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Block Ownership, Trading Activity, and Market Liquidity

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Abstract

We examine the impact of block ownership on the firm's trading activity and secondary-market liquidity. Our empirical results show that block ownership takes potential trading activity off the table relative to a diffuse ownership structure and impairs the firm's market liquidity. These adverse liquidity effects disappear, however, once we control for trading activity. Our findings suggest that block ownership is detrimental to the firm's market liquidity because of its adverse impact on trading activity—a real friction effect. After controlling for this real friction effect, we find little evidence that block ownership has a negative impact on informational friction. Our results suggest that the relative lack of trading, and not the threat of informed trading, explains the inverse relation between block ownership and market liquidity.

I. Introduction

Block ownership plays an increasingly important role in U.S. capital markets. Dlugosz, Fahlenbrach, Gompers, and Metrick (DFGM) (2006) find that block ownership increased from 21.7% of outstanding shares in 1996 to 25% in 2001 in their sample of over 1,900 relatively large firms.[1] Given the pervasiveness of block ownership, it is important to understand the role that blockholders play in such areas as firm valuation, corporate decision making, and secondary-market liquidity. Several previous studies have investigated the effect of block ownership on firm valuation and corporate decision making (e.g., Stulz (1988), Demsetz and Lehn (1985), Morck, Shleifer, and Vishny (1988), and Kole (1995)).[2] In contrast, few studies to date have examined the impact of block ownership on the firm's

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[1]We follow prior literature to define blockholders as shareholders who hold 5% or more of a firm's shares.

[2]See Holderness (2003) for a review of the block ownership literature.

market liquidity.[3] The purpose of this paper is to help fill this void by examining the real and informational friction effects of block ownership.

There are two primary mechanisms through which block ownership can affect the firm's secondary-market liquidity: altering the firm's trading activity or changing its information environment. Stoll (2000) refers to the first mechanism as a real friction effect and to the second mechanism as an informational friction effect. Real friction is defined as "the real resources used up" in the liquidity-provision process. These order processing and inventory costs are highly sensitive to trading activity levels. Previous empirical research has shown that trading volume is negatively related to bid-ask spreads (Benston and Hagerman (1974), Stoll (2000)) and positively related to depths (Brockman and Chung (1999)). Therefore, block ownership could affect the real friction component of liquidity by altering the firm's trading activity relative to a diffusely owned firm. In particular, if blockholders trade significantly less than nonblockholders, the reduction in trading activity will increase real friction costs by spreading fixed real costs over fewer trades.

The second mechanism through which block ownership can affect the firm's market liquidity is informational friction.[4] Instead of reflecting the real costs of liquidity provision, informational friction reflects the potential losses of trading against informed traders. Previous research has shown that market makers widen bid-ask spreads and reduce depths in the presence of informed traders (Copeland and Galai (1983), Kyle (1985), and Glosten and Milgrom (1985)). The impact of blockholders on the informational friction component of liquidity depends on their proclivity to use private information while trading against the uninformed. If blockholders (relative to nonblockholders) frequently trade on private information, then block ownership will adversely affect market liquidity by increasing informational friction costs. On the other hand, if legal, regulatory, or internal governance concerns effectively restrict such informed trading, then block ownership will not adversely affect informational friction costs.

It is important to distinguish between real and informational friction effects because of their direct implications for asset pricing, corporate governance, and regulation.[5] With respect to asset pricing, real friction will lead to lower prices and

[3]As discussed below, Heflin and Shaw (2000) is an exception.

[4]The degree to which aggregate or specific types of blockholders are informed traders is an open empirical question. Most of the literature dealing with block ownership and stock market returns focuses on the operational and monitoring aspects of block ownership. Barclay and Holderness (1991) and Bethel, Liebeskind, and Opler (1998) find abnormally positive returns associated with blockholder purchases. However, both studies reject the idea that these positive returns are mostly due to superior information. Studies that focus on specific types of blockholders, including institutions and insiders, have also yielded rather weak results. Bartov, Radhakrishnan, and Krinsky ((2000), p. 43) show that their "tests evaluating the validity of institutional holdings as a proxy for investor sophistication yield only mixed results." Bushee and Goodman (2007) find that changes in institutional ownership are consistent with trading on private information. Perhaps the strongest evidence that some blockholders trade on superior information comes from studies of insider trading. But even here, Lakonishok and Lee (2001) show that insider trading abilities are limited to purchases (not sales) of relatively small companies.

[5]More generally, there is an important causal link between market liquidity and cost of capital (Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996), Datar, Naik, and Radcliffe (1998), and Easley, Hvidkjaer, and O'Hara (2002)). Block ownership can indirectly affect the firm's cost of capital through its impact on liquidity.

higher expected returns to offset the real costs of trading (Stoll (2000), Amihud (2002)). The impact of informational friction on asset prices is less clear, since informational friction mainly affects the distribution of wealth between informed and uninformed investors (Stoll (2000)). With respect to corporate governance and regulation, evidence of higher informational friction suggests that blockholders not only possess superior information, but actively trade on it to the detriment of uninformed investors. In contrast to real frictions, informational friction could be reduced through stricter corporate governance and regulatory provisions.

There is little consensus on the relative importance of real and informational frictions in general, and even less consensus on the block ownership-liquidity relation. At least part of the difficulty has to do with measurement. In this study, we follow Stoll's ((2000), p. 1510) suggestion that informational friction can be thought of as "the difference between total friction (such as the quoted or effective spread) and real friction." We disentangle real and informational effects by first examining the impact of block ownership on the real costs of trading. These real friction effects are directly related to the firm's trading activity level (e.g., volume, turnover, number of trades, and trade sizes). After measuring the real friction effects, we examine the impact of block ownership on the firm's market liquidity (e.g., spread, depth, adverse selection, and price impact) while controlling for the known real friction effects.

Previous empirical studies that investigate block ownership often suffer from biased or insufficient data. DFGM (2006) show that the widely available Compact Disclosure database contains a large number of mistakes that can lead to a significant overstatement in the level of reported block ownership. One can avoid these Compact Disclosure biases by hand-collecting block ownership data from source documents. This alternative, however, leads to a relatively small number of observations and works against standardization and comparability across studies. In addition, Chordia, Roll, and Subrahmanyam (2001) stress the importance of analyzing trading activity and market liquidity over multiyear periods. We overcome these shortcomings by using the multiyear, standardized database generated by DFGM (2006).

Another advantage of the DFGM (2006) database is that it includes three distinct categories of block ownership: insiders, outsiders, and employee stock ownership plans (ESOPs). Access to private information is not uniformly distributed across these three blockholder categories. Inside blockholders are more likely to possess private information than outside blockholders and ESOPs. Consistent with this argument, Lakonishok and Lee (2001) find that managerial trades are more informative than large shareholder trades. In this study, we examine the impact of each blockholder category on informational friction costs after controlling for real friction costs. If block ownership adversely affects informational friction costs, then this negative impact should be strongest for inside blockholders.

We divide our empirical analysis into two main sections. In the first section we conduct an analysis of the real frictions caused by block ownership by evaluating the impact of block ownership on the firm's trading activity, including turnover, number of trades, and average trade size. We find that block ownership significantly reduces the firm's trading activity in the cross section relative to a diffuse ownership structure. Most of the reduced turnover caused by block ownership results from a reduction in the number of trades, as opposed to changes in the average trade size.

In our second section we investigate the blockholder-liquidity relation, which potentially involves both real and informational frictions. We analyze the impact of block ownership on the firm's market liquidity, including bid-ask spread, depth, adverse selection components, and price impact. We find that block ownership significantly increases the firm's quoted and effective bid-ask spreads, adverse selection costs, and Amihud's (2002) price impact measure. Block ownership also significantly reduces the firm's market depth. These adverse liquidity effects, however, either disappear or are reversed after controlling for blockholders' direct impact on trading activity. Thus, our results suggest that block ownership impairs the firm's market liquidity by reducing trading activity and not by increasing asymmetric information costs. Separate analyses of inside and outside block ownership yields results similar to those for aggregate block ownership.

In a related study, Cao, Field, and Hanka (2004) disentangle real and informational frictions by examining changes in the firm's trading activity versus bid-ask spreads around initial public offering (IPO) lockup expirations. At the expiration of an IPO lockup, there is a large-scale entry of informed (insider) traders into the market. Cao et al. (2004) distinguish between changes in the firm's trading activity (i.e., volume, number of trades, and average trade size) and changes in the firm's bid-ask spreads. They show that lockup expirations are associated with a significant increase in the firm's trading activity but little if any change in bid-ask spreads. The implication is that any increase in the firm's informational friction is offset by a decrease in the firm's real friction.

Heflin and Shaw (2000) find that higher block ownership for both managers and nonmanagers leads to wider spreads, thinner depths, and higher adverse selection costs. They attribute these findings to informational frictions caused by differentially informed insiders (blockholders) and outside investors. Although there are similarities between their study and ours, there are also significant differences. They use a hand-collected sample of 260 firms during 1988, whereas our sample includes 1,225 firms spanning a 6-year period from 1996 to 2001. While the primary focus of their study is on informational friction effects, we examine in considerable detail the real friction effects of block ownership. The main difference, however, is our evidence and conclusion that block ownership affects market liquidity principally through its impact on real frictions and not informational frictions.

In another related study, Rubin (2007) finds that institutional ownership affects the liquidity-ownership relation more than inside ownership.[6] He shows that while liquidity is positively related to the level of institutional ownership (consistent with Gompers and Metrick (2001) and Bennett, Sias, and Starks (2003)), it is negatively related to the concentration of institutional ownership. However, he is

[6]Rubin's (2007) "trading hypothesis" corresponds to our real friction effect (i.e., liquidity differences are mainly due to trading activity differences), and his "adverse selection hypothesis" corresponds to our informational friction effects (i.e., liquidity differences are mainly due to asymmetric information differences).

unable to determine whether the inverse liquidity-concentration relation is due to real friction effects or informational friction effects (or both).

In Section II we describe the data used in our study and discuss our methods of analysis. In Section III we present our empirical findings and analysis. In Section IV we conclude our study.

II. Data and Methods of Analysis

A. Data and Sample Description

Our sample includes the 6-year period beginning in 1996 and ending in 2001. The block ownership data are from the blockholding database constructed by DFGM (2006).[7] In addition to reading original proxy statements, DFGM (2006) use a filtering process designed to determine actual beneficial ownership.[8] We use the Center for Research in Security Prices (CRSP) database to obtain stock returns, share prices, number of shares outstanding, and trading volume. We use the Trade and Quote (TAQ) database to construct the number of trades, average trade size, quoted and effective spreads, quoted depth, and adverse selection components of the bid-ask spread.[9] We exclude firms for which trading and liquidity data are not available. In our main analysis, we include only firms that are traded in NYSE or AMEX. We exclude NASDAQ-listed firms and firms that switch exchanges due to market microstructure differences.

Our main variable of interest, block ownership, includes three mutually exclusive and exhaustive categories: insiders, outsiders, and ESOPs. Inside blocks include the blockholdings of officers, directors, and affiliated entities. DFGM's (2006) definition of an affiliated entity includes "any individual, trust, or company whose voting outcome is partially influenced, but not completely controlled, by an officer or director of the company." Examples include shares owned by retired officers or directors, shares held in a trust controlled by officers or directors, or shares owned by another business entity that has a specific business relationship

[7]DFGM (2006) construct their database beginning with firms covered by the Investor Responsibility Research Center (IRRC). The IRRC database provides board of director information and governance details for roughly 1,500 firms each year, including the components of the S&P 500 and other large corporations listed in such publications as *Forbes*, *Fortune*, and *Businessweek*. Companies with multiple-class stocks are eliminated, leaving them with roughly 1,300 firms per year over the 1996–2001 sample period. Next, DFGM (2006) collect ownership data from Compact Disclosure. They use only the data that Compact Disclosure obtains directly from proxy statements, since ownership data based on insider trading has been shown to be problematic for these purposes (Anderson and Lee (1997)). They compare the ownership data from Compact Disclosure with original proxy statements for every firm in the sample, even if Compact Disclosure shows no block ownership. This process corrects Compact Disclosure's two main biases—overlapping beneficial ownership and the treatment of preferred shares.

[8]These rules deal with such issues as the definition of beneficial ownership using voting power versus investment power, the inclusion of shares that can be acquired within 60 days, and the treatment of temporary ownership from a recent merger. See DFGM's (2006) appendices A and B for additional details. See Chetty and Saez (2005) and Cronqvist and Fahlenbrach (2009) for other studies that use the DFGM database.

[9]We follow Chordia, Roll, and Subrahmanyam (2001), (2002) to purge the following trade and quote data: trades out of sequence, trades and quotes before the open or after the close, quotes not originated on the primary exchange, negative trades or quotes or spreads, and quotes with spread greater than $4 or 20% of the midquote.

with the firm. Inside block ownership, therefore, includes all shares that are directly or indirectly controlled by officers and directors of the firm. Outside blocks include all blockholdings that are not held by insiders or through ESOPs.

In addition to the block ownership data, we obtain or construct various independent and dependent variables from CRSP and TAQ databases. Our first set of dependent variables corresponds to real friction effects, including turnover (trading volume divided by the number of shares outstanding), number of trades, and trade size (share trading volume divided by the number of trades). Our second set of dependent variables represents different aspects of market liquidity, including relative quoted bid-ask spreads, relative effective bid-ask spreads, and quoted depths. We define the quoted bid-ask spread as the quoted ask price minus the quoted bid price scaled by their midpoint. Our quoted depth measure is simply the number of shares available at the inside quoted bid and ask prices. We define the effective bid-ask spread as 2 $\times$ the absolute value of the difference between the transaction price and the quoted midpoint, scaled by the quoted midpoint. All trading activity and liquidity variables are averages across all trading days of each calendar year.

Our third set of dependent variables includes the adverse selection component of the bid-ask spread and Amihud's (2002) price impact measure. We define and present three alternative spread decomposition models in the next section. We follow Amihud's (2002) definition of a price-impact illiquidity measure by dividing the absolute value of daily stock returns by daily dollar volume.[10]

Our control variables include price, volatility, firm size, a dummy variable for S&P 500 Index inclusion, and institutional ownership. Price is the average daily closing price, volatility is the standard deviation of daily returns, and firm size is the share price times the total number of shares outstanding. We define S&P 500 as a dummy variable that takes the value of 1 if the firm is included in the S&P 500 Index during the calendar year. We define institutional ownership as the fraction of total shares outstanding held by 13F institutions at the end of the previous calendar year, and we obtain these values from Thomson Financial.

B. Adverse Selection Models

We use three methods to estimate the adverse selection component of the bid-ask spread (i.e., Glosten and Harris (GH) (1988), Huang and Stoll (HS) (1997), and Lin, Sanger, and Booth (LSB) (1995)) as described below.[11] We use these three approaches because recent research shows that different models capture different aspects of adverse selection (Van Ness, Van Ness, and Warr (2001)). First, we follow GH (1988) and estimate the following decomposition model:

(1) $$\Delta P_t = \theta(\Delta Q_t) + \delta(Q_t V_t) + u_t,$$

[10]We exclude zero-volume days in our calculation of Amihud's illiquidity measure. Zero-volume days represent only about 0.1% of our sample. Therefore, this exclusion has a negligible effect on our results.

[11]We estimate each of the three adverse selection models using firm-month data. We then use the monthly averages of adverse selection estimates over each year as our annual measure. We also estimate each model using firm-year data and obtain similar results.

where $\Delta P_t = P_t - P_{t-1}$ and $\Delta Q_t = Q_t - Q_{t-1}$; Q_t is the indicator for trade type at time t and takes a value of +1 if the trade is a buyer-initiated transaction and -1 if the trade is a seller-initiated transaction;[12] V_t is the transaction size at time t; θ is the transitory component of the bid-ask spread; and δ is the adverse selection component of the bid-ask spread. As in GH (1988), our estimated adverse selection coefficients are expressed in units of 1,000-share lots.

Second, we follow HS (1997) and estimate the following regression:

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

where $\Delta M_{t+1} = M_{t+1} - M_t$; M_t is the quoted bid-ask spread midpoint at time t; $S_{t-1}/2$ is the half spread that is half the difference between the quoted ask and bid prices; Q_t is the indicator for trade type at time t and takes a value of +1 if the trade is a buyer-initiated transaction and -1 if the trade is a seller-initiated transaction; and α is the combined adverse selection and inventory holding cost component of the bid-ask spread.

And third, we use LSB's (1995) approach to estimate the following bid-ask spread decomposition model:

$$\Delta M_{t+1} = \lambda(z_t) + e_{t+1}, \quad (3)$$

where $\Delta M_{t+1} = M_{t+1} - M_t$; M_t is the quoted bid-ask spread midpoint at time t; $z_t = P_t - M_t$; λ is the adverse selection component of the bid-ask spread; and e is a normally distributed error term.

III. Empirical Results

A. Summary Statistics and Univariate Tests

Table 1 reports summary statistics for the full sample (Panel A) and by year (Panel B). The block ownership figures in Panel A show that, on average, 2.29 blockholders control 23.07% of company shares. When we break these figures down into blockholder types, we find that inside blockholders control 5.36% of company shares on average, ESOPs own an average of 1.24% of company shares, and outside blockholders have the highest company ownership with an average of 16.47%. Turning to the real friction (i.e., trading activity) measures, we show that the average number of trades per day is 390, the average daily share volume is 640,000, and the average annual turnover is 104.90%. The average trade size is 1,450 shares.

[12]We classify transactions as buyer- or seller-initiated using the Lee and Ready (1991) algorithm: If a trade occurs above (below) the midpoint of the prevailing quote, it is classified as a buyer- (seller-) initiated trade; if a trade occurs at the midpoint of the prevailing quote, it is signed based on the tick test. Werner (2003) shows that the Lee and Ready (1991) algorithm can misclassify a significant percentage of market orders because buyer-initiated (seller-initiated) market orders are often executed below (above) the bid-ask midpoint. This potential shortcoming, however, does not affect most of our trading activity or liquidity variables including turnover, number of trades, quoted spread, effective spread, quoted depth, and price impact. The misclassification of buyer- versus seller-initiated transactions only affects our adverse selection cost estimates.

TABLE 1

Summary Statistics for Block Ownership, Trading Activity, Liquidity, and Control Variables

Table 1 presents the summary statistics for block ownership, trading activity, liquidity, and control variables. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from Dlugosz, Fahlenbrach, Gompers, and Metrick (DFGM) (2006). Inside blockholders include officers, directors, and affiliated entities. ESOP is block ownership by employee stock option plans. Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Turnover, number of trades, average trade size, relative quoted spread, effective spread, and depth are averages across all trading days for each stock in each year. Market capitalization, share price, and stock returns are from the CRSP stock database. Volatility is calculated as the standard deviation of daily stock returns. Institutional ownership is the fraction of total shares outstanding held by 13F institutions and is from Thomson Financial. Panel B presents the mean values of variables by year.

Panel A. All Years

Variables	Mean	Standard Deviation	Median	25th Percentile	75th Percentile
Block Ownership Variables					
Block ownership (%)	23.07	18.20	20.10	8.75	33.60
Number of blockholders	2.29	1.63	2.00	1.00	3.00
Block ownership – Insiders (%)	5.36	11.80	0.00	0.00	5.63
Block ownership – ESOP (%)	1.24	4.02	0.00	0.00	0.00
Block ownership – Outsiders (%)	16.47	15.51	13.60	5.20	25.00
Trading and Liquidity Variables					
Number of trades ('000 per day)	0.39	0.82	0.15	0.06	0.39
Volume (million shares per day)	0.64	1.38	0.24	0.08	0.63
Turnover (% per year)	104.90	79.66	84.43	56.13	127.62
Average trade size ('000 shares)	1.45	0.61	1.37	1.02	1.78
Relative quoted spread (%)	0.36	0.49	0.25	0.16	0.39
Relative effective spread (%)	0.24	0.29	0.16	0.11	0.26
Quoted depth ('000 shares)	4.96	6.33	3.24	1.96	5.46
Control Variables					
Market capitalization ($ billion)	7.70	23.20	1.73	0.62	5.23
Share price ($)	34.86	26.29	29.85	19.21	44.32
Volatility (% per year)	40.62	19.32	36.59	27.91	48.62
Institutional ownership (%)	57.53	18.35	59.58	45.31	71.28

Panel B. By Year

Variables	1996	1997	1998	1999	2000	2001
Block Ownership Variables						
Block ownership (%)	21.07	20.87	23.38	23.68	24.77	24.45
Number of blockholders	2.07	2.07	2.31	2.34	2.48	2.44
Block ownership – Insiders (%)	5.25	5.00	5.58	5.31	5.48	5.52
Block ownership – ESOP (%)	1.41	1.45	1.06	1.09	1.22	1.24
Block ownership – Outsiders (%)	14.41	14.42	16.74	17.28	18.07	17.69
Trading and Liquidity Variables						
Number of trades ('000 per day)	0.18	0.25	0.31	0.43	0.50	0.69
Volume (million shares per day)	0.32	0.43	0.51	0.69	0.85	1.07
Turnover (% per year)	84.21	91.14	100.38	105.09	120.66	128.54
Average trade size ('000 shares)	1.68	1.55	1.50	1.43	1.44	1.08
Relative quoted spread (%)	0.44	0.30	0.33	0.38	0.42	0.29
Relative effective spread (%)	0.30	0.20	0.22	0.25	0.28	0.18
Quoted depth ('000 shares)	7.66	6.14	3.91	4.64	5.51	2.02
Control Variables						
Market capitalization ($ billion)	4.86	6.74	7.13	8.91	8.99	9.62
Share price ($)	35.05	40.65	37.11	33.89	31.04	31.43
Volatility (% per year)	29.72	30.70	41.80	43.18	52.10	45.27
Institutional ownership (%)	54.01	53.47	58.18	59.45	59.04	60.63
No. of stocks	904	846	1,043	964	917	863

Next we present summary statistics for three liquidity measures: relative quoted spread, relative effective spread, and depth. The average relative quoted bid-ask spread is 0.36%. As expected, relative effective bid-ask spreads are uniformly lower than their quoted spread counterparts. The average relative effective bid-ask spread is 0.24%. According to Stoll (2000), these bid-ask spread figures capture both real friction costs and informational friction costs. The average quoted depth is 4,960 shares. Our sample firms have an average market capitalization of $7.70 billion, price of $34.86, annual volatility of 40.62%, and institutional ownership of 57.53%.

In Panel B of Table 1, we report average values for block ownership, trading activity, liquidity, and control variables by year. Total block ownership and the number of blockholders have both increased over our sample period. Much of this increase is due to the rise in outside block ownership. Although there is some time variation in block ownership over our sample period, we find considerably more time variation in real friction costs. The number of trades, trading volume, and turnover increased substantially from 1996 to 2001, while average trade sizes decreased. Consistent with Goldstein and Kavajecz (2000) and Bessembinder (2003), our liquidity measures, including relative quoted and effective spreads and quoted depths, decreased over our sample period. The decrease in spreads implies that stocks became more liquid, while the decrease in depths implies the opposite. Investors could buy and sell at lower costs, but for fewer shares. With the exception of average price, our control variables generally increased in value over our sample period.

In Table 2 we examine the relation between block ownership and the firm's trading activity and market liquidity by using a univariate portfolio approach. We divide all sample stocks with nonzero block ownership into quintile portfolios (from Q1-low to Q5-high) every year. We group sample stocks with no block ownership into a separate portfolio (Q0-none). In the two rightmost columns, we perform difference-in-means tests between high and zero block ownership portfolios (Q5 − Q0) and between high and low block ownership portfolios (Q5 − Q1).

TABLE 2

Trading Activity, Liquidity, and Block Ownership: Univariate Sort Portfolios

Table 2 examines the relation between trading activity, liquidity, and block ownership by using a univariate portfolio approach. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from DFGM (2006). Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Each year we divide all sample stocks with nonzero block ownership into 5 quintiles based on total block ownership. Stocks with no block ownership are grouped into a separate portfolio. Price impact is the Amihud (2002) price impact measure. GH (1988), HS (1997), and LSB (1995) are measures of the adverse selection component of spreads as defined in equations (1)–(3) in Section II.B. Numbers in parentheses are *t*-statistics.

	Block Ownership Portfolios									
Variables	Q0-None	Q1-Low	Q2	Q3	Q4	Q5-High	Q5 − Q0		Q5 − Q1	
Number of trades ('000 per day)	0.86	0.52	0.41	0.29	0.23	0.13	−0.73	(−13.41)	−0.39	(−13.76)
Volume (million shares per day)	1.41	0.86	0.68	0.48	0.38	0.21	−1.20	(−12.78)	−0.65	(−12.13)
Turnover (% per year)	86.03	115.09	116.36	118.31	109.18	80.81	−5.22	(−1.49)	−34.28	(−9.13)
Trade size ('000 shares)	1.40	1.44	1.50	1.49	1.46	1.38	−0.02	(−0.69)	−0.06	(−2.19)
Relative quoted spread (%)	0.24	0.28	0.34	0.39	0.39	0.51	0.27	(13.23)	0.23	(11.65)
Relative effective spread (%)	0.16	0.19	0.23	0.24	0.26	0.34	0.18	(12.04)	0.15	(10.59)
Quoted depth ('000 shares)	6.22	5.59	5.24	4.80	4.41	3.76	−2.46	(−8.46)	−1.83	(−6.58)
Price impact	1.43	1.76	2.25	2.53	3.09	5.08	3.65	(16.33)	3.32	(16.22)
GH	0.06	0.07	0.08	0.09	0.11	0.17	0.11	(10.76)	0.10	(14.74)
HS	0.14	0.16	0.17	0.17	0.19	0.21	0.07	(14.93)	0.05	(12.12)
LSB	0.40	0.44	0.46	0.47	0.49	0.51	0.11	(14.95)	0.07	(9.75)

We find that trading activity declines significantly as we move from the zero or lowest block ownership portfolios (Q0 or Q1) to the highest block ownership portfolio (Q5). The average number of trades decreases monotonically from 860 (520) for the zero (lowest) block ownership portfolio to 130 for the highest block ownership portfolio. The differences in the number of trades (Q5 – Q0 and Q5 – Q1) are highly significant, with *t*-values in excess of 13. Share volume displays the same pattern, decreasing monotonically from 1.41 (0.86) million for the zero (lowest) block ownership portfolio to 0.21 million for the highest block ownership portfolio. We find a similar overall pattern across block ownership portfolios for turnover; that is, the highest block ownership portfolio has lower turnover than the zero and lowest block ownership portfolios. But unlike the monotonic decline in the number of trades, turnover displays an inverted U-shaped pattern (with the right-side foot lower than the left-side foot). Overall, these univariate tests are consistent with our hypothesis that block ownership generally reduces trading activity.

Next we examine the relation between block ownership and the firm's market liquidity. We find a monotonically increasing relation between block ownership and relative bid-ask spreads, both quoted and effective. The relative effective bid-ask spread, for example, increases from 0.16% (0.19%) in the zero (lowest) block ownership portfolio to 0.34% in the highest block ownership portfolio. We find a similar, though inverse, monotonic relation between block ownership and quoted depth. The average depth decreases from 6,220 (5,590) shares in the zero (lowest) block ownership portfolio to 3,760 shares in the highest block ownership portfolio. These results suggest that block ownership impairs market liquidity. However, the extent to which these liquidity patterns are caused by real friction effects (e.g., trading volume, number of trades) remains an open empirical question. Lastly, consistent with our results on bid-ask spreads, we find a monotonically increasing relation between block ownership and price impact, as well as between block ownership and each of our adverse selection estimates.

B. Real Friction Effects: Turnover, Number of Trades, and Trade Size

In this section we examine the impact of block ownership (BLOCK) on real friction effects (i.e., trading activity) in a multivariate setting, holding constant firm size, price, volatility, S&P 500 Index inclusion, and institutional ownership (IO). We fit the following cross-sectional regression model:

$$
\begin{aligned}
(4) \qquad \text{TRADING\_ACTIVITY}_i \quad = \quad & \beta_0 + \beta_1 \log(\text{MARKET\_CAP}_i) \\
& + \beta_2 \log(\text{PRICE}_i) + \beta_3 \log(\text{VOLATILITY}_i) + \beta_4 \text{S\&P\_500}_i \\
& + \beta_5 \text{IO}_i + \beta_6 \text{BLOCK}_i + \varepsilon_i.
\end{aligned}
$$

Our real friction trading activity variables (TRADING_ACTIVITY) include turnover, number of trades, and trade size. Our BLOCK variable refers to firm *i*'s aggregate block ownership. We use lagged values for BLOCK and IO and contemporaneous values for all other variables in our regressions.[13] Specifically, market capitalization (MARKET_CAP), price (PRICE), and trading activity (TRADING_ACTIVITY) variables are averages over the current year. Volatility (VOLATILITY) is estimated using daily returns during the same year. The IO

[13]We also estimated our regressions using contemporaneous block ownership values. The results based on contemporaneous values are qualitatively similar to those reported here.

and BLOCK variables are measured at the end of the previous year. Parallel to regression model (4), we replace BLOCK with its constituent parts to analyze the incremental effects of inside, outside, and ESOP block ownership. We normalize the block ownership variables by their respective cross-sectional standard deviations in each year. This allows us to make meaningful comparisons across the coefficients. We estimate the cross-sectional regression model (4) using time-series averages for both dependent and independent variables. Specifically, for each firm we first compute its time-series averages for all variables in model (4) across all years that the firm is in our sample. We then run a single cross-sectional regressions using these time-series averages across all firms.[14]

In columns 1 and 2 of Table 3, we report the results of model (4) using the logarithm of turnover as our dependent variable. The aggregate block ownership coefficient (−0.223) in column 1 is significantly negative (t-value = −16.5). This result is consistent with our univariate result in Table 2 and confirms our expectation that an increase in block ownership leads to a significant reduction in turnover. This result is economically significant; a one-standard-deviation increase in block ownership (i.e., 18.2% as reported in Table 1) leads to a 22.3% decrease in share turnover. The coefficients on control variables are generally consistent with expectation. Small, high-priced, volatile, and S&P 500 firms have higher turnover. Interestingly, we find that institutional ownership has a positive impact on turnover, opposite to the impact of block ownership. This positive institutional ownership–turnover relation is consistent with Gompers and Metrick (2001), Bennett et al. (2003), and Rubin (2007).

In column 2 of Table 3 we report the disaggregated results for inside, outside, and ESOP block ownership. All categories of blockholders have a negative effect on turnover. The inside and outside block ownership coefficients (−0.164 and −0.173, respectively) are significant at the 1% level, while the ESOP coefficient (−0.028) is significant at the 5% level. Our tests for equality between coefficients at the bottom of the table reveal that inside and outside block ownership coefficients are significantly different from the ESOP coefficient but are not significantly different from each other. Overall, these results show that block ownership is detrimental to trading activity, all else being equal.

In columns 3–6 of Table 3, we examine the source of this negative relation between block ownership and turnover. Specifically, how does block ownership affect the firm's number of trades versus its average trade size? In column 3 we find that aggregate block ownership significantly reduces the firm's number of trades. The aggregate ownership coefficient is −0.23, with an associated t-value of −17.79. In column 4 we show that both inside and outside block ownership coefficients (−0.158 and −0.195, respectively) are negative and significant, while the ESOP coefficient (−0.008) is negative and insignificant. The outside block ownership coefficient is significantly more negative than the inside block ownership coefficient, which in turn is significantly more negative than the ESOP coefficient. Again, it is interesting to note that institutional ownership has the opposite

[14]As an alternative approach, we estimate six annual regressions using daily averages for all variables. The results from these regressions are consistent across the 6 years, as well as with the results reported in Table 3.

TABLE 3

Block Ownership and Share Turnover, Number of Trades, and Trade Size

Table 3 examines the relation between turnover, number of trades, trade size, and lagged block ownership. We first calculate time-series averages of all variables for each firm and then estimate a cross-sectional regression using these firm averages. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from DFGM (2006). Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Market capitalization, share price, and stock returns are from the CRSP stock database. Institutional ownership data are from Thomson Financial. SUMBLKS is the lagged total block ownership. SUMIN is the lagged total ownership by inside blockholders, including officers, directors, and affiliates. SUMOUT is the lagged ownership by outside blockholders. SUMESOP is the lagged ownership by employee stock option plans. Institutional ownership (IO) is the fraction of total shares outstanding held by 13F institutions at the end of the previous calendar year. We normalize block and institutional ownership variables each year by their respective cross-sectional standard deviations. Numbers in parentheses are *t*-statistics.

Independent Variables	Dependent Variables					
	log(TURNOVER)		log(#TRADES)		log(TRADE_SIZE)	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	–0.651	–0.669	–4.083	–4.125	7.007	7.029
	(–3.25)	(–3.34)	(–21.24)	(–21.53)	(53.24)	(53.44)
log(MARKET_CAP)	–0.037	–0.036	0.713	0.713	0.254	0.256
	(–2.55)	(–2.45)	(50.71)	(50.88)	(26.37)	(26.55)
log(PRICE)	0.238	0.241	–0.148	–0.145	–0.620	–0.620
	(7.80)	(7.92)	(–5.05)	(–4.98)	(–30.99)	(–31.03)
log(VOLATILITY)	1.167	1.173	1.231	1.240	–0.066	–0.069
	(26.31)	(26.45)	(28.92)	(29.26)	(–2.26)	(–2.39)
S&P_500	0.098	0.089	0.124	0.118	–0.036	–0.124
	(2.35)	(2.31)	(3.36)	(3.20)	(–1.42)	(–2.10)
IO	0.197	0.185	0.060	0.057	0.144	0.135
	(14.69)	(12.41)	(4.63)	(4.02)	(16.29)	(13.85)
SUMBLKS	–0.223		–0.230		0.009	
	(–16.50)		(–17.79)		(0.99)	
SUMIN		–0.164		–0.158		–0.003
		(–13.06)		(–13.20)		(–0.35)
SUMESOP		–0.028		–0.008		–0.018
		(–2.08)		(–0.60)		(–2.07)
SUMOUT		–0.173		–0.195		0.021
		(–11.83)		(–13.94)		(2.16)
Coefficient Tests (p-value)						
SUMIN = SUMESOP		0.0001		0.0001		0.3348
SUMOUT = SUMESOP		0.0001		0.0001		0.0028
SUMIN = SUMOUT		0.8833		0.0473		0.0236
R^2	0.58	0.58	0.91	0.91	0.60	0.61

effect on number of trades as block ownership; that is, the greater the percentage of institutional ownership, the greater the number of trades.

In columns 5–6 of Table 3 we examine the relation between block ownership and average trade size. The coefficient on aggregate block ownership (0.009) is insignificant, suggesting that blockholders as a whole neither increase nor reduce average trade size. A closer examination of different types of blockholders (column 6), however, suggests that outside blockholders have a positive effect on trade size, while inside and ESOP blockholders have a negative effect on trade size. These positive and negative effects offset each other, resulting in a negligible effect on average trade size by the total block ownership. Overall, the results in columns 3–6 suggest that block ownership reduces turnover because it reduces the number of trades as opposed to the average trade size.

Taken together, our trading activity findings in Table 3 paint a coherent picture regarding the real friction effects of block ownership. Aggregate block ownership reduces the firm's turnover and number of trades relative to similar firms with diffuse shareholders. This detrimental impact on the firm's trading activity is attributable to both inside and outside block ownership.

C. Liquidity: Bid-Ask Spreads and Depths

We next examine the effect of block ownership on bid-ask spreads and depths. To the extent that block ownership impacts the firm's market liquidity, we want to determine whether this impact is due to a real friction effect, an informational friction effect, or both. We expect block ownership to negatively affect liquidity (before controlling for trading activity) because block ownership reduces trading activity, which in turn reduces liquidity. If block ownership impacts liquidity via a separate informational friction effect, we would expect the coefficient on block ownership to have the same sign and remain significant after controlling for trading activity.

We estimate regression model (5) using various measures of liquidity as our dependent variable. These liquidity measures include the relative quoted bid-ask spread, relative effective bid-ask spread, and quoted depth. We fit the following cross-sectional regression model using each firm's time-series averages for both dependent and independent variables:

$$(5)\quad \text{LIQUIDITY}_i = \beta_0 + \beta_1\log(\text{MARKET\_CAP}_i) + \beta_2\log(\text{PRICE}_i) + \beta_3\log(\text{VOLATILITY}_i) + \beta_4\text{S\&P\_500}_i + \beta_5\text{IO}_i + \beta_6\log(\text{\#TRADES}_i) + \beta_7\log(\text{TRADE\_SIZE}_i) + \beta_8\text{BLOCK}_i + \varepsilon_i.$$

For each dependent variable, we fit two regressions: one with trading activity control variables (i.e., logarithm of number of trades (#TRADES) and logarithm of average trade size (TRADE_SIZE)) and one without.[15] Our objectives in this research design are twofold: i) to examine the impact of block ownership on the firm's market liquidity, and ii) to disentangle the real friction effects from the information friction effects.

In Table 4 we present our regression model (5) results for quoted bid-ask spreads in columns 1–2, effective bid-ask spreads in columns 3–4, and depths in columns 5–6. The aggregate block ownership coefficient (0.056) in column 1 is positive and significant, implying that block ownership leads to wider quoted spreads. This result is consistent with our univariate result in Table 2 and is economically significant. A one-standard-deviation increase in total block ownership is associated with an increase in quoted spreads by about 5.6 basis points (e.g., from 0.4% to 0.456%). The coefficients on control variables are mostly consistent with our expectations. For example, large firms, high-priced firms, and firms with high institutional ownership have narrower quoted spreads, while firms with more volatile returns have wider quoted spreads.

However, after we control for the impact of trading activity (i.e., number of trades and trade size), the adverse effect of block ownership on the quoted

[15]We follow Heflin and Shaw (2000) to control for number of trades and trade size in regression equation (5). Our results are similar if we use the logarithm of turnover (or trading volume) as the trading activity control variable.

TABLE 4

Regression of Quoted Spread, Effective Spread, and Quoted Depth on Lagged Total Block Ownership

Table 4 presents the results on regressions of quoted spread, effective spread, and quoted depth on lagged total block ownership. We first calculate time-series averages of all variables for each firm and then estimate a cross-sectional regression using these firm averages. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from DFGM (2006). Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Market capitalization, share price, and stock returns are from the CRSP stock database. Institutional ownership data are from Thomson Financial. QP is relative quoted spread. EP is relative effective spread. SUMBLKS is the lagged total block ownership. Institutional ownership (IO) is the fraction of total shares outstanding held by 13F institutions at the end of the previous calendar year. We normalize block and institutional ownership variables each year by their respective cross-sectional standard deviations. Numbers in parentheses are *t*-statistics.

	Dependent Variables					
Independent Variables	log(QP) (1)	log(QP) (2)	log(EP) (3)	log(EP) (4)	log(DEPTH) (5)	log(DEPTH) (6)
Intercept	1.518	–0.505	0.793	–0.955	8.334	1.232
	(14.98)	(–3.62)	(7.60)	(–6.14)	(38.84)	(4.19)
log(MARKET_CAP)	–0.216	–0.000	–0.192	0.013	0.409	–0.056
	(–29.08)	(–0.03)	(–25.16)	(0.97)	(26.07)	(–2.24)
log(PRICE)	–0.492	–0.483	–0.499	–0.503	–1.027	–0.276
	(–31.91)	(–30.17)	(–31.48)	(–28.09)	(–31.49)	(–8.17)
log(VOLATILITY)	0.095	0.513	0.161	0.549	–0.057	–0.278
	(4.22)	(23.51)	(6.97)	(22.48)	(–1.20)	(–6.04)
S&P_500	0.050	0.095	0.010	0.051	0.111	0.123
	(2.58)	(6.61)	(0.48)	(3.15)	(2.69)	(4.03)
IO	–0.051	–0.044	–0.069	–0.060	0.045	–0.135
	(–7.50)	(–7.78)	(–9.83)	(–9.40)	(3.14)	(–11.23)
log(#TRADES)		–0.335		–0.312		0.241
		(–28.30)		(–23.52)		(9.66)
log(TRADE_SIZE)		0.093		0.068		1.154
		(5.40)		(3.51)		(31.64)
SUMBLKS	0.056	–0.022	0.055	–0.017	–0.048	–0.003
	(8.14)	(–3.94)	(7.83)	(–2.72)	(–3.33)	(–0.23)
R^2	0.91	0.95	0.91	0.94	0.62	0.80

spread completely disappears. In fact, the block ownership coefficient (−0.022) becomes negative and significant.[16] This same pattern holds for effective spreads. The block ownership coefficient (0.055) is positive and significant before controlling for trading activity, and negative and significant (−0.017) after controlling for trading activity. Results on depth are consistent with those on quoted and effective spreads. The block ownership coefficient for depth (−0.048) is negative and significant before controlling for trading activity, suggesting that block ownership leads to lower depth (i.e., lower liquidity). After controlling for trading activity, the adverse effect of block ownership on depth again completely disappears. The coefficient on block ownership (−0.003) becomes insignificant.

Total liquidity costs can be partitioned into real friction costs and informational friction costs (Stoll (2000)). In Table 3 we show that block ownership increases the real friction costs by reducing trading activity. In Table 4 we show that block ownership increases the total liquidity costs (real and informational

[16]Using an alternative approach of six annual regressions, we find the block ownership coefficients become mostly *insignificant* after controlling for trading activity. We find similar results using change-in-variable regressions; that is, block ownership has *no* incremental impact on market liquidity beyond its impact on trading activity.

friction costs combined); that is, block ownership increases the firm's quoted and relative spreads (columns 1 and 3) and reduces its depth (column 5). However, after controlling for real friction costs (columns 2, 4, and 6), we show that block ownership either reduces or has no impact on informational friction costs. Taken together, our results suggest that the adverse liquidity effect of block ownership is due to its impact on trading activity—a real friction. Relative to diffusely owned firms, block ownership impairs liquidity by increasing real friction costs, not by increasing informational friction costs.

It is useful at this point to contrast our Table 4 results with the related findings in Heflin and Shaw (2000). Using a similar research design, Heflin and Shaw (2000) find a negative (positive) and significant relation between block ownership and bid-ask spreads (depths) after controlling for the number of trades and trade size. These results support their conclusion that blockholders increase liquidity costs because of their "access to private, value-relevant information" (p. 621). This conclusion implies that block ownership has a negative impact on market liquidity through informational friction. Although we confirm the negative (net) effect of block ownership on liquidity, our Table 4 results show that adverse liquidity effects are due to real friction costs. Differences between their study and ours are likely due to different samples (i.e., Heflin and Shaw's (2000) 260 security-year observations versus our 5,537 security-year observations).

In Table 5 we examine our Table 4 findings in greater detail by disaggregating the blockholder data into inside, outside, and ESOP block ownership. Before controlling for real friction effects (column 1), we find that the coefficients on inside and outside block ownership (0.031 and 0.057, respectively) are positive and significant, while the ESOP coefficient (−0.012) is negative and insignificant. The outside block ownership coefficient is significantly larger than the other two, suggesting that outsiders have the most adverse effect on quoted spreads. After controlling for real friction effects (column 2), these coefficients become either significantly negative or insignificant.

We observe similar results for effective spreads in columns 3 and 4 of Table 5. Before controlling for real friction effects (column 3), we have positive and significant coefficients for inside (0.029) and outside (0.058) block ownership. These results suggest that both inside and outside block ownership lead to wider effective spreads. The ESOP coefficient (−0.015) is negative and significant. The outside block ownership coefficient is again significantly larger than the other two coefficients. After controlling for real friction effects, the adverse liquidity effect of inside and outside block ownership completely disappears and is even reversed for inside blockholders. These results are similar to our quoted spread results (column 2).

Our depth regression (column 5 of Table 5) reveals a negative and significant relation between inside block ownership (−0.063) and depths, a negative and significant relation between ESOPs (−0.046) and depths, and an insignificant relation between outside block ownership (−0.002) and depths. These findings suggest that outside block ownership has a more detrimental impact on spreads than depths. After controlling for real friction effects (column 6), we find that the coefficients for inside block ownership (−0.021) and for ESOPs (−0.023) remain negative, but their magnitudes are substantially reduced and are only marginally

TABLE 5

Regression of Quoted Spread, Effective Spread, and Quoted Depth on Lagged Block Ownership by Type

Table 5 presents the results on regressions of quoted spread, effective spread, and quoted depth on lagged block ownership by type. We first calculate time-series averages of all variables for each firm and then estimate a cross-sectional regression using these firm averages. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from DFGM (2006). Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Market capitalization, share price, and stock returns are from the CRSP stock database. Institutional ownership data are from Thomson Financial. QP is relative quoted spread. EP is relative effective spread. SUMIN is the lagged total ownership by inside blockholders, including officers, directors, and affiliates. SUMOUT is the lagged ownership by outside blockholders. SUMESOP is the lagged ownership by employee stock option plans. Institutional ownership (IO) is the fraction of total shares outstanding held by 13F institutions at the end of the previous calendar year. We normalize block and institutional ownership variables each year by their respective cross-sectional standard deviations. Numbers in parentheses are t-statistics.

	Dependent Variables					
Independent Variables	log(QP) (1)	log(QP) (2)	log(EP) (3)	log(EP) (4)	log(DEPTH) (5)	log(DEPTH) (6)
Intercept	1.543	–0.470	0.821	–0.905	8.374	1.334
	(15.29)	(–3.36)	(7.91)	(–5.80)	(39.21)	(4.53)
log(MARKET_CAP)	–0.215	0.001	–0.191	0.014	0.413	–0.053
	(–29.07)	(0.07)	(–25.15)	(1.06)	(26.46)	(–2.12)
log(PRICE)	–0.492	–0.484	–0.499	–0.505	–1.024	–0.279
	(–32.09)	(–30.30)	(–31.68)	(–28.28)	(–31.58)	(–8.31)
log(VOLATILITY)	0.090	0.511	0.156	0.545	–0.061	–0.284
	(4.03)	(23.32)	(6.801)	(22.28)	(–1.30)	(–6.16)
S&P_500	0.055	0.097	0.015	0.053	0.120	0.128
	(2.83)	(6.75)	(0.74)	(3.31)	(2.93)	(4.21)
IO	–0.057	–0.050	–0.076	–0.067	0.018	–0.150
	(–7.59)	(–8.18)	(–9.86)	(–9.80)	(1.16)	(–11.69)
log(#TRADES)		–0.334		–0.310		0.243
		(–28.17)		(–23.39)		(9.75)
log(TRADE_SIZE)		0.090		0.064		1.145
		(5.21)		(3.29)		(31.46)
SUMIN	0.031	–0.021	0.029	–0.020	–0.063	–0.021
	(4.93)	(–4.27)	(4.51)	(–3.48)	(–4.70)	(–1.98)
SUMESOP	–0.012	–0.013	–0.015	–0.016	–0.046	–0.023
	(–1.81)	(–2.64)	(–2.16)	(–2.91)	(–3.20)	(–2.19)
SUMOUT	0.057	–0.011	0.058	–0.004	–0.002	0.022
	(7.68)	(–1.79)	(7.64)	(–0.60)	(–0.13)	(1.76)
Coefficient Tests (p-value)						
SUMIN = SUMESOP	0.0001	0.0299	0.0001	0.2556	0.2319	0.8173
SUMOUT = SUMESOP	0.0001	0.4002	0.0001	0.5549	0.0526	0.0241
SUMIN = SUMOUT	0.0122	0.2173	0.0048	0.0747	0.0013	0.0066
R^2	0.91	0.95	0.91	0.94	0.63	0.80

significant. The two negative coefficients are evidence that inside and ESOP block ownership increase informational friction costs in the depth dimension of liquidity. However, when combined with outside block ownership (see Table 4), the overall effect of informational friction on depth is insignificant. In contrast, the effect of real friction on depth is consistently (and significantly) negative.

In summary, our results in Tables 3, 4, and 5 indicate that block ownership, at both aggregate and disaggregated levels, has a direct impact on trading activity; and by reducing the firm's trading activity, it has an indirect impact on market liquidity (i.e., a real friction effect). We find little to no evidence that block ownership increases the firm's informational friction costs. If blockholders had been responsible for increasing the firm's informational friction, then we would have found wider spreads and lower depths after controlling for the real friction effects of reduced trading activity.

D. Additional Liquidity Measures: Adverse Selection and Price Impact

In this section we examine the effect of block ownership on the adverse selection component of the bid-ask spread as well as the price impact of trading. If blockholders exacerbate informational friction costs (over and above real friction costs), then adverse selection costs and price impact should increase after controlling for the reduction in trading activity. We estimate regression model (6) using three measures of adverse selection as our dependent variable (ADV_SELECTION).

$$(6)\quad \text{ADV\_SELECTION}_i = \beta_0 + \beta_1\log(\text{MARKET\_CAP}_i) + \beta_2\log(\text{PRICE}_i) + \beta_3\log(\text{VOLATILITY}_i) + \beta_4\text{S\&P\_500}_i + \beta_5\text{IO}_i + \beta_6\log(\text{\#TRADES}_i) + \beta_7\log(\text{TRADE\_SIZE}_i) + \beta_8\text{BLOCK}_i + \varepsilon_i.$$

Our adverse selection estimates follow the methods of GH (1988), HS (1997), and LSB (1995) as described in Section II.B. As in the previous section, we fit two regressions for each dependent variable, one with trading activity control variables and one without. We again estimate the above cross-sectional regression model using each firm's time-series averages for both dependent and independent variables.[17]

In Table 6 we report the GH (1988), HS (1997), and LSB (1995) adverse selection results for aggregate block ownership. In the GH (1988) model (column 1) the aggregate block ownership coefficient (0.116) is positive and significant without trading activity controls. This same coefficient is positive and significant without the trading activity controls in the HS (1997) and LSB (1995) models (0.061 and 0.033, respectively) reported in columns 3 and 5. Consistent with our liquidity results in Table 4, block ownership increases the information component of bid-ask spreads because of its impact on trading activity.[18] After we control for the real friction costs associated with reduced trading activity, the aggregate block ownership coefficient (−0.022) is negative and significant in the GH (1988) model (column 2). This same coefficient is negative (positive) and insignificant in the HS (1997) (LSB (1995)) model reported in column 4 (6). Again, these results are consistent with our liquidity findings in Table 4 after controlling for the real friction effects of block ownership. The reduction in the firm's liquidity is entirely

[17] The results reported here are based on adverse selection estimates using firm-month data. The resulting firm-month estimates are then averaged over the firm-year. We exclude any negative estimates before averaging over the firm-year. In our sample, 0.73% (0.02%) of our adverse selection estimates are negative (and significant) using the GH (1988) model, 0.26% (0.07%) of the estimates are negative (and significant) using the HS (1997) model, and 0.13% (0.01%) of the estimates are negative (and significant) using the LSB (1995) model. Our results are robust to including these negative firm-month estimates before averaging over the firm-year. Our results are also robust to estimating adverse selection components using firm-year data.

[18] Stoll (2000) also finds an inverse relation between trading activity and informational friction. He states: "The informational component tends to be negatively associated with activity measures such as volume or number of shares. This is reasonable if we recall that what is being measured is the adverse information friction in one trade. Of two stocks with the same potential for adverse information over the trading day, the one with greater trading volume will have a smaller adverse information effect per trade" (p. 1508). In a parallel manner, we find that the firm with lower trading volume (due to block ownership) has a larger adverse information effect per trade.

attributable to the real friction effects of block ownership. To the extent that block ownership has any effect on informational friction, it mitigates or offsets some of the adverse real friction effects.

TABLE 6

Regression of Adverse Selection Costs on Lagged Total Block Ownership

Table 6 presents the results on regressions of adverse selection costs on lagged total block ownership. We first calculate time-series averages of all variables for each firm and then estimate a cross-sectional regression using these firm averages. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from DFGM (2006). Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Market capitalization, share price, and stock returns are from the CRSP stock database. Institutional ownership data are from Thomson Financial. GH (1988), HS (1997), and LSB (1995) are measures of the adverse selection component of spreads as defined in equations (1)–(3) in Section II.B. SUMBLKS is the lagged total block ownership. Institutional ownership (IO) is the fraction of total shares outstanding held by 13F institutions at the end of the previous calendar year. We normalize block and institutional ownership variables each year by their respective cross-sectional standard deviations. Numbers in parentheses are *t*-statistics.

	Dependent Variables					
Independent Variables	log(GH) (1)	log(GH) (2)	log(HS) (3)	log(HS) (4)	log(LSB) (5)	log(LSB) (6)
Intercept	–0.334	–1.736	–0.675	–5.568	–0.212	1.376
	(–2.42)	(–11.53)	(–3.95)	(–21.71)	(–2.16)	(8.14)
log(MARKET_CAP)	–0.431	0.039	–0.187	–0.097	–0.115	0.034
	(–42.61)	(3.02)	(–14.96)	(–4.44)	(–16.09)	(2.38)
log(PRICE)	0.149	–0.035	0.220	0.495	0.208	0.013
	(7.08)	(–3.01)	(8.46)	(16.77)	(13.93)	(0.65)
log(VOLATILITY)	0.131	0.864	–0.210	0.206	–0.144	–0.061
	(4.27)	(36.63)	(–5.55)	(5.12)	(–6.64)	(–1.19)
S&P_500	–0.009	0.061	0.021	0.078	–0.065	–0.062
	(–0.33)	(3.91)	(0.62)	(2.93)	(–3.44)	(–3.55)
IO	–0.079	–0.021	0.001	–0.055	0.044	0.092
	(–8.49)	(–3.37)	(0.06)	(–5.25)	(6.74)	(13.30)
log(#TRADES)		–0.605		–0.310		–0.107
		(–47.20)		(–14.23)		(–7.43)
log(TRADE_SIZE)		–0.152		0.517		–0.289
		(–8.14)		(16.24)		(–13.76)
SUMBLKS	0.116	–0.022	0.061	–0.015	0.033	0.010
	(12.46)	(–3.54)	(5.33)	(–1.40)	(4.93)	(1.52)
R^2	0.86	0.95	0.36	0.58	0.46	0.54

In Table 7 we examine our adverse selection findings in greater detail by disaggregating block ownership into inside, outside, and ESOP blockholders. Before controlling for trading activity, we find mostly positive and significant block ownership coefficients. For the GH (1988) model (column 1), the coefficients for inside and outside block ownership (0.079 and 0.100, respectively) are positive and significant, while the ESOP coefficient is insignificant. The results are similar for the HS (1997) and LSB (1995) models in columns 3 and 5, respectively. After controlling for trading activity, the GH (1988) coefficients for inside and outside block ownership (−0.017 and −0.015, respectively) are negative and significant, while the ESOP coefficient remains insignificant. For the HS (1997) model in column 4, the inside block ownership coefficient is negative and significant, while the outside and ESOP block ownership coefficients are insignificant. All of these GH (1988) and HS (1997) results are consistent with the hypothesis that block ownership's detrimental effect on firm liquidity is due to its impact on real friction costs, not informational friction costs. We do find some evidence of informational friction cost in the LSB (1995) model (column 6). However, when combined with outside block ownership (see Table 6), the overall effect of informational friction on adverse selection is insignificant. The real friction effects on adverse selection, in contrast, are consistently (and significantly) positive.

TABLE 7

Regression of Adverse Selection Costs on Lagged Block Ownership by Type

Table 7 presents the results on regressions of adverse selection costs on lagged block ownership by type. We first calculate time-series averages of all variables for each firm and then estimate a cross-sectional regression using these firm averages. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from DFGM (2006). Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Market capitalization, share price, and stock returns are from the CRSP stock database. Institutional ownership data are from Thomson Financial. GH (1988), HS (1997), and LSB (1995) are measures of the adverse selection component of spreads as defined in equations (1)–(3) in Section II.B. SUMIN is the lagged total ownership by inside blockholders, including officers, directors, and affiliates. SUMOUT is the lagged ownership by outside blockholders. SUMESOP is the lagged ownership by employee stock option plans. Institutional ownership (IO) is the fraction of total shares outstanding held by 13F institutions at the end of the previous calendar year. We normalize block and institutional ownership variables each year by their respective cross-sectional standard deviations. Numbers in parentheses are *t*-statistics.

	Dependent Variables					
Independent Variables	log(GH) (1)	log(GH) (2)	log(HS) (3)	log(HS) (4)	log(LSB) (5)	log(LSB) (6)
Intercept	–0.308	–1.722	–0.642	–5.526	–0.232	1.312
	(–2.23)	(–11.35)	(–3.77)	(–21.43)	(–2.37)	(7.75)
log(MARKET_CAP)	–0.431	0.039	–0.185	–0.095	–0.117	0.034
	(–42.66)	(3.02)	(–14.82)	(–4.33)	(–16.35)	(2.35)
log(PRICE)	0.147	–0.035	0.221	0.494	0.207	0.015
	(7.03)	(–2.03)	(8.52)	(16.74)	(13.92)	(0.76)
log(VOLATILITY)	0.125	0.863	–0.215	0.205	–0.141	–0.025
	(4.09)	(36.31)	(–5.71)	(5.06)	(–6.54)	(–0.95)
S&P_500	–0.005	0.062	0.027	0.080	–0.069	–0.065
	(–0.17)	(3.96)	(0.83)	(3.01)	(–3.68)	(–3.74)
IO	–0.078	–0.023	–0.012	–0.064	0.054	0.099
	(–7.65)	(–3.49)	(–0.97)	(–5.68)	(7.48)	(13.35)
log(#TRADES)		–0.604		–0.310		–0.109
		(–46.89)		(–14.16)		(–7.61)
log(TRADE_SIZE)		–0.153		0.513		–0.284
		(–8.18)		(16.08)		(–13.55)
SUMIN	0.079	–0.017	0.026	–0.021	0.032	0.014
	(9.17)	(–3.07)	(2.48)	(–2.28)	(5.25)	(2.30)
SUMESOP	–0.001	–0.008	–0.017	–0.011	0.025	0.019
	(–0.10)	(–1.55)	(–1.53)	(–1.14)	(3.80)	(3.11)
SUMOUT	0.100	–0.015	0.072	0.001	0.013	–0.002
	(9.90)	(–2.33)	(5.80)	(0.10)	(1.87)	(–0.29)
Coefficient Tests (p-value)						
SUMIN = SUMESOP	0.0001	0.2978	0.0088	0.3995	0.3187	0.5552
SUMOUT = SUMESOP	0.0001	0.4539	0.0001	0.5640	0.2018	0.0187
SUMIN = SUMOUT	0.1360	0.8339	0.0060	0.1403	0.0202	0.0445
R^2	0.86	0.95	0.36	0.59	0.49	0.59

Next we use regression model (6) to examine the effect of block ownership on the price impact of trading by replacing the adverse selection dependent variable with Amihud's (2002) price impact measure. The Amihud (2002) price impact measure of illiquidity is defined as the absolute value of daily stock returns divided by daily trading volume. The results in Table 8 exhibit the same general pattern that we have observed in our previous tables. The aggregate block ownership coefficient (0.614) is positive and significant before controlling for the number of trades and average trade size. When we add these controls, the aggregate block ownership coefficient becomes insignificant. We observe similar results in columns 3 and 4. In column 3, the inside and outside block ownership coefficients (0.449 and 0.490, respectively) are positive and significant, while the ESOP coefficient (−0.005) is negative and insignificant. After adding the real friction controls (column 4), none of the block ownership coefficients is significant. Overall, these results confirm that block ownership adversely affects firm liquidity (price impact, in this case) through its real friction impact on trading activity. Once we control for the reduction in trading activity, we find no evidence that liquidity is adversely affected through informational friction.

TABLE 8

Regression of Amihud's Price Impact Measure on Lagged Block Ownership

Table 8 presents the results on regressions of Amihud's price impact measure on lagged block ownership. We first calculate time-series averages of all variables for each firm and then estimate a cross-sectional regression using these firm averages. The sample period for block ownership is from 1996 to 2001. Our sample includes only stocks traded on NYSE or AMEX. Block ownership data are from DFGM (2006). Trading activity and liquidity variables are calculated using data from the Trade and Quote Database (TAQ). Market capitalization, share price, and stock returns are from the CRSP stock database. Institutional ownership data are from Thomson Financial. SUMBLKS is the lagged total block ownership. SUMIN is the lagged total ownership by inside blockholders, including officers, directors, and affiliates. SUMOUT is the lagged ownership by outside blockholders. SUMESOP is the lagged ownership by employee stock option plans. Institutional ownership (IO) is the fraction of total shares outstanding held by 13F institutions at the end of the previous calendar year. We normalize block and institutional ownership variables each year by their respective cross-sectional standard deviations. Numbers in parentheses are *t*-statistics.

	Dependent Variables: Amihud's Price Impact Measure			
Independent Variables	(1)	(2)	(3)	(4)
Intercept	15.118	16.936	15.252	17.040
	(13.63)	(9.81)	(13.73)	(9.81)
log(MARKET_CAP)	–1.373	1.512	–1.376	1.509
	(–16.92)	(10.30)	(–16.94)	(10.23)
log(PRICE)	–0.937	–2.764	–0.947	–2.766
	(–5.56)	(–13.92)	(–5.62)	(–13.92)
log(VOLATILITY)	0.538	4.423	0.506	4.408
	(2.19)	(16.358)	(2.06)	(16.19)
S&P_500	1.478	1.804	1.496	1.810
	(6.91)	(10.09)	(6.99)	(10.10)
IO	–0.707	–0.199	–0.680	–0.200
	(–9.51)	(–2.82)	(–8.26)	(–2.63)
log(#TRADES)		–3.273		–3.267
		(–22.31)		(–22.14)
log(TRADE_SIZE)		–2.167		–3.055
		(–10.12)		(–4.02)
SUMBLKS	0.614	–0.121		
	(8.22)	(–1.72)		
SUMIN			0.449	–0.074
			(6.47)	(–1.18)
SUMESOP			–0.005	–0.070
			(–0.07)	(–1.13)
SUMOUT			0.490	–0.103
			(6.04)	(–1.41)
Coefficient Tests (p-value)				
SUMIN = SUMESOP			0.0021	0.9761
SUMOUT = SUMESOP			0.0037	0.8646
SUMIN = SUMOUT			0.9032	0.8275
R^2	0.60	0.72	0.60	0.72

E. Robustness Tests

We conduct a series of robustness tests.[19] First, we reestimate models (4), (5), and (6) for each year in our sample (i.e., six annual regressions) and then examine the magnitude and significance of the annual coefficients. This set of regressions confirms that block ownership i) reduces trading activity and increases real friction costs, ii) impairs market liquidity through its impact on real friction costs, and iii) does not impair market liquidity through its impact on informational friction costs.[20]

Second, we reestimate models (4), (5), and (6) using change-in-variable regressions. We examine how annual changes in block ownership affect changes in trading activity, market liquidity, and informational costs. Although the change-in-variable results are somewhat weaker than the level regression results, the estimated coefficients show that increases in block ownership lead to reductions in trading activity and market liquidity. More importantly, the change-in-variable regressions confirm that the negative liquidity effect of block ownership is attributable to real friction costs, not informational friction costs.

Third, we reestimate models (4), (5), and (6) using NASDAQ-listed firms instead of NYSE/AMEX-listed firms. Bessembinder (1999) shows that transaction cost differences between NYSE/AMEX- and NASDAQ-listed firms cannot be fully explained by differences in firm characteristics. This result suggests the need for a separate analysis based on NASDAQ-listed firms before we can generalize our findings. In addition to cross-sectional regressions based on time-series averages across all 6 years, we also estimate six annual regressions using level data as well as change-in-variable regressions. The NASDAQ results are consistent with the NYSE/AMEX results reported here.

Fourth, we examine the possibility that our results are subject to endogeneity. While endogeneity is a general concern with block ownership data, it is unlikely to be driving our results. It is not at all obvious why blockholders would prefer stocks with *lower* trading activity and *lower* liquidity. Nevertheless, we perform a direct test of endogeneity based on a two-stage regression approach described in Wu (1973), Hausman (1978), and Heflin and Shaw (2000). Our first-stage regressions fit the data reasonably well, and our second-stage regressions show that endogeneity is not a serious problem in our sample.

F. Summary of Main Results

In Table 9 we summarize the predicted relations between block ownership and various trading and liquidity variables, as well as the actual relations (in parentheses) between these variables documented in Tables 3 through 8 and the robustness section. Overall, our empirical results show that block ownership

[19]Due to space constraints, we do not report the results for these robustness tests in tables. These results are available from the authors.

[20]Our block ownership coefficients in Tables 4–7 are often negative and significant after controlling for trading activity. These same coefficients are mostly insignificant in annual regressions. In neither case, however, does block ownership impair market liquidity through informational friction costs. That is, all effects adverse to liquidity are attributable to real friction costs.

impairs the firm's market liquidity by reducing its trading activity, and not by increasing its asymmetric information costs. First, we document a strong negative impact of block ownership on turnover. Second, we find block ownership negatively impacts various liquidity measures before controlling for trading activity. Third, after controlling for trading activity, the adverse effect of block ownership either disappears or is reversed.

TABLE 9

Predicted and Actual Signs on Block Ownership Coefficients

Table 9 presents the predicted and actual signs on block ownership coefficients of regressions of turnover, quoted spread, effective spread, quoted depth, adverse selection measures, and price impact. Predicted signs are listed outside the parentheses, while actual signs are listed inside the parentheses. We report two results in parentheses (e.g., (0 / –)) whenever there are differences between the pooled regression results in Tables 3 through 8 and the annual regression results as described in our robustness section. +, –, and 0 indicate positive significant, negative significant, and insignificant, respectively.

Panel A. Before Controlling for Trading Activity Variables

Block Variables	Dependent Variables TURNOVER	QP	EP	DEPTH	GH	HS	LSB	Amihud
SUMBLKS	– (–)	+ (+)	+ (+)	– (–)	+ (+)	+ (+)	+ (+)	+ (+)
SUMIN	– (–)	+ (+)	+ (+)	– (–)	+ (+)	+ (+)	+ (+)	+ (+)
SUMOUT	– (–)	+ (+)	+ (+)	– (0)	+ (+)	+ (+)	+ (0 / +)	+ (+)
SUMESOP	– (–)	+ (0)	+ (0 / –)	– (0 / –)	+ (0)	+ (0)	+ (0 / +)	+ (0)

Panel B. After Controlling for Trading Activity Variables

Block Variables	Dependent Variables QP	EP	DEPTH	GH	HS	LSB	Amihud
SUMBLKS	0 (0 / –)	0 (0 / –)	0 (0)	0 (0 / –)	0 (0)	0 (0)	0 (0)
SUMIN	0 (0 / –)	0 (0 / –)	0 (+ / –)	0 (0 / –)	0 (0 / –)	0 (0 / +)	0 (0)
SUMOUT	0 (0)	0 (0)	0 (0)	0 (0 / –)	0 (0)	0 (0)	0 (0)
SUMESOP	0 (0 / –)	0 (0 / –)	0 (0 / –)	0 (0)	0 (0)	0 (0 / +)	0 (0)

IV. Conclusion

This study provides an analysis of block ownership's effect on liquidity. Our tests reveal that block ownership significantly reduces the firm's trading activity relative to a diffuse ownership structure. This result occurs primarily through fewer trades rather than a decline in the average trade size. The reduced trading activity has a real friction effect on the firm's liquidity: Block ownership increases the firm's bid-ask spread, increases the adverse selection component, increases the price impact, and decreases the depth. After controlling for this real friction effect, we find no evidence that block ownership has an informational friction effect: Block ownership does not adversely affect spread, depth, adverse selection components, or price impact after controlling for the reduction in trading activity. Because blockholders increase liquidity costs (through their real friction effects), higher block ownership may be associated with higher returns to the extent that liquidity risk is priced. Moreover, the lack of a relation between blockholders and informational frictions suggests that either: i) blockholders do not have an informational advantage, ii) they have an informational advantage but do not use it (perhaps due to regulatory concerns), or iii) they have and use an informational advantage, but markets fail to account for it.

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