EVIDENCE ON BOARD SIZE AND INFORMATION ASYMMETRY: A CAPITAL MARKETS PERSPECTIVE

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Abstract

We examine the relation of board size with market liquidity and adverse selection costs using a sample of Fortune 200 companies. After controlling for firm specifics, equity characteristics, and ratio of insiders, we find a direct relation between board size and equity market liquidity. Our findings indicate that board size is positively and significantly related to dollar depth but has no impact on bid-ask spreads. Furthermore, using the adverse selection component of the bid-ask spread as a proxy for transparency, we find that larger boards reduce information asymmetries, but the ratio of insiders to total board members has no impact on informational asymmetries.

Keywords: board size, corporate governance, market liquidity, information asymmetry

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1. Introduction

Board size has long been argued to impact firm performance. Lipton and Lorsch (1992) are among the first to propose limiting the size of board to ten with a preferred membership of eight or nine. They theorize the failure of board to criticize top management performance escalates with the increasing number of directors on the board. The implication of their argument is that when board membership becomes too large, the cost of slower decision-making and hesitation to challenge top management becomes too high. Jensen (1993) echoes their recommendation by going further to suggest larger boards are less effective and can be easily controlled by the CEO. The proposal to downsize boards relies on the conjecture that smaller boards monitor top management more effectively, which leads to better firm performance.

Empirical findings on the relationship between board size and firm performance has been mixed. Yermack (1996) examines a sample of 452 large U.S. industrial corporations and finds an inverse relation between board size and firm value. He uses numerous controls and alternative corporate governance structures and concludes that smaller boards enhance firm value. Eisenberg, Sundgren, and Wells (1998) find that small firms with larger boards are associated with decreasing firm value. Thus, they agree that fewer directors on the board can result in improved firm performance. On the contrary, Dalton, Daily, Johnson, and Ellstrand (1999) provide evidence to suggest a positive and significant relation between size of board and performance of firm. Their results are supported by a meta-analysis with 20,620 observations. Raheja (2005) develops a model to consider the trade-offs of insiders vs. outsiders and optimal board size for firms. His model suggests that optimal board size depends on the interaction between insiders' incentive to accumulate private benefits and outsiders' costs to verify information. Raheja posits the most effective boards are those in firms with low project verification costs for outsiders and fewer private benefits to insiders.

We argue that the size of the board could have important implications for the firm's cost of capital. Amihud and Mendelson (1986, page 224) argue that "liquidity increasing financial policies can reduce the opportunity cost of capital..." Firms that engage in policies that reduce information transfer issues within firm will not only increase the performance of the firm but also reduce information asymmetry in the capital markets. The evidence on cost of liquidity and returns reinforces this finding. Amihud and Mendelson (1986) and Datar, Naik, and Radcliffe (1998), Brennan, Chordia, and Subrahmanyam (1998), and Fiori (2000) find a positive relation between the cost of liquidity and expected stock

returns. The liquidity hypothesis suggests that the holders of less liquid stocks demand higher expected returns because they bear more liquidity risk. These studies suggest that that there is a discount associated with less liquid stocks and that this discount represents compensation to the investor for the higher cost, as measured by the bid-ask spread. If investors consider the cost of liquidity when assessing stock returns, firms that reduce the cost of liquidity will reduce the cost of capital. It is plausible that optimal board size leads to efficient processes and analysis of information. In return, the efficient information process results in optimal and effective decisions that are eventually observed and reflected in the market valuation of the firm. Reduced informational asymmetries translate into higher liquidity and a lower firm wide cost of capital. Therefore, we posit that the benefits of an optimal board size are reflected in the cost of liquidity for the firm, where costs are measured by a narrower bid-ask spread and larger depth. In particular, we employ the adverse selection component of the bid-ask spread as a proxy for informational asymmetries. In this context, we examine the relationship between board size and informational asymmetries. In addition, our study represents an attempt to understand the relation between board size and liquidity premiums. Using a cross-sectional analysis, we use ordinary least square regression to examine the relation between board size, the cost of liquidity and adverse selection costs for a sample of Fortune 200 companies in the year of 2000. We collect firm specific board features and director characteristics to control for other governance effects and price level, return volatility, and trading volume to control for market effects. Our conjecture is that board size influences the dissemination of information in a form of more efficient communication and decision-making and that hierarchical processes improve within a firm. We argue that if an optimal board size is in place, asymmetric information declines resulting in a decline in the cost of liquidity. We find that information asymmetry (as proxied by adverse selections costs) is decreasing in board size while firm liquidity is increasing in board size. As board size increases adverse selection costs decrease. As board size increases the ability of the board to monitor the actions of management increase, which in turn decrease informational asymmetries and decrease adverse selection costs. As these costs decrease, the liquidity of the firm increases because investors are better informed regarding the firm's prospects. We do caution that we are not attempting to find the optimal board size. Also, we fail to find any correlation between the proportion of insiders served on board and information asymmetry and cost of liquidity. This suggests ratio of insiders on the board does not lead to a reduction in informational asymmetries. In the next section we discuss the formal hypotheses that we examine in this work.

2. Hypotheses

Amihud and Mendelson (1986) show that the cost of liquidity, as measured by the spread, is not subsumed by beta when examining the relationship between returns and the bid-ask spread. From their initial theory, it is evident that liquidity is a risk factor associated with firm returns in the same way that beta is a risk premium and can be priced. Given that liquidity is a risk, it can be decomposed into multiple components. Previous literature has shown that the spread can be decomposed into inventory holding, order processing costs, and adverse selection. In this work we focus on the adverse selection component, which proxies for information asymmetries.

We hypothesize a relation between board size and firm-level external liquidity. While smaller boards might be able to make faster decisions, larger boards promote diversity of expertise resulting in more efficient monitoring. In the context of board monitoring, larger boards may be better able to monitor management and minimize information asymmetries between shareholders and management. Thus, we hypothesize,

H_1: *Adverse selections costs are decreasing and liquidity is increasing in board size*

It is possible that as board size increases, monitoring increases and information asymmetry decreases, which lead to an increase in liquidity. This increase in liquidity decreases the firm's cost of equity, which in turn decreases the firm's total cost of capital, and increases firm value.

In addition to the size of the board of directors, we hypothesize that the constancy of the board of directors will have an impact on liquidity and adverse selection costs. Insiders have incentives to keep information away from outsiders if private benefits are high to them. Thus, information disclosure under a regime of an insider-dominated board of directors may be lower than that of an "independent" board. This leads to the second hypothesis that we test in this work:

H_2: *Adverse selections costs are increasing and liquidity is decreasing in the ratio of insiders to total board members.*

3. Data and Method

Our firm sample contains the top 200 publicly traded Fortune 500 firms in the year 2000 included in the Fortune 500 Database.[1] Board size is identified and obtained from the proxy statement for the year 2000.

[1] Because of missing proxy statements and unavailable data for 8 firms, we use the next 8 firms in the Fortune Database. However, after merging the board characteristics with the IRRC, CRSP, Compustat, and TAQ databases only 141 have complete data across each variable of interest.

If a firm does not provide a proxy statement that year, we examine the one before the year 2000 to ensure proper identification of the number of board members. Following the method used in Fairchild and Li (2005), we classify directors into six categories based on information reported in the proxy statements: 1) top management of sample firm; 2) blockholders; 3) decorating directors; 4) grey directors; 5) top management of another independent publicly traded firm; and 6) venture capitalists. We regard directors in the first category as insiders and the last five categories of directors as outsiders. Our two primary investigative variables are *Boardsize* and *Insiderratio*. *Boardsize* is the number of directors on the board. *Insiderratio* is the ratio of the number the firm's executive management on the board of directors to the total number of board members.

All transactions data are collected from *The New York Stock Exchange Trade and Quote* (TAQ) database, and are filtered using methods commonly employed in market microstructure analyses. We exclude the following data points from the National Best Bid Offer (NBBO) calculation: 1) Non-positive prices and quotes; 2) All quotes with a time stamp before 9:30am (market opening) or after 4:00pm (market closing); 3) Quoted with zero bid or offer sizes, and quoted that result in a negative spread; 4) Quoted and effective spreads that are more than 7.5 standard deviations away from the mean (McDermott, Hegde, and Ascioglu 2005); and 5) Quotes that were reported in error.

Buys and sells are classified using the method of Lee and Ready (1990). We calculate spread and depth measures for each trading day in the second quarter of 2000 and average over the second quarter of 2000 to obtain one observation per firm for three different measures of liquidity. We evaluate three commonly used measures to proxy the cost of liquidity:

1) Quoted Spread (*Quoted*) = $Ask_{i,t} - Bid_{i,t}$;
2) Effective Spread (*Effective*) =; $2\left|p_{i,t} - MP_{i,t}\right|$;
3) Dollar Depth (*Dollardepth*) = Number of Shares at Ask Price * Ask Price + Number of Shares at Bid Price * Bid Price,

where $Ask_{i,t}$, $Bid_{i,t}$, $p_{i,t}$, $MP_{i,t}$, , are the best ask price, best bid price, price, and quoted midpoint, respectively, of firm *i* at time *t*. As in Chiyachanyana et al. 2005, the quoted spreads are time weighted and the effective spreads are trade weighted. We time weight the quoted spreads by the number of seconds the quote is outstanding weighted by the trading time in each trading day. The effective spread is weighted by the size of the trade. This weighting is calculated by dividing the size of the trade by the total trade volume for the trading day. These values are summed over that trading day and then averaged over all trading days in the second quarter of 2000. All measure of liquidity are averaged for each day and then averaged across second quarter of 2000.

Empirical research suggests that quoted bid-ask spreads tend to increase in price and volatility. However, spreads tend to decrease as trading volume increases (Demsetz (1968), Tinic (1972), Benston and Hagerman (1974), and Hamilton (1978)). Therefore, we use several control variables in our estimation process. To obtain the control variable *Price*, we take the daily closing price in CRSP, for each sample equity stock, and average it over each trading day in the second quarter of 2000 to obtain one observation per firm. Using a similar procedure, we take natural log of the average daily volume for each trading day in the second quarter of 2000 and average it to obtain the control variable *LnVolume*. *STD* is the standard deviation of daily returns during the second quarter of 2000. *GIndex* is an index measure of 24 corporate governance mechanisms. Gompers, Ishii, & Metrick (2003) construct an index of shareholder rights, and this index is derived from the *Investor Responsibility Research Center* (IRRC), which publishes 24 corporate governance provisions annually. The IRRC obtains these data from proxy statements, annual reports, corporate bylaws, 10-k and 10-q statements. The value of the index is created by the addition of one point for every provision that reduces shareholder rights. Thus a score of 24 would represent the presence of all 24 of the provisions and a score of zero would represent the absence of all 24 values. The IRRC provides 22 charter provisions, bylaw provisions, and other firm-level provisions in addition to six state takeover laws, because of overlap between state and laws results in 24 unique provisions. The IRRC data are constructed from the *Standard and Poor 500 Index*, in addition to firms listed in *Fortune*, *Forbes*, and *Business Week*. We match values of this index with values from the corporate finance and microstructure variables for the year 2000. *LMarketCap* is the natural logarithm of the end of year market capitalization of the firm. *ROA* is net income divided by total assets at the end of 2000.

When trading with informed agents, market makers increase the bid-ask spread to offset losses associated with their information disadvantage, and in this work, we employ two commonly used bid-ask spread decomposition methodologies to measure adverse selection costs. First, we follow the method of Lin, Sanger and Booth (1995), which decomposes the bid-ask spread into order processing and adverse selection components. Second, we use the model of Glosten and Harris (1988), which decomposes the bid-ask spread into order-processing/inventory-holding component and an adverse selection component. Van Ness, Van Ness, and Warr (2001), in an analysis of several adverse selection models, find that the adverse selection estimates from the Lin, Sanger, and Booth (1995) and Glosten and Harris (1988) models are highly correlated with accepted external measures of asymmetric information. We

discuss each model in more detail below. The Lin, Sanger and Booth (1995) adverse selection and persistence parameters are estimated from the following equations:

$$M_{t+1} - M_t = \lambda Z_t + \varepsilon_{t+1},$$
$$Z_{t+1} = \theta Z_t + \eta_{t+1}$$
$$Z_t = P_t - M_t$$

(1)

where M_t is the quote midpoint at time t, P_t is the transaction price at time t, ε_{t+1} and η_{t+1} are random error terms. λ is the is the proportion of the effective spread that is attributed to adverse selection.

Glosten and Harris (1988) specify the adverse selection, and inventory-holding/order-processing costs, as a linear function of transaction volume. Their model can be expressed as:

$$\Delta P_t = c_0 \Delta Q_t + c_1 \Delta Q_t V_t + z_0 Q_t + z_1 Q_t V_t + e_t,$$

(2)

where Q_t takes the value of one when the transaction is a purchase and negative one when the transaction is a sale, V_t is volume traded at time t, and e_t captures public information innovations. As in Jiang and Kim (2005), we use the average transaction volume to estimate the adverse selection component of the bid-ask spread as:

$$\frac{2(z_0 + z_1 \bar{V})}{2(c_0 + c_1 \bar{V}) + 2(z_0 + z_1 \bar{V})},$$

(3)

We estimate all adverse selection costs measures across all transactions in the second quarter of 2000. We report the raw percentages and the dollar cost estimates. Both the Lin, Sanger and Booth (1995), and the Glosten and Harris (1998) model percentage adverse selection cost estimates are bounded between zero and one. The dollar costs estimates are calculated by multiplying percentage adverse selection cost estimates times the quoted spreads for the Glosten and Harris (1988) and the Lin, Sanger and Booth (1995) model estimates times the effective spread.

(Table 1 Here)

4. Empirical Results

We present the descriptive statistics of all variables used in the study in Table 1 Panel A. The average firm has a quoted spread of .108 cents, an average effective spread of .11 cents and average dollar depth of 527,747. The average averse selection percentage cost estimate ranges from 18.7% for the Lin, Sanger, Booth (1995) model to 19.8% for the Glosten and Harris (1998) model. The average firm in the sample has a board size of 12 with 21% of the board consisting of insiders. The average index value of 9 is our study is similar to that found for the average firm in Small, Kwag, and Li (2005) and Gompers et al. (2003). In addition, the average firm in the sample is very large. The average firm has a market capitalization of more than 45 billion. The firms included in our dataset are very large and well monitored. Table 1 Panel B gives information on board size and insider ratio in our sample and Panel C provides information on some specific companies. Conventional wisdom calls for ten or fewer directors to sit on a board of directors. There are 42 firms in our sample that have ten or fewer directors on the board, representing 29.79% of the sample. Also, 19 firms (13.48%) have nine or fewer directors. In recent years, corporations in the U.S. have recruited more outside directors to serve on their boards. In our sample, 35 firms (24.82%) have ten percent or fewer insiders on the board, while 23 firms (16.31%) have 30 percent or more insiders on board. InGram Micro Inc has the highest insider ratio of 62.5% with eight directors on board. There are five firms (3.55%) that have no insider served on their boards. They are A M R Corp, Eastman Kodak, Valero Energy Corp, Archer Daniels Midland, and American Electric Power Inc.

(Table 2 Here)

To determine the differences between firms with large and small boards we employ a univariate analysis to examine the liquidity characteristics of firms with large boards and those with small boards. More specifically, we undertake an examination of the univariate differences of the adverse selection and liquidity variables across firms with large and small boards. We dichotomize firms using the mean value of the *Boardsize*, which is 12. We create two groups, one contains firms with board sizes larger than twelve members and the other contains firms with board sizes twelve and smaller. Table 2 contains the results from the univariate analysis of the liquidity characteristics between these two groups. Quoted spreads of firms with small boards are .109 while the quoted spread for large boards is .104 a difference of .005. Effective spreads are .007 lower for firms with larger boards, with larger boards having an average effective spread of .112. Dollar depth is significantly larger for firms that have larger boards. Firms with small boards have 421,021 dollars of quoted dollar depth while firms with larger boards have quoted dollar depth of 668,280. The adverse selection costs are lower for firms with larger boards. The average adverse selection cost measures, *LSB, LSBDollar, GH,* and *GHDollar*, are significantly lower for firms with larger boards than those with small boards. This provides support for the board monitoring hypothesis, or more specifically that adverse selection costs decrease as board size increases. Our findings indicate that firms with larger boards have higher market liquidity and lower adverse selections (information asymmetry) costs, but our univariate analysis fails to consider mitigating factors.

Multivariate Results:

To examine the relation between liquidity and board consistency we employ the following model:

$$Liquidity_i = \alpha + \beta_1 \Pr ice_i + \beta_2 LnVolume_i + \beta_3 STD_i + \beta_4 ROA_i + \beta_5 LnMarketCap_i + \beta_6 Gindex_i + \beta_7 BoardSize_i + \beta_8 InsiderRatio_i + e_{i9}$$

, (x)

Where liquidity takes the value of the Quoted Spread =Ask_t-Bid_t, Ask_t, the $Effective\ Spread = 2|p_t - MP_t|$, and Dollar Depth which is the Number of Shares at Ask Price * Ask Price + Number of Shares at Bid Price * Bid Price.

(Table 3 Here)

Table 3 contains the results of the multivariate estimation of quoted spreads, effective spreads, and dollar depth on the set of control variables and the board consistency proxies *Boardsize* and *Insiderratio*. The coefficient estimates on *LnVolume*, *STD*, and *Price* have the expected signs across each specification. The coefficient estimates on *Boardsize* and *Insiderratio* are insignificant in each of the spread estimations, but the coefficient estimate on *Boardsize* is positive and significant in the dollar depth specification. This indicates that dollar depth is increasing in board size. As dollar depth increases the underlying security's liquidity increases because larger trades can take place without impacting the securities price. If spreads are unchanged and depth increases, the net impact is an increase in liquidity. Increased dollar depth benefits the firm because it reduces the firm's cost of capital by directly lowering the cost of equity. We also note that the coefficient estimate on *Gindex* is positive and significant in the quoted spread specification and negative and significant in the depth specification. This indicates that more dictatorial firms have lower levels of liquidity than democratic firms. It is possible that the entrenched management of the dictatorial firms take actions that decrease firm value, which has an impact on the preference of investors to hold the securities. This, in turn, decreases the liquidity of the securities. We note the positive impact of board size on market liquidity, but does it reduce adverse selection costs? Do larger boards provide a beneficial monitoring service that decreases informational asymmetries between shareholders and management? In the next section we explore these possibilities. To examine the relation between adverse selection costs and board consistency, we estimate the following model:

$$AdverseSelection_i = \alpha + \beta_1 \Pr ice_i + \beta_2 LnVolume_i + \beta_3 STD_i + \beta_4 ROA_i + \beta_5 LnMarketCap_i + \beta_6 Gindex_i + \beta_7 BoardSize_i + \beta_8 InsiderRatio_i + e_{i9}$$

,

where adverse selection takes the value of the Lin, Sanger, Booth (1995) percentage estimate of adverse selection component of the effective spread, and the Glosten and Harris (1998) percentage estimate of adverse selection component of the quoted spread.

Table 4 contains the adverse selection costs model specifications. The coefficient estimate on *Insiderratio* is insignificant at the 10% level or below. However, we find the coefficient estimate on *Boardsize* is negative and significant across all specifications and models. This empirical finding indicates that as a firm's board size increases adverse selection costs decrease. Thus larger boards provide a valuable monitoring role, but the ratio of the number of insiders on the board to total board members does not increase adverse selection costs. The coefficient estimate on *Gindex* is positive and significant. This suggests that firms with less democratic governance structures have higher adverse selection costs. Adverse selections costs increase as management become more entrenched. It is possible that management of less democratic firm's, issue less informative financial statements because the corrective mechanism as inhibited by the entrenchment.

5. Conclusion

Among the many features of the board of directors, size is one of the few that has begun to receive attention. The literature has provided theories to suggest that a linkage exist between board size and firm performance. However, empirical results on the relationship between board size and firm performance have been inconclusive. We take a market microstructure perspective to analyze the relationship between board size, liquidity premiums and adverse selection costs.

We find that larger boards have higher market liquidity, translating into higher quoted dollar depth, but lower bid-ask spreads. Also, our findings suggest that larger boards have lower costs associated with adverse selection and information asymmetry. After controlling for ROA, stock price, volume, the standard deviation of returns, and governance regime, we find that larger boards have lower adverse selection costs.

Because higher levels of liquidity decrease the firm's cost of equity, and thereby decrease the firm's weighted average cost of capital, and thus, increase firm value. Holding all of other factors constant, the reduction in informational asymmetries due to additional board members increases firm performance.

Our research opens the door for future studies in this area. One important question that we leave for future research, is what is the optimal board size? Can board size grow too large, where the decision making process is hampered by the size of the board. In addition, what are the relationships between board members' private benefits and monitoring? Using market microstructure tools may provide answers to these questions.

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Appendix A
Definitions of Explanatory Variables in Regressions

Variables	Definitions
Microstructure Controls:	
PRICE	Stock price at market close, averaged over the second quarter of 2000 (CRSP)
LNVOLUME	Average daily volume averaged over the second quarter of 2000 (CRSP)
STD	Standard deviation of returns over the second quarter of 2000 (CRSP/Authors)
Microstructure Variables:	
QUOTED	Quoted Spread. $QS_t = Ask_t - Bid_t$, averaged over the second quarter of 2000 (TAQ/Authors)
EFFECTIVE	Effective Spread. $ES = 2\left\|p_t - MP_t\right\|$, averaged over the second quarter of 2000 (TAQ/Authors)
DOLLAR DEPTH	Is the sum of the depth at the bid and ask prices, and represents the number of shares multiplied times the prevailing price, averaged over the second quarter of 2000 (TAQ/Authors)
LSB	Lin, Sanger, Booth (1995) model estimate of adverse selection cost decomposition of the bid-ask spread, averaged over the second quarter of 2000 (TAQ/Authors)
GH	Glosten and Harris (1999) model estimate of adverse selection cost decomposition of the bid-ask spread, averaged over the second quarter of 2000 (TAQ/Authors)

Appendix A (continued)
Definitions of Explanatory Variables in Regressions

Variables	Definitions
Board structure:	
BSIZE	Number of directors on the board during the year 2000 (Li & Keys 2004)
INSIDERRATIO	Ratio of insiders to total board members in the year 2000 (Li & Keys 2004)
GINDEX	Gompers et al. governance measure for the year 2000 (Gompers et al. 2003)
Firm characteristics:	
LnMARKETCAP	The log of market value of firm at the end of 2000 (Compustat/Authors)
ROA	Operating income divided by total assets at the end of 2000 (Compustat/Authors)

Table 1. Panel A. Univariate Results

This table presents the univariate characteristics of the investigative board variables, firm specifics, liquidity measures, and the control variables. *BoardSize* is the size of the board of directors, *Insiderratio* is the ratio of the number the firm's executive management on the board of directors to the total number of board members. *GIndex* is the Gompers et al. (2003) governance measure. *ROA* is end of year return on assets, and *LnMarketCap* is the natural log of the firm's market capitalization in millions. The three proxies for liquidity measures are quoted spread, effective spread, and dollar depth. *Quoted Spread* =Ask_t-Bid_t, Ask_t is the ask price at time *t* and Bid_t is the bid at time *t*, $Effective\ Spread = 2\left|p_t - MP_t\right|$, where p_t is the price at time *t*, and MP_t is the quote midpoint at time *t*, *Dollar Depth* is the Number of Shares at Ask Price * Ask Price + Number of Shares at Bid Price * Bid Price, *LSB* is the Lin, Sanger, Booth (1995) percentage estimate of adverse selection component of the effective spread, *LSBDollar* is the *Effective*LSB* , *GH* is the Glosten and Harris (1998) percentage estimate of adverse selection component of the quoted spread, *GHDollar is GH*Quoted, Price* is the end of day price of the security averaged over the second quarter of 2000, *STD* is the daily standard deviation of daily returns estimated over the second quarter of 2000, *LnVolume* is the natural log of daily volume of security averaged daily over the second quarter of 2000.

Variable	Mean	Max	Min	STD
Quoted	.108	.217	.062	.029
Effective	.110	.236	.060	.031
Dollar Depth	527,747	2,213,440	62,827	331,618
LSB	.187	.459	.002	.111
LSBDollar	.0216	.074	.0003	.0159
GH	.198	.463	.007	.110
GHDollar	.023	.0004	.084	.017
Price	47.9	129.2	5.60	24.6
Volume	3,712,660	54,484,644	126,073	6,500,189
STD	.030	.059	.016	.008
Board Size	12.1	24	6	2.88
InsiderRatio	.214	.625	0	.126
ROA	.055	.268	-.200	.059
GIndex	9.33	15.0	2.47	3.00
MarketCap	45,227	476,115	5.70	68,907

Table 1. Continued

Panel B. Descriptive Statistics on Board size and Number of Inside Directors

Total Number of firms in the sample is 141	Number	Percent
Ten or fewer board members	42	29.79
Nine or fewer board members	19	13.48
Ten percent or less insiders	35	24.82
Thirty percent or more insiders	23	16.31
No insiders	5	3.55

Panel C. Some Company Specifics

Company Name	Insider Ratio (%)	Number of directors
Ingram Micro Inc	62.5	8
A M R Corp Del	0	10
Eastmas Kodak Co	0	10
Valero Energy Corp New	0	9
Archer Daniels Midland Co	0	8
American Electric Power Inc	0	8

Table 2. Univariate Comparison Between Larger and Smaller Boards

This table presents the results of a univariate comparison of liquidity variables between firms with large boards and small boards. A large board is defined as a board larger than 12 and a small board is defined as a board equal to or smaller than 12. *Quoted Spread* =Ask_t-Bid_t, Ask_t is the ask price at time *t* and Bid_t is the bid at time *t*, $Effective\ Spread = 2|p_t - MP_t|$, where p_t is the price at time *t*, and MP_t is the quote midpoint at time *t*, *Dollar Depth* is the Number of Shares at Ask Price * Ask Price + Number of Shares at Bid Price * Bid Price, *LSB* is the Lin, Sanger, Booth (1995) percentage estimate of adverse selection component of the effective spread, *LSBDollar* is the *Effective*LSB* , *GH* is the Glosten and Harris (1998) percentage estimate of adverse selection component of the quoted spread, and *GHDollar is GH*Quoted.*

Variable	Small Board	Large Board	Difference
Quoted	.109	.104	.005 (.004)
Effective	.112	.105	.007 (.004)
Dollar Depth	441,021	668,280	227,259*** (49,393)
LSB	.204	.151	.053*** (.017)
LSBDollar	.023	.016	.006*** (.002)
GH	.212	.169	.042** (.017)
GHDollar	.025	.019	.006** (.002)
GKN	.342	.295	.046** (.023)
GKNDollar	.040	.033	.007** (.003)

Standard Errors in Parentheses
** indicates Significance 10% level*
*** indicates Significance 5% level*
**** indicates significance 1% level*

Table 3. Multivariate Analysis on the Relation between Board Size and Cost of Liquidity

This table presents the results of a multivariate analysis of impact that board size has on the cost of liquidity. The cost of liquidity are proxied by three measures: quoted spread, effective spread, and dollar depth. *Quoted Spread* =Ask_t-Bid_t, Ask_t is the ask price at time *t* and Bid_t is the bid at time *t*, $Effective\ Spread = 2|p_t - MP_t|$, where p_t is the price at time *t*, and MP_t is the quote midpoint at time *t*, *Dollar Depth* is the Number of Shares at Ask Price * Ask Price + Number of Shares at Bid Price * Bid Price, *Price* is the end of day price of the security averaged over the second quarter of 2000, *STD* is the daily standard deviation of daily returns estimated over the second quarter of 2000, *LnVolume* is the natural log of daily volume of security averaged daily over the second quarter of 2000, *BoardSize* is the size of the board of directors, *Insiderratio* is the ratio of the number the firm's executive management on the board of directors to the total number of board members, *ROA* is end of year return on assets, *GIndex* is the Gompers et al. (2003) governance measure, and *LnMarketCap* is the natural log of the firm's market capitalization in millions.

	Quoted Spread	Effective Spread	Dollar Depth
Intercept	.307***	.210***	-3,105,106***
	(.026)	(.019)	(478,917)
Price	.0008***	.001***	584.8
	(.00008)	(.00006)	(613)
LnVolume	-.019***	-.012***	271,253***
	(.002)	(.001)	(44,012)
STD	.745***	1.34***	-6,374,829***
	(.239)	(.211)	(2,395,997)
ROA	-.012	.028	-714,152
	(.027)	(.024)	(502,966)
LnMarketCap	.0003	-.0008	-18,557
	(.001)	(.001)	(13,034)
GIndex	.0009*	.00007	-13,809**
	(.0005)	(.0004)	(5,982)
Boardsize	.0004	-.0005	19,410***
	(.0004)	(.0003)	(6,123)
InsiderRatio	-.018	-.005	-87,762
	(.012)	(.010)	(118,226)
Adjusted R^2	.71	.81	.59
F	44.25	78.06	26.45
N	141	141	141

Standard Errors in Parentheses; * indicates Significance 10% level; ** indicates Significance 5% level; *** indicates significance 1% level

Table 4. Multivariate Analysis on the Relation between Board Size and Information Asymmetry

Table 4 presents the results of a multivariate analysis of impact that board size has on the information asymmetry. Information asymmetry is proxied by two adverse selection measures: *LSB* and *GH*. *LSB* is the Lin, Sanger, Booth (1995) percentage estimate of adverse selection component of the effective spread, *GH* is the Glosten and Harris (1998) percentage estimate of adverse selection component of the quoted spread, *Price* is the end of day price of the security averaged over the second quarter of 2000, *STD* is the daily standard deviation of daily returns estimated over the second quarter of 2000, *LnVolume* is the natural log of daily volume of security averaged daily over the second quarter of 2000, *BoardSize* is the size of the board of directors, *Insiderratio* is the ratio of the number the firm's executive management on the board of directors to the total number of board members, *ROA* is end of year return on assets, *GIndex* is the Gompers et al. (2003) governance measure, and *LnMarketCap* is the natural log of the firm's market capitalization in millions.

Adverse Selection Measures	LSB (Percentage)	LBS (Percentage)	GH (Percentage)	GH (Percentage)
Intercept	1.377***	1.39***	1.41***	1.41***
	(.091)	(.090)	(.080)	(.081)
Price	.001***	.001***	.001***	.001***
	(.0002)	(.0002)	(.0002)	(.0002)
LnVolume	-.082***	-.083***	-.092***	-.092***
	(.007)	(.007)	(.006)	(.006)
STD	-1.71**	-1.56**	.205	.219
	(.688)	(.694)	(.610)	(.628)
ROA	-.065	-.047	-.046	-.044
	(.081)	(.080)	(.076)	(.077)
LnMarketCap	.002	.001	.002	.002
	(.004)	(.004)	(.003)	(.003)
GIndex	.003*	.003	.003**	.003**
	(.002)	(.0022)	(.001)	(.001)
Boardsize	-.005***	-.005***	-.002**	-.002**
	(.001)	(.001)	(.001)	(.001)
InsiderRatio		-.057		-.005
		(.042)		(.042)
Adjusted R^2	.74	.74	.78	.77
F	57.9	51.3	72.50	63
N	141	141	141	141

Standard Errors in Parentheses
** indicates Significance 10% level*
*** indicates Significance 5% level*
**** indicates significance 1% level*