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Insider Holdings and Perceptions of Information Asymmetry: A Note

RAYMOND CHIANG and P. C. VENKATESH*

RESEARCHERS HAVE FOUND THAT trades by corporate insiders yield excess profits (for example, Finnerty [9] and Jaffe [11]). In an efficient capital market, we should expect other market participants to consider this in their investment/trading decisions. Demsetz [7] notes that, to protect themselves, ordinary (uninformed) investors may adopt a buy-and-hold strategy but incur the “cost of illiquidity” in doing so. Therefore, he argues, the recorded rates of return (measured before losses to insiders) should be higher for stocks more likely to present outsiders with informationally disadvantageous trades. Based on a 159-firm sample, he finds that there is a significant positive correlation between the recorded market rates of return and the ratio of insider trading to total trading. In this paper, we study the market’s perception of information asymmetry between insiders and outsiders through the behavior of another group of traders—the dealers/specialists. The degree of information asymmetry is proxied here by the concentration of insider holdings.

The dealer/specialist provides the trading public the service of immediacy by standing ready to buy and sell. He or she incurs, in the process, inventory holding costs and information trading costs, which are the expected losses due to transactions with informed traders. Therefore, the dealer/specialist sets the bid-ask spread (his or her source of revenue) according to the anticipated levels of these costs. In particular, it has been shown that the higher the information trading cost, the wider the spread should be (Jaffe and Winkler [12], Copeland and Galai [6], and Glosten and Milgrom [10]). Thus, *ceteris paribus*, a higher degree of information asymmetry leads to a larger bid-ask spread. The question, then, is what factors influence the dealer’s assessment of information asymmetry. One convenient measure is the extent of insider holdings. Corporate insiders have access to nonpublic firm-specific information and exercise a good deal of corporate control. We use the percentage of ownership by corporate insiders as a proxy for the degree of information asymmetry faced by the dealer. A positive correlation between spreads (net of holding costs and firm-size effects) and insider holdings would imply that dealers perceive a positive relationship between insider holdings and information asymmetry.

We also study how the market views institutional holdings through the effect on bid-ask spread. Compared with the typical stockholder, institutions tend to hold larger blocks of a firm’s stock; thus, their information acquisition costs are spread over a larger investment, creating an incentive to acquire information.

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However, as Demsetz notes, institutional owners differ from corporate insiders in that they do not specialize their portfolios, hold relatively smaller fractions of a firm's stocks, and, of course, do not have direct access to nonpublic information. These differences may reflect the legal and fiduciary constraints facing institutional investors.¹ It is an empirical question whether the dealer regards institutional holdings as a measure of information trading.

By examining the impact of insider holdings and firm size on the dealer's spread, our analysis can also shed some light on the widely documented firm-size anomaly in the literature. Often, researchers have attributed the higher returns earned by small firms to the relative scarcity of information about these firms (for example, Barry and Brown [3] and Arbel and Strebel [2]).² In a recent paper, Amihud and Mendelson [1] suggest that expected asset returns are increasing in the (relative) bid-ask spread. Consequently, the observed small-firm anomaly is the result of their illiquidity, which is also reflected in larger bid-ask spreads. Alternatively, Williams [25] hypothesizes that the small-firm effect may actually be an asymmetric-information effect. Because a smaller firm often has a smaller number of insiders and hence retains more inside information, this poses a greater adverse-selection problem to the dealer. The resulting higher spreads lead to higher expected returns for smaller firms in equilibrium (via Amihud and Mendelson [1]).³ In this paper, the concentration of insider holdings serves as a proxy for the degree of information asymmetry. If insider holdings were found to impact positively upon the dealer's spread, it would provide a partial empirical confirmation of Williams' explanation.

The rest of the paper is organized as follows. Section I contains a literature review. The data and hypotheses are discussed in Section II. Section III presents the tests and results. The paper is summarized in Section IV.

I. Literature Review

Empirical research on bid-ask spreads has been concentrated on examining the determinants of the variation in spread across stocks, as exemplified by two recent, widely cited papers by Benston and Hagerman [4] and Stoll [20]. Both papers recognize that differences in information trading costs may explain some of the cross-sectional variation in the spread and include proxies for that purpose, but they conclude that further research relating the spread to better measures of information trading is required. The present study uses the theory and the empirical work from Stoll [19, 20] as basic starting points. Stoll [20] regresses the percentage spread against the price per share, the trading volume, measures of risk (variability of returns), and other variables that measure competition and the capital of the dealers. Trading volume and risk measures are included because

¹ Since institutions do not specialize their investments as dominant individuals and family owners do, there is little incentive for institutional investors to monitor management. However, they may spend more resources than an average investor in analyzing the public information released by the firms. Thus, they may make the market more efficient in the semi-strong sense.

² Chan et al. [5] and Merton [14] provide some different perspectives on this issue.

³ We are grateful to the reviewer for pointing this out.

they affect the dealer's holding cost. Price per share is included as a proxy for the unobservable minimum cost. As per theoretical predictions, Stoll finds that spreads are negatively related to price and volume and positively related to risk/variability of returns.

The proxies for information trading used by Stoll and Benston and Hagerman are indirect but appear to have explanatory power. Stoll uses the turnover ratio (shares traded to shares outstanding) and finds the regression coefficient to be positive and significant. Benston and Hagerman also find a significant and positive coefficient for unsystematic risk in their regression and argue that this reflects in part an information trading cost because unsystematic risk and insider holdings are positively correlated.⁴

The empirical association between information asymmetry and the bid-ask spread is the subject of papers by Morse and Ushman [15] and Venkatesh and Chiang [24]. Hypothesizing that information asymmetry is likely to be higher before earnings and dividend announcements, Venkatesh and Chiang employ time-series data on spreads to ascertain whether spreads have increased during those pre-announcement periods. This is done by examining whether pre-announcement spreads are significantly higher than "expected," i.e., net of anticipated holding costs and normal information trading costs. Their results suggest that the dealer suspects an increase in information asymmetry whenever the second announcement is delayed from the first by at least ten days.⁵ Furthermore, their work provides a model for evaluating information asymmetry through the dealer's spread.

II. Data and Hypotheses

Closing bid and ask quotes were collected for a sample of seventy-five NYSE stocks from the Francis Emory Fitch publications for the period January 1, 1973 to December 31, 1973, which included 251 trading days.⁶ The daily trading volume was obtained from the ISL tapes. Earnings and dividend announcement dates were obtained from *The Wall Street Journal*. The sample eventually contains sixty-three different firms.

We consider informed traders as those individuals who have access to nonpublic information. Our proxy for informed trading attempts to capture this characteristic via the shareholdings of corporate insiders. Data on the fraction of a firm's outstanding shares held by corporate insiders (who have access to nonpublic information), denoted by *INSDH*, are collected from the *Value Line* publications and are available for thirty-seven firms. We should note that this definition specifically excludes large shareholdings by outsiders. The larger is *INSDH*, the larger is the proportion of shares held by informed traders and, hence, the greater is the threat of informed trading.

⁴ Evidence on this issue can be found in Demsetz and Lehn [8].

⁵ Venkatesh and Chiang [24] also find that the holding-cost component increases prior to the announcements.

⁶ We use data from 1973 because, in a separate study, we wish to examine the impact on bid-ask spreads of the introduction of organized options markets (in 1973).

The percentages of insider holdings (*INSDH*) by quartiles in our sample are, respectively, 0.5, 2.5, twelve, and forty-four percent. The insider holdings of some firms are small because these are stocks traded over the NYSE and large holdings by outsiders are excluded.

Moody's Handbook of Common Stocks provides data on the number of institutional investors in a firm and their total holdings. Since these figures are likely to be related to the size of the firm, we scale these variables by the total shares outstanding, resulting in the proportion of outstanding shares held by institutions. Averaging the total institutional holdings by the number of institutions gives a measure of the concentration of institutional holdings (*INTCONC*).⁷ Similar statistics on the remaining stockholders (those who do not fall into either of the above groups) are also obtained from *Moody's Handbook*.

The main issues we are investigating are (a) the relationship between the dealer's spread and insider holdings, (b) whether firm size can affect the effectiveness of insider holdings as a proxy for information asymmetry, and (c) the relationship between the dealer's spread and institutional holdings. The findings of the first issue will directly confirm the hypothesized relationship between information asymmetry and spread. Such findings can also serve as partial support for Williams' explanation for the small-firm effects via the Amihud and Mendelson argument that expected asset returns are increasing in spread. The second issue studies the robustness of insider holdings as the proxy for information asymmetry. In a regression, if the inclusion of firm size has little or no effect on the significance of insider holdings, it will strengthen the argument that information asymmetry (*vis-à-vis INSDH*) has a positive impact on the spread and the expected return of a security. The third issue deals with examining Demsetz's conjecture that institutional investors do not behave like informed traders because they are bound by legal and fiduciary constraints and because they do not specialize in their portfolios. In testing for whether insider holdings and institutional holdings influence the spread through the information trading cost, it is necessary to adjust for the holding costs. Our test procedures take these adjustments into account.

III. Tests and Results

A. Preliminary Findings

We compute, for each firm, the mean values of the daily percentage spread (*APS*) and the daily volume (*VOL*) from the time series of 251 daily observations. This mean value is taken to be the typical or normal value of that variable for that firm. The price variability is measured by the time-series variance of the daily returns computed by the average of the daily closing bid and ask prices (*VRBA*). This assumes that, on average, the true price lies midway between the bid and the ask.⁸

⁷ A detailed breakdown of holdings of each stock by individual institutions proved difficult to obtain.

⁸ We are grateful for the reviewer's suggestion of using *VRBA*. This is also consistent with Roll's [16] assumption and Stoll's [18] findings that the dealer's inventory levels regress toward zero.

As a preliminary evaluation, we use the thirty-third and sixty-sixth percentiles of the cross-sectional distributions of average percentage spread to classify each firm into a low-, medium-, or high-*APS* group. Simple bivariate analysis (by groups) indicates that *APS* is inversely related to the market value of equity, price per share, volume, shares outstanding, number of shareholders, number of institutional holders, and institutional holdings. These findings are consistent with other studies.⁹ Consequently, we just present the summary characteristics of spreads, prices, and ownership control in Table I.

B. Regression Results—Impact of Insider Holdings

In examining the impact of insider holdings on spread, we run four regressions. The first two are base or reference regressions for, respectively, the entire sample and the subsample of firms for which insider data are available. These base regressions include the holding cost variables: natural log of trading volume (*VOL*) and price variability proxied by *VRBA*. The third regression adds *INSDH*, the information-asymmetry proxy, to the set of independent variables. If the information-asymmetry proxy has explanatory power over and above the reference equation, we should observe (a) a significant *t*-value for the information variable, and (b) a higher adjusted R^2 .¹⁰ The fourth regression further includes the market value of equity. Note that insider trading can be affected by the depth and resiliency of a security.¹¹ On the other hand, firm size may be a surrogate for depth and resiliency above and beyond trading volume and price variability. If the presence of firm size affects only the significance of the holding-cost variables (trading volume and price variability), and not the information-asymmetry proxy, it will further strengthen the support for Williams' hypothesis that the small-firm effect may (at least partially) be an asymmetric-information effect.

The regression results for insider holdings are presented in Panel A of Table II. The reference regressions, 1 and 2a, indicate that the regression coefficients of the holding-cost variables—*VOL* and *VRBA*—are of the right signs and highly significant.¹² The adjusted R^2 is also large. In regression 2b, insider holdings are added to the independent variables to determine whether *INSDH* helps to explain cross-sectional variation in the spread. Though the $\bar{R}^2$ increases by only one

⁹ For example, see Stoll and Whaley [21] and Amihud and Mendelson [1].

¹⁰ Except for the absence of price per share, the variables for holding costs are consistent with Tinic [22], Tinic and West [23], Stoll [20], and Venkatesh and Chiang [24]. The inclusion of *MV*, however, alleviates any problem (missing holding costs) caused by the absence of price per share. With the correlation coefficient between *MV* and price per share being 0.86, including both *MV* and price per share would lead to severe multicollinearity problems. The natural logarithmic transformation of the independent variable is consistent with the cross-sectional studies of bid-ask spread (for example, Stoll [18, 20] and Benston and Hagerman [4]). Similar results are obtained when *MV* is replaced by price per share or when volatility is measured by the difference of daily high and low.

¹¹ See Kyle [13].

¹² Comparing regressions 1 and 2a, we note that the parameter estimates and other statistics are affected somewhat by the set of observations included in the regression. In the present case, this is due more to a "selection bias" than to multicollinearity. The selection bias arises from the fact that firms for which insider-holdings data are unavailable tend to be firms with low market value and low price per share, so that the nonlinearity with respect to the holding-cost/firm-size variables) is not as pronounced for the latter regression.

Table I
Summary Characteristics of Spreads, Prices, and Ownership Control

	Mean	Median	Standard or Variance Deviation	N ^a
Spread (%)— <i>APS</i>	1.08	0.94	0.80	63
Market Value of Equity (millions of dollars)— <i>MV</i>	2,357	440	566	63
Price Per Share (dollars)— <i>PRC</i>	41	26	44	63
Daily Shares Traded (hundreds of shares)— <i>VOL</i>	208	135	215	63
Return Variability (%)— <i>VRBA</i>	2.53	2.46	0.77	63
Insider Holdings (%)— <i>INSDH</i>	10	3	13	37
Number of Institution Holders	136	73	185	57
Average Holding per Institution (%)— <i>INTCONC</i>	0.28	0.16	0.31	57

^a N = number of observations.

percent, the *t*-value on *INSDH* is positive and significant. With the inclusion of *INSDH*, there are nontrivial reductions in the sizes and significance of the coefficients on *VOL* and *VRBA* and the constant term. This suggests that those explanatory variables in regression 2a may be proxying the depth and resiliency of a security *partially*; as suggested by Kyle [13], insider trading can be affected by depth and resiliency. When the market value of equity (firm size) is included in regression 2c, the $\bar{R}^2$ value increases sizably and the *t*-values for *VOL* and *VRBA* drop below the ten percent significance level though the signs are right. The more important finding, however, is that the coefficient and significance of *INSDH* on spread are not affected by such inclusion.¹³ This supports the hypothesis that firm size affects (or proxies) only the holding-cost variables and not the asymmetric-information variable. It further strengthens the empirical evidence for Williams' hypothesis that the firm-size anomaly may at least partially be an asymmetric-information effect via the Amihud and Mendelson argument. The significance of the *INSDH* variable in both regressions 2b and 2c also establishes a clear link between the dealer's spread and *INSDH* (an informal conjecture by Seyhun [17]).

C. Regression Results—Impact of Institutional Holdings

In studying the impact of institutional holdings, we again run a reference regression before the inclusion of the institutional-concentration variable. As before, *VRBA* is used as a proxy for price variability. Panel B of Table II displays our findings. The coefficient on the institutional-concentration variable

¹³ *MV* and *VOL* are highly correlated. As we indicated earlier, our findings regarding the significance of *INSDH* are quite robust. Results from regressions when *MV* is replaced by price per share (comparable to other researchers) are similar to those in Table II. Our results are also quite robust over various *INSDH* configurations. However, the sample size (38) inhibits us from breaking up the sample into too many subsamples.

Table II
Effect of Insider and Institutional Holdings on Spread^a
 $APS = a_o + \sum_i b_i X_i + e_i$

Regression No.	Regression Coefficient						$\bar{R}^2$	N
	a_o	VOL	$VRBA$	$INSDH$	$INTCONC$	MV		
A. Effect of Insider Holdings								
1	2.02 (8.05)	-0.39 (-9.51)	0.92 (4.76)				0.63	63
2a	2.06 (9.83)	-0.39 (-10.28)	0.91 (5.75)				0.77	38
2b	1.79 (8.24)	-0.30 (-7.34)	0.62 (3.60)	0.010 (1.85)			0.79	38
2c	4.06 (8.47)	-0.03 (-0.42)*	0.13 (0.66)*	0.013 (2.07)		-0.24 (-4.78)	0.88	38
B. Effect of Institutional Holdings								
1a	2.11 (18.62)	-0.36 (-10.76)	0.66 (4.34)				0.69	56
1b	1.96 (7.46)	-0.33 (-6.28)	0.56 (2.90)		0.33 (0.89)*		0.68	56

^a t -Values are in parentheses under $H_o: b_i = 0$. All t -values are significant at ten percent or below except for those with an asterisk.

(*INTCONC*) is small and insignificant regardless of the variable used.¹⁴ This conforms with our intuition that dealers do not regard institutions as information traders.

IV. Conclusion

This paper examines the dealer's bid-ask spread to test whether the dealer regards shareholdings by corporate insiders and institutional investors as measures of the information trading cost that the dealer incurs. We find that insider holdings have a positive impact on the dealer's information cost even after all other holding costs are accounted for, and also with the inclusion of firm size. The adverse-selection problem resulting from information asymmetry affects ordinary investors (outsiders excluding dealers) in two ways. First, a higher degree of information asymmetry leads to a larger spread, which in turn causes investors to demand higher expected return in equilibrium (Williams' argument for small-firm effect). Second, the adverse-selection problem also places an ordinary investor more frequently on the wrong side of the trade when there is greater information asymmetry. Thus, the recorded rates of return (measured before losses to insiders) should be higher for stocks more likely to present outsiders with informationally disadvantages trades (Demsetz's argument). Both arguments can at least be partial explanations for the firm-size anomaly. Institutional holdings, however, are found to have no influence on the dealer's information trading cost.

¹⁴ Using the percentage of shares held by institutions yields results similar to those in Table II. Furthermore, the holdings of an average shareholder are also found to be irrelevant in determining the spread.

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