidity

1	2	3	4
Variable	Mean for Firms with Below Median Non-Block Managerial Ownership ($N = 102$)	p-Value for Two-Tailed t-Test of Difference between (2) and (4)	Mean for Firms with Above Median Non-Block Managerial Ownership ($N = 103$)
Non-manager block %	7.50	(0.198)	9.75
Non-block manager %	0.73	(0.000)	4.06
# of blockholders	0.83	(0.015)	1.22
Relative spread	0.726	(0.003)	0.911
Effective spread	0.149	(0.010)	0.163
LSB adverse selection	0.051	(0.000)	0.069
HS adverse selection	0.046	(0.004)	0.059
Total quoted depth	14,370	(0.047)	10,178

The sample consists of 260 firms with quote, price, and trade data on the 1988 ISSM database, and share ownership data available in proxy statements. This table excludes 55 firms with blockholders who are also managers of the firm. Each firm contributes one observation.

Relative spread % is the ask price minus the bid price, divided by the average of the bid and ask prices. Effective spread (in cents per share) equals twice the absolute value of the difference between a transaction price and the midpoint of the bid and ask quotes in effect at the time of the transaction. LSB (HS) adverse selection is the amount (in cents per share) of the effective spread due to adverse selection, estimated using the Lin, Sanger, and Booth (1995) (Huang and Stoll (1997)) technique. Total quoted depth is the number of shares quoted at the ask price plus the number of shares quoted at the bid price.

Blockholders are entities holding at least 5% of a firm's outstanding common shares. Non-manager block % is the percentage of outstanding common shares held by entities who are not also officers or directors of the firm in which they hold a block. Non-block manager % is the percentage of outstanding shares held in total by officers and directors, where no individual manager holds 5% or more of the firm's outstanding shares.

observations in 1988. We use natural logarithms of relative spread, quoted depths, and firm size to reduce heteroskedasticity.[12]

If block ownership by non-managers puts market makers at an informational disadvantage, then the estimated coefficient on non-manager block %, α_1, should be greater (less) than zero when a spread measure (depth) is the dependent variable. Similarly, if block ownership by managers puts market makers at an informational disadvantage, then the estimated coefficient on manager block %, α_2, should be greater (less) than zero when a spread measure (depth) is the dependent variable. Finally, if manager ownership, even if no individual manager holds a block, puts market makers at an informational disadvantage, then the estimated coefficient on non-block manager %, α_3, should be greater (less) than zero when a spread measure (depth) is the dependent variable.

Columns 2, 3, 4, 5, and 6 of Table 4 report results of estimating equation (3) when relative spreads (RS), effective spreads (ES), Lin, Sanger, and Booth (1995) adverse selection spreads (LSB), Huang and Stoll (1997) adverse selection

[12]White's (1980) misspecification test suggests the presence of heteroskedasticity when these variables are not logged, but indicates no heteroskedasticity when they are logged. Residual plots show the residuals from the Table 4 regressions are symmetrically distributed. Our inferences are unchanged when we delete low (less than \$5 per share) and high (greater than \$150 per share) priced stocks, truncate all variables at the 99th and first percentiles of their distributions, or delete observations with large studentized residuals (Belsley, Kuh, and Welsch (1980)).

spreads (HS), or total quoted depth (DP) is the dependent variable, respectively. Coefficient estimates on the control variables are in the expected direction and generally significant at conventional levels.[13] More importantly, Table 4 shows that spreads (depths) are positively (inversely) related to non-manager block ownership even after controlling for block ownership by managers, non-block managerial ownership, and other determinants of spreads and depths. The coefficient estimates on non-manager block % are 0.222, 0.022, 0.031, 0.034, and −0.280, respectively, in columns 2 through 6 of Table 4, and each coefficient is significant at the 0.05 level or better.[14] This is consistent with the notion that external blockholders increase the risk of informed trading losses to market makers.

The coefficient estimates on the percentage of shares held by blockholders who are also managers of the firm (manager block %) equal 0.301, 0.032, 0.050, 0.048, and −0.791, respectively, in columns 2–6 of Table 4, and each coefficient is significant at less than the 0.01 level. These results suggest block ownership by managers, after controlling for external block ownership, non-block managerial ownership, and other determinants of spreads and depths, reduces market liquidity by placing market makers at an increased informed trading risk. Together, the non-manager block % and manager block % results form the main inference of this study: block ownership is associated with reduced market liquidity. Both block ownership by external entities and by managers is associated with higher total spreads, higher informed trading spreads, and smaller depths.[15]

The estimates of the coefficient on non-block manager % are significantly different from zero at less than the 0.05 level only in regressions where the informed trading component of the spread is the dependent variable (columns 4 and 5). If spread decomposition models are effective at isolating the informed trading component of the spread, then regressions employing these variables should be more powerful than those employing total spreads (or possibly depths). Though not as consistently strong as our evidence regarding block ownership, our data provide evidence that managerial ownership reduces market liquidity even when individual managers do not hold large blocks.[16] Together, the manager block % and non-block manager % results suggest that in certain specifications, consid-

[13] An exception is return volatility, which is significant only in the relative spread regression. We also employed an alternative measure, the standard deviation of daily share price, and re-estimated the regressions reported in Table 4. The coefficient on standard deviation of price is in the predicted direction and significant at the 0.05 level in each regression, and none of our other inferences are affected.

[14] All p-values reported in Table 4 are for two-tailed hypothesis tests of whether the coefficient differs from zero.

[15] We repeated these regressions after substituting the number of non-manager blockholders and the number of manager blockholders for their percentage of shares owned, and obtained qualitatively similar results. Also, we estimated a regression that included i) the number of non-manager blockholders, ii) the number of manager blockholders, iii) the percent owned by non-manager blockholders, iv) the percent owned by manager blockholders, v) the percent owned by managers who are not blockholders, and vi) the control variables from equation (3). Results suggest the percent owned by external blockholders, and not the number of external blockholders, is associated with reduced liquidity. Generally, however, both the number of manager blockholders and percentage ownership by manager blockholders appear associated with reduced liquidity.

[16] Our evidence regarding managerial ownership and the informed trading component of the spread is consistent with Sarin, Shastri, and Shastri (1999).

TABLE 4

Multivariate Analyses of Ownership and Market Liquidity

1	Coefficient Estimates (*p*-Values)				
	2	3	4	5	6
Independent Variables	LIQ = RS	LIQ = ES	LIQ = LSB	LIQ = HS	LIQ = DP
Intercept	−2.521**	0.245**	0.166**	0.122**	3.083**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Non-manager block %	0.222*	0.022**	0.031**	0.034**	−0.280*
	(0.020)	(0.040)	(0.009)	(0.002)	(0.044)
Manager block %	0.301**	0.032**	0.050**	0.048**	−0.791**
	(0.009)	(0.001)	(0.001)	(0.001)	(0.001)
Non-block manager %	0.179	0.054	0.125**	0.105**	−1.045
	(0.635)	(0.286)	(0.007)	(0.017)	(0.061)
Share price	−0.013**	0.002**	0.001**	0.001**	−0.823**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Return volatility	6.495**	0.173	0.169	0.418	1.180
	(0.008)	(0.504)	(0.470)	(0.064)	(0.680)
Trade size	−0.008	−0.002**	−0.007**	−0.006**	0.037**
	(0.649)	(0.001)	(0.003)	(0.004)	(0.001)
Trades per day	−0.008**	−0.002**	−0.002**	−0.001**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm size	−0.136**	−0.007**	−0.009**	−0.008**	0.243**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Adjusted R^2	87.90	84.28	80.49	83.64	86.06

The sample consists of 260 firms with quote, price, and trade data on the 1988 ISSM database, and share ownership data available in proxy statements. Each firm contributes one observation.

Firm size (in $millions) equals share price times number of common shares outstanding, share price is the average of the quote midpoints, trades per day is the average number of trades per day, rounded to the nearest whole number, trade size is the average number of shares traded in a transaction, rounded to the nearest whole number, and return volatility is the standard deviation of daily returns (computed using the change in close to close share prices). Relative spread % is the ask price minus the bid price, divided by the average of the bid-ask prices. Effective spread (in cents per share) equals twice the absolute value of the difference between a transaction price and the midpoint of the bid and ask quotes in effect at the time of the transaction. LSB (HS) adverse selection is the amount (in cents per share) of the effective spread due to adverse selection, estimated using the Lin, Sanger, and Booth (1995) (Huang and Stoll (1997)) technique. Total quoted depth is the number of shares quoted at the ask price plus the number of shares quoted at the bid price.

Blockholders are entities holding at least 5% of a firm's outstanding common shares. Total block ownership % is the percentage of outstanding common shares held by blockholders. Manager (non-manager) block % is the percentage of outstanding common shares held by entities who are (are not) also officers or directors of the firm in which they hold a block. Non-block manager % is the percentage of outstanding shares held in total by officers and directors, where no individual manager holds 5% or more of the firm's outstanding shares.

The equation estimated is LIQ $= \alpha_0 + \alpha_1$(non-manager block %) $+ \alpha_2$(manager block %) $+ \alpha_3$(non-block manager %) $+ \alpha_4$(share price) $+ \alpha_5$(return volatility) $+ \alpha_6$(trade size) $+ \alpha_7$(trades per day) $+ \alpha_8$size $+ \epsilon$. In columns 2, 3, 4, 5, and 6, the dependent variables (LIQ) are relative spread (RS), effective spread (ES), Lin, Sanger, and Booth (1995) adverse selection spread (LSB), Huang and Stoll (1997) adverse selection spread (HS), and total quoted depth (DP), respectively. The estimations use the natural logarithms of RS, DP, and SIZE. For presentation purposes, the coefficient on trade size has been scaled by 10 in columns 2, 4, and 5, and the coefficient on trades per day has been scaled by 10 in columns 2–5.

* and ** indicate that the coefficients are significantly different from zero at the 5 and 1% levels, respectively, in two-tailed tests.

eration of the block aspect of total managerial ownership can impact inferences from ownership structure studies.

Finally, we explored the possibility of simultaneous equations bias. In other words, a non-manager's decision to become a blockholder might be influenced by a stock's liquidity (e.g., its spreads and depths). To address this concern, we rely upon work by Demsetz and Lehn (1985), Denis and Sarin (1999), and Sarin, Shastri, and Shastri (1999) to motivate the following set of explanatory variables for ownership concentration: firm size (market value of equity); return volatility (standard deviation of daily returns); leverage (debt to equity ratio); firm age (number of years publicly traded through the end of 1988); diversification (number of distinct segments reported in the firm's 10-K); and a dummy variable that equals 1 if the firm operates in a regulated industry (primary SIC code first digit is 4 or 6). Thus, the two-equation system consists of equation (3) and the following,

$$\text{(4)} \quad \text{Non-manager block \%} = \alpha_0 + \alpha_1(\text{LIQ}) + \alpha_2(\text{firm size}) + \alpha_3(\text{leverage}) + \alpha_4(\text{firm age}) + \alpha_5(\text{return volatility}) + \alpha_6(\text{diversification}) + \alpha_7(\text{industry regulation}) + \epsilon.$$

To ascertain whether non-manager block % or our liquidity variables are endogenous, we perform an endogeneity test (see Wu (1973) and Hausman (1978)) on equations (3) and (4). This test uses the residuals from a first stage regression of a (potentially) endogenous variable on all the exogenous variables as an additional explanatory variable in a second stage estimation of the other endogenous variable. In our case, we are most interested in the significance of the residuals from estimation of non-manager block % on all the exogenous variables in equations (3) and (4) as an added explanator in estimations of equation (3). If non-manager block % is (is not) endogenous, the coefficient on the first stage residuals in the second stage will be non-zero (zero). We find that in all estimations of equation (3), the coefficient on the residuals from the first stage is not different from zero. Hence, the Hausman-Wu test rejects the notion that non-manager block % is endogenous. Thus, we conclude it unlikely our estimations of equation (3) are unduly influenced by simultaneous equations bias.[17]

Our regression coefficients from columns 4 and 5 of Table 4 suggest an increase in the informed trading spread of about 3.25 (3.1 employing LSB estimates, 3.4 employing HS estimates) one hundredths of a cent for each increase of one percentage point in non-manager block ownership and about five one hundredths of a cent for each increase of one percentage point in manager block ownership. For example, spreads for a firm with 20% non-manager block ownership would, ceteris paribus, be ($0.20 \times 0.0325 = 0.0065$) 6.5 tenths of a cent higher than for a firm with no block ownership, or about \$13 more on a 2,000 share trade. Spreads for a firm with 20% manager block ownership would, ceteris paribus, be ($0.20 \times 0.05 = 0.01$) one cent higher than for a firm with no manager block ownership, or about \$20 more on a 2,000 share trade.

These numerical estimates, however, likely understate the full extent of costs of blockholder ownership. For example, results in column 6 of Table 4 suggest quoted depths are lower as block ownership rises, but extant theory provides no method to combine spreads and depths to measure the costs of illiquidity. Further, though prior research suggests market illiquidity is associated with higher costs of capital (e.g., Amihud and Mendelson (1986) and Chalmers and Kadlec (1998)),

[17]As expected, the Hausman-Wu test suggests the liquidity variables are endogenous.

there are no generally accepted methods for computing the impact of illiquidity on costs of capital and firm value. Our objective is simply to document how block ownership impacts market liquidity, thereby increasing our understanding of the economic forces at work.

IV. Conclusion

We conduct empirical tests to determine whether spreads and depths are associated with the proportion of the firm owned by blockholders, i.e., entities owning 5% or more of a firm's shares. Although blockholders may provide a monitoring function that helps reduce agency costs and increase firm value, they also potentially have access to, or can develop, private, value-relevant information. Theory suggests market makers increase bid-ask spreads and decrease depths as expected losses to informed traders increase. If market makers perceive blockholders have better information regarding firm value, then spreads should increase and/or depths should decrease as the level of block ownership increases.

We find that both relative and effective spreads increase as the proportion of the firm owned by blockholders rises. Further, we construct estimates of the portion of the spread due to adverse selection using two different spread decomposition models, and find both estimates increase as the level of ownership by blockholders increases. We also find total quoted depths are inversely related to the level of block ownership. Our results hold both for blockholders who are managers of the firm in which they hold blocks and non-manager blockholders.

In sum, the results suggest higher blockholder ownership, regardless of whether the blockholders are managers, is associated with reduced liquidity for the firm's stock. Although a higher level of ownership by blockholders might be useful in reducing agency costs, it appears to be accompanied by reduced market liquidity.

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