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The Moderating Role Of Institutional Quality On The Relationship Between Board Structure And Stock Liquidity

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Abstract

The purpose of the study is to examine the moderating impact of Institutional Quality on the association between board structure and stock liquidity by following the theory of agency and information asymmetry. We have used the data of 230 listed non-financial firms from 2009 to 2019. Board and IQ indices are established through PCA. An instrumental variable approach is used to study the association between board structure and stock liquidity. For the moderating effect of IQ, we have followed the phenomenon of resource complimentary. The findings are significantly positive for the association between board structure and stock liquidity. Study findings suggest that the association between board structure and stock liquidity is positively moderated by the institutional quality index. The results are robust to a sequence of endogeneity checks while using substitute proxies of stock liquidity.

Keywords: Institutional Quality, Board Structure, Stock Liquidity, PCA

I INTRODUCTION

Stock liquidity is deemed to be a significant factor in the microstructure of the economy and is regarded as the topic of most discussion in finance literature. For measuring market growth and efficiency, stock liquidity performs a vital role (Singh & Sharma, 2016) By comparison, the developed and developing high-premium markets are highly illiquid. The growth in stock value expands the status of the corporation in the markets. As an outcome, it raises the company's worth and decreases capital expense (Diamond & Verrecchia, 1991). To discover ways to improve liquidity, Regulators or financial analysts can find ways to improvement of stock liquidity by concentrating on academic and specialized concerns. I.e. Such controllers, protect the interest of minority investors from expropriation and corporate participation that increases liquidity slightly (Brockman & Chung, 2008).

Board structure denotes the number and type of directors, as determined by the usual insider as well as outsider category (Lei, Lin, & Wei, 2013). Board structure suggests a strong corporate governance mechanism to specify a strategic direction for the interests of shareholders and stakeholder protection (Leuz, Nanda, & Wysocki, 2003). Board structure denotes corporate governance core issues, as it influences the power and nature of the director, and also influences the board regarding managers to be accountable in controlling firms. Agency theorists stated that the board of directors must adopt an efficient oversight role to protect the interests of shareholders. It is supposed to board structure affect the monitoring role and performance of the director, which is subjective to be affected by CEO duality and independence of directors.

North (1991) argued that institutional quality of the country is regarding the people's conduct of that region. Rules and principles, the

structure for sheltering stakeholders and property rights and managerial plan of the government is considered to be the formal mechanism , while the informal factors are culture and citizen's behavior which has been formed according to the historical pattern.

For example, if rules of a country are that much strong regarding general tradition so that the regulators judiciary processes cannot be influenced by political parties or other forces so the people are less motivated to fraud. This would result provide suitable implementation of agreement and safety for investors, and will boost stock liquidity. Hodgson (2006) claimed that the rules are set by the institutions is compulsory for companies and groups to support.

We have used the data of listed companies at the (PSX) for 2009–2019. Our study enriches the studies about stock liquidity , board structure and IQ, precisely. In Pakistan ownership is extremely concentrated and corporate boards are like a "rubber stamps," because majority of the shares are hold by family. The role of stock liquidity is different in Pakistan because firm rely on funds from the capital market. This study also enriches the literature by presenting IQ's the moderating role by obeying the complementary phenomenon of resources. We found evidence that the association between board structure and stock liquidity is positively influenced by IQ by using IV approach, recommending high liquidity in well-governed firms. The findings were found vigorous to a sequence of endogeneity tests while using substitute measures of stock liquidity.

Furthermore, the article is organized as below. The Relative Literature and hypothesis section postulates proper literature, The "methodology" section entitles sample and research techniques applied to analyze board structure and Stock liquidity. The "Discussion and Results section" shows the findings . The "Conclusion" illustrates concluded remarks, upcoming research directions, and limitations.

2 Relative Literature and Hypothesis

A variety of research on stock liquidity has been conducted generally and numerous estimations have been acknowledged. Research by (Amihud & Mendelson, 1986) firstly documented a strong and significant relationship among illiquidity and stock. Amihud and Mendelson (1986) showed the existence of optimistic association for expected revenue and liquidity of stock. Eleswarapu and Reinganum (1993) studied the association for stock revenue and stock liquidity.

Generally, the function of managers in administrative activities is combating poor decisions and in advising high-level regulation. In corporate governance literature, the independence of the directors became a much-discussed subject. Because the research of Fama and Jensen (1983b) suggested the freedom and productivity of the board. This study also suggest the board's most relevant members are the internal bodies, because their information about the institution's function is right and concrete. Fama (1980) & Fama and Jensen (1983b) suggested the board's most relevant members and, of all, the internal bodies, because of their information about the institution's function is right and concrete.

2.1 Board structure index and Stock Liquidity

Board's efficiency in management supervision depends on the board 's independence (John & Senbet, 1998). And as goal, independent directors to defend themselves from management and regulating shareholders' operational actions, with a view to decrease the issue of the company (Zahra & Pearce, 1989). Independent directors are able to have greater power through their experience and rank. They are able to gain characteristics that mitigate the division and power challenge (Byrd & Hickman, 1992; Fama & Jensen, 1983a).

Attig (2007) concluded research on the liquidity and characteristics of the board. He used the data of the listed firms at Canadian stock exchange. He argued that the price spread will be decreased through the independence of the Board. This study also suggest the board's

most relevant members are the internal bodies, because their information about the institution's function is right and concrete. Fama (1980) & Fama and Jensen (1983b) suggested the board's most relevant members and, of all, the internal bodies, because of their information about the institution's function is right and concrete.

This knowledge is gathered primarily by shared internal supervision of other managers. Eng and Mak (2003) has also discussed that a growing number of external managers reduces voluntary information disclosure by corporate managers. This raises the issue of unfavorable selection and raises the price distribution. Ajinkya, Bhojraj, and Sengupta (2005) argued that an autonomous director increases the speed and value of the benefit forecasts by actively controlling executive.

The boards that do more successful monitor-management work enhance the quality and frequency of information released by Management (Ajinkya et al., 2005), In addition, firms with efficient boards are producing a higher profit forecast and more precise plans. Therefore, decrease in information asymmetry must be related to efficient board. By following above discussion, we hypothesize that:

H1: Board of director's index has positive relationship with stock liquidity.

2.2 Board Size and Stock Liquidity

The information's reliability and eminence of stipulated by the management to the stockholders is deemed be vigorous function of the board. Two qualities that influences board efficiency are independent directors and board size (Eisenberg, Sundgren, & Wells, 1998). Board Size is important element of the board. The prior researchers state different views about size of the board. First, to monitor and to control managerial performance larger board have efficient recourses as compared to small boards. (Anderson, Mansi, & Reeb, 2004) stated that bigger boards have the essential abilities to shape numerous operative teams, assign precise tasks, and assist better debate regarding serious corporate matters, which lead to efficient information transparency. Concerning the association between board size and liquidity (Daadaa, 2021) argued that there is adverse relationship between board size and bid–ask spread, which states board size and stock liquidity are positive related. Abbassi, Hunjra, Alawi, and Mehmood (2021) also stated that there is positive relationship between board size and stock liquidity. by following the exceeding debate, we hypothesized that:

H2: Board size is positively related to Stock Liquidity.

2.3 Independence of the Board and Stock Liquidity

Independent directors to defend themselves from management and regulating shareholders' operational actions, with a view to decrease the issue of the company (Zahra & Pearce, 1989). Independent directors are able to have greater power through their experience and rank. They are able to gain characteristics that mitigate the division and power challenge (Byrd & Hickman, 1992; Fama & Jensen, 1983a). In addition, a high percentage of independent directors linked to higher misreporting and documented high quality earnings are critical for market liquidity (Chen & Jaggi, 2000; Heflin & Shaw, 2000) .As useful encouragement from the monitor, an autonomous board thus enhances liquidity by enhanced monitoring. Based on the above discussion we hypothesized that:

H3: Board independence positively affect stock Liquidity.

2.4 Board Gender Diversity and Stock Liquidity

The previous literature indicating that the participation of women in business board is related to convincing supervision and efficient information atmosphere (Adams & Ferreira, 2009; Gul, Srinidhi, & Ng, 2011). Gul et al.

(2011) claims that the women directors assume better monitoring in comparison with their male colleagues by means of auditing. Nielsen and Huse (2010) describe that woman directors regulate management procedures relevant to governance and corporate practices and procedures, increasing the performance of boards in strategic regulation. Abbott, Parker, and Peters (2012) suggest that women administrators increase the board's freedom from the broad perspective, which decreases group thinking in the boardroom. by following the review of literature, it can assume that board gender diversity can strengthen the monitoring level corporate boards in Pakistan and will improve stock liquidity. Therefore, it is hypothesized hat;

H4. Board gender diversity and stock liquidity are positive related.

2.5 CEO Duality and Stock Liquidity

Ho and Wong (2001) indicates that the combined roles of dissemination do not affect voluntary information**.** Ultimately, it has been identified that the principal shareholder of the company is the one having dual position (Chairman CEO &). according to Cai, Keasey, and Short (2006) the CEO duality will improve the public distribution of information by cutting the possibilities informed dealing. It will also weaken the unfavorable selection aspect and will increase stock liquidity. According to agency theory as regards superior efficiency and chief executive must be distinguished from each other to enhance the autonomous administration and firm's audit supervisory panel. Chairman and CEO around the facilities and increasing Board capability to carry out audits and administration are delegated under safe working conditions. In line with above discussion that CEO duality improves the monitoring level of Pakistani boards which lead to an increase in stock liquidity. Therefore, it is hypothesized hat;

H5. CEO duality positively affect Stock liquidity

2.6 Institutional Quality, Board structure and Stock Liquidity

Generally, the function of managers in administrative activities is combating poor decisions and in advising high-level regulation. In corporate governance literature, the independence of the directors became a much-discussed subject. Because the research of Fama and Jensen (1983b) suggested the freedom and productivity of the board. This study also suggest the board's most relevant members are the internal bodies, because their information about the institution's function is right and concrete. Fama (1980) & Fama and Jensen (1983b) suggested the board's most relevant members and, of all, the internal bodies, because of their information about the institution's function is right and concrete. Shuaib Ali, Zhongxin, Ali, Fei, and Chowdhury (2022) observe that corporate higher liquidity for better governed firms. Prommin, Jumreornvong, and Jiraporn (2014) using theoretic structure and the implementation of the major corporations in Thailand reveals that a standard deviation in the quality of governing increases liquidity ratio by 26.10%.

This knowledge is gathered primarily by shared internal supervision of other managers. Eng and Mak (2003) has also discussed that a growing number of external managers reduces voluntary information disclosure by corporate managers. This raises the issue of unfavorable selection and raises the price distribution. An autonomous board increases the speed and value of the benefit forecasts by actively controlling executive (Ajinkya et al., 2005).

In this context, Jensen and Meckling (1976) wrote outstanding research. They stated that governance mechanisms differed widely from one concept to another, thus undermining their enforceability, which undermined the standard of investor security as governance mechanisms at the fundamental level were faulty with low enforceability and only the companies themselves could deal with this issue. But currently the focus of finance

literature moved from corporate-level governance study to the country's IQ indicators (Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1998) (Ball, Kothari, & Robin, 2000; Hooper, Sim, & Uppal, 2009) & (Shuaib Ali, Zhongxin, Ali, Usman, & Zhuoping, 2022; Claessens & Fan, 2002).

According to the prior literature better corporate governance enhances stock liquidity and IQ decreases information asymmetry which results increase stock liquidity. To my best knowledge, the institutional quality indicators have not been taken as a moderator by anyone in Pakistani companies in order to explore the link between board structure and stock liquidity. in line with these statements , it is assumed that:

H6: IQ positively influence the association between Board structure and stock liquidity.

3 Research Methodology

3.1 Data Collection

The aim is to analyze the association between board structure and stock liquidity 230 listed firms for 2009-2019. Financial companies are excluded due to difference structure (Fama & French, 1992). financial data is collected from business recorder, State bank, and Pakistan stock exchange, and annual reports are used to collect the data related, share traded, stock prices market capitalization and financial transparency. World bank portal (WGI) is used to collect institutional quality data. Annual reports are used to collect data by hands related Board structure.

3.2 Variables Measurement

I. Stock Liquidity (Dependent variable)

a) Zero Return Measure

"Zero return measure" denotes the days of zero return a year. (Lesmond, Ogden, & Trzcinka, 1999) explain that zero return and spread measures are positively related , estimated as:

$$\mathbf{zero_{it}} = \frac{\mathbf{ZR_{it}}}{\mathbf{TD_{it}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{1}$$

where ZR_{it} represents "zero-return days" in year t for company i, in year t denotes by TD_{it} for company i. there will be lower stock liquidity if the value of this measure is higher.

b) Amihud Illiquidity Estimate

The real trade return in Pakistani currency. Amihud is define as the total collected amount of stock return during some days in a year. It is the fluctuation level of real stock price with trade volume, as:

$$\mathbf{ILLIQ_{it}} = \frac{\mathbf{1}}{\mathbf{D_t}} \sum_{\mathbf{d=1}}^{\mathbf{D_{iy}}} \frac{|\mathbf{R_{itd}}|}{\mathbf{VOLD_{itd}}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{2}$$

where idt denotes the firm's absolute stock return i for the year t, $VOLD_{idt}$ idenotes firm's volume i on the d of year t, and D_{iy} represents number available days for firm i on the d of year t. increase in ILLIQ caused decrease in stock liquidity.

c) Liquidity Ratio (AMIVEST)

The ratio of liquidity (AMIVEST) is measured as trade volume related unit change in stock price. (Amihud, Mendelson, & Lauterbach, 1997; Berkman & Eleswarapu, 1998) (Datar, Naik, & Radcliffe, 1998). It is measured as:

$$\mathbf{AMIVEST_{it}} = \sum_{\mathbf{t}} \mathbf{VOL_{it}} / \sum_{\mathbf{t}} |\mathbf{R_{it}}| \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{3}$$

d) Turnover-Adjusted Zero Daily Volume

A latest measurement is proposed for stock liquidity by Liu (2006) called the the volume of zero daily adjusted sales (LM)". Its focus is on the pace of trade ; anyhow, many dismissions of liquidity are captured by LM, as :

$$\mathbf{LM_{it}} = \left[\mathbf{NoZV_{it}} + \frac{\mathbf{1/(turn\ over_{it})}}{\mathbf{Deflator}}\right] \mathbf{X} \frac{\mathbf{252}}{\mathbf{NoTD_{it}}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{4}$$

where $NoZV_{it}$ represents zero day volume's number for firm i in the year t; inventory of company i in year t is represented by turnover

(T), $NoTD_t$ denotes total trade days in year t; and 480,000 is the deflator (Liu, 2006). The NoTD element multiplication t standardization makes LM equal over time and trading days are standardizes within one year. The higher LM value denotes lower stock liquidity.

II. Board Structure (Independent Variable)

This study measures the influence of board structure on stock liquidity for listed firms. Thus, we establish a board index using PCA. To develop the board index, we have used independence of board, board gender diversity, size of the board and CEO duality.

III. Institutional quality

We developed IQ index from WGI indicators i.e. control of corruption , Political stability, rule of law, voice and accountability, government effectiveness and regulatory quality (Al-Marhubi, 2004; Bjørnskov, 2006; Easterly, 2002; Kaufmann, Kraay, & Mastruzzi, 2009; Méon & Weill, 2005) & (Langbein & Knack, 2010).

Table 1 Definitions of Variables

Variables	Abs	Measurement
Dependent (Stock Liquidity)		
Amihud-Illiquidity-Estimate	Amihud	absolute stock return's daily ratio to trading volume average over trading days' number in a year.
Liquidity Ratio	AMIVEST	Daily trading volumes' sum divide by sum absolute stock return's sum.
Turnover -Adjusted-Zero-Daily Volumes	LM	Turn over adjusted zero daily volumes.
Zero_Return_measure	Zero	zero daily returns' Proportion divide trading days in a year.
Independent		
Board structure	Board_index	
Board independence.	B_ind	independent directors divide total number of directors.
CEO duality	Cduality	Binary Variable
Board size	Bsize	Natural log of directors
Gender diversity	BD	female directors' percentage to total of directors
Moderator		
Institutional Quality	IQ_index	Components: PS, R.law, RQ, C,corruption, voice and accountability and govt effectiveness
Controls		
Firm-Size	F_size	Outstanding shares' numbers by Share price at year's end.
Leverage	Leverage	Total liabilities' book value divide by Total assets' book value.
Firm-Age	Age	Firm registration's' year at the PSX.
Stock- Price	S_price	Stock price' natural log.

Volatility	VOLATILITY	Daily stock return's standard deviation.

3.3 Research models

We have used the f baseline models to check whether the board structure has any significance for stock liquidity and if institutional quality moderates this association. For H1 the following regression model is used ,

$$SL_{it} = \beta_0 + \beta_1 BOD + CONTROLS + \epsilon_{it} \quad \text{i}$$

For H2 the following regression model is used,

$$SL_{it} = \beta_0 + \beta_1 Bsize_{it} + CONTROLS + \epsilon_{it} \quad \text{ii}$$

To test H3 we have used the following regression,

$$SL_{it} = \beta_0 + \beta_1 B\_ind_{it} + CONTROLS + \epsilon_{it} \quad \text{iii}$$

For H4 the study used the following regression,

$$SL_{it} = \beta_0 + \beta_1 BM_{it} + CONTROLS + \epsilon_{it} \quad \text{iv}$$

To test H5 we used the following regression,

$$SL_{it} = \beta_0 + \beta_1 BG_{it} + CONTROLS + \epsilon_{it} \quad \text{v}$$

For testing H6 the following regression model is used,

$$SL_{it} = \beta_0 + \beta_1 BOD_{it} + \beta_2 IQ_{it} + \beta_3 IQ_{it} \times BOD_{it} + CONTROLS + \epsilon_{it} \quad \text{vi}$$

4 Results & Discussion

4.1 Descriptive Statistics

This part displays the descriptives for stock liquidity, i.e., Liquidity ratio (Amivest), "Amihud - Illiquidity - Estimate" (Amihud), Turnover adjusted zero daily volume (LM) and Zero return measure (Zero). Table 2 also shows descriptive board structure and IQ index.

Table 2 Descriptive Statistics

Variables	Obs	Mean	Std deviation	Mini	Maxi
Amihud	2,485	0.00153	0.0086	1.11e-07	0.189
Zero	2,485	0.100	0.133	0	0.944
Amivest	2,394	1.005e+09	9.991e+09	0	4.363e+11
LM	2,423	17.83	157.3	1.11e-07	297
B_Size	2,465	2.066	0.166	1.609	3.045
B_Indepeendce	2,465	0.175	0.188	0	1
B_Diversity	2,465	0.0945	0.139	0	1
B_Duality	2,466	0.172	0.377	0	1
IQ_Index	2,466	1.10e-08	1.000	-1.556	1.521
Leverage	2,456	0.598	0.329	0.00433	3.146
Size	2,443	2.784e+10	4.049e+11	0	1.971e+13
Age	2,466	43.75	18.17	13	160
S_Price	2,443	3.745	1.860	-4.605	9.350
VOLATILITY	2,489	0.0518	0.0616	0.00855	0.775

Source: Author's Calculation (2022)

Amihud is measured absolute stock return's daily ratio to trading volume average over trading days' number in a year. the mean value 0.00153 and standard deviation 0.0086. And least value for Amihud is 1.11e-07, highest is 0.189. furthermore, the liquidity ratio mean is 1.005 followed by standard deviation 9.991. in this study the Moderator is IQ index with mean of 1.10e-08 by the range of -2.747 least value to a highest 1.521 followed by standard deviation of 1.000.

4.2 Structure of the Board and Stock Liquidity

Table 3 shows the findings for structure of the board and stock liquidity. B_size is negatively connected to (LM and Amihuid) with significant level of 5%. This negative relationship denotes that increase in board size will increase stock liquidity. These findings are in line with previous literature of (Daadaa, 2021). B_ind is also negative and significantly related to (Amihud and LM) at l% and %5 respectively, which states that higher independence level at board will have high stock liquidity at Pakistani firms. Independent directors can provide more information from outside due to their expertise and reputation (Kaymak & Bektas, 2008). The table also shows negative and significant relationship between board diversity and Amihud and LM at 5%. Which indicates that board diversity positive influences stock liquidity, these results are consistent with results of (Gul et al., 2011). Further more our results also suggest positive relationship between CEO duality and stock liquidity. hence as a whole the findings of the this suggest that board structure influences stock liquidity positively in Pakistan and these results are consistent with previous literate of (Kaymak & Bektas, 2008), (Searat Ali, Liu, & Su, 2017).

Table 3 Board structure and Stock Liquidity

Variables	Amihud	LM	Amihud	LM	Amihud	LM	Amihud	LM
B_Size	-0.001**	-0.055**						
	(-2.202)	(-2.203)						
B_Ind			-0.001***	-2.987**				
			(-6.234)	(-2.390)				
B_Diversity					-0.002**	-11.19**		
					(-2.157)	(-2.352)		
CEO_Duality							-0.134***	).154***
							(-10.44)	(-10.34)
Leverage	-0.00117	6.614***	-0.0008**	4.389*	-0.00129**	6.842***	-0.001**	6.647**
	(-1.237)	(2.887)	(-2.450)	(1.802)	(-2.356)	(2.990)	(-2.268)	(2.903)
Size	-0.000189*	-5.239***	-0.000170**	-5.018**	-0.000198	-5.098***	-0.000169	-5.215**
	(-1.730)	(-9.794)	(-2.028)	(-8.534)	(-1.560)	(-9.594)	(-1.332)	(-9.831)
Age	0.000329	2.194	-5.75e-05	0.994	0.000411	2.882	0.000563	2.185
	(1.014)	(1.210)	(-0.204)	(0.505)	(0.953)	(1.601)	(1.324)	(1.229)
S_Price	-5.42e-05	6.189***	-8.64e-05	6.105***	-0.000108	6.180***	-0.000113	6.221***
	(-0.461)	(9.795)	(-0.873)	(8.802)	(-0.719)	(9.805)	(-0.745)	(9.819)
Volatility	0.0788***	56.41***	0.0373***	62.65***	0.0781***	56.01***	0.0781***	55.95***
	(4.533)	(4.843)	(16.38)	(3.935)	(28.10)	(4.816)	(27.98)	(4.793)
Constant	-0.00209	74.97***	0.00349	73.93***	0.00127	68.20***	-0.000118	74.06***
	(-0.735)	(5.143)	(1.645)	(4.981)	(0.397)	(5.085)	(-0.0373)	(5.610)
Observations	2,404	2,392	1,739	1,731	2,404	2,392	2,404	2,392
R_squared	0.313	0.158	0.216	0.148	0.320	0.160	0.319	0.158
Industry FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3 Board index analysis

PCA is used to establish board index to decline the variables' number to uncorrelated mechanisms. The first stage of PCA in Combination of greatest variance is the representation greatest variance factors of CEO duality , board_size, board independence, board_diversity were chosen as proposed by (Tarchouna, Jarraya, & Bouri, 2017).

Table 4 Board PCA index

Variables	Weights
B_Size	0.6686
B_Independence	0.5614
B_Diversity	-0.3552
B_Duality	-0.3341
Kaiser-Meyer-Olkin Statistic	0.51
Bartlett's test p-value	0.0000

Source: Author's Calculation (2022)

The study regressed stock liquidity measurements (LM and Amihud) with board index established through (PCA) consist board independence, board diversity, board size and dummy CEO duality. high score of firm shows good corporate governance as compared to the low score. The table 4 shows negative significant relationship between board index and Amihud at 10% and with LM at 5%. This board index strength produces decline in Amihud and boosts stock liquidity as proposed by (Shuaib Ali, Zhongxin, Ali, Fei, et al., 2022).

Table 5 Board index and stock liquidity (OLS)

Variables	Amihud	LM
Board-index	-0.000161*	-1.5560**
	(-1.665)	(-2.37)
Leverage	-0.000839*	4.220*
	(-1.743)	(1.731)
size	-9.59e-05	-5.130***
	(-1.634)	(-8.714)
age	0.000228	1.991
	(0.865)	(1.012)
S_Price	-0.000170*	5.915***
	(-1.889)	(8.560)
Volatility	0.0369***	61.55***
	(3.025)	(3.858)
Constant	0.00137	74.87***
	(0.725)	(4.991)
Observations	1,739	1,731
R-squared	0.180	0.145
Industry FE	No	Yes

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The two-stage least squares (2SLS) approach is an alternate way to deal with potential Endogeneity. This approach includes an instrumental variable that is highly correlated with board index, but not with liquidity. Table 6 explains the results of 2SLS, where firstly board index is regressed which is established via (PCA) composed of board measures. First IV is Indus_B_index is Industrial board index, measured by (industry_board _index – firm _board _index / total industry observation - 1). "CG act 2013" (CG_Act) is second IV is binary variable equivalent as 0 before 2013 and 1 for the year after 2013.

Table 6 Board-index and Stock liquidity (2SLS)

Variables	Board-Index	Amihud	LM
Board Index		-0.00447***	-36.69**
		(-4.945)	(-2.379)
Indus B Index	-0.280***		
	(-5.301)		
CG-Act	-0.182***		
	(-3.306)		
Leverage	0.154**	-0.00145***	2.051
	(2.054)	(-2.973)	(0.819)
Size	0.165***	-0.000930***	-5.458***
	(10.86)	(-4.795)	(-5.476)
Age	0.338***	-0.00128***	-0.954
	(5.871)	(-2.692)	(-0.394)
S_Price	-0.0586***	0.000166	4.562***
	(-3.074)	(1.219)	(6.524)
Volatility	-0.799	0.0393***	70.97***
	(-1.560)	(11.98)	(4.210)
Constant	-4.512***	0.0239***	109.5***
	(-11.72)	(4.579)	(4.082)
Observations	1,708	1,708	1,700
R-squared		-0.632	0.081
Industry_FE	No	No	No

The table 6 explains negative association among board index and LM and Amihud, which means rise in board index instigates decline in Amihud and LM, results high stock liquidity. which affirms the hypothesis. The findings are consistent with previous literature of (Searat Ali et al., 2017).

4.4 Institutional quality, Board Structure and Stock Liquidity

Following the literature (Khan, Islam, & Akbar, 2020; Khan, Kong, Xiang, & Zhang, 2019), we established IQ index via (PCA). The index is composed of "WGI" six indicators, government efficiency, control of corruption, regulatory quality, rule of law and political stability and voice and accountability. The KMO value is 0.511 and the bartlett's test is significant. The table 6 explains the (2SLS) regression for . In first stage we regress board index (PCA). First

instrumental variable is Indus_B_index is Industrial board index. The second instrumental variable is B_index and IQ_index interaction. The table shows the IVs significant and positive at 1% means that instrumental variables are good. The results suggest positive relation for the of Board IQ indexes' interaction term with stock liquidity (via LM and Amihud) which reverse proxies for SL.

Table 7 Board structure, Institutional Quality and Stock Liquidity

Variables	Board-Index	Amihud	LM
Board_Index X .IQ_Index	-0.127***	-0.000548***	-6.855**
	(-5.602)	(-2.823)	(-2.341)
Board_Index		0.00493***	7.251
		(4.759)	(1.403)
IQ_Index	0.229***	0.000146	1.450*
	(5.765)	(0.902)	(1.781)
Indus_CGP	0.275***		
	(5.172)		
CG_Act	-0.186***		
	(-2.839)		
Leverage	0.145*	-0.00154***	1.229
	(1.947)	(-2.970)	(0.474)
Size	0.167***	-0.00103***	-6.213***
	(11.06)	(-4.647)	(-5.602)
Age	0.343***	-0.00143***	-2.009
	(5.938)	(-2.776)	(-0.786)
S_Price	-0.0667***	0.000217	4.812***
	(-3.505)	(1.472)	(6.506)
Volatility	-0.747	0.0399***	73.95***
	(-1.481)	(11.49)	(4.268)
Constant	-4.538***	0.0264***	128.8***
	(-11.81)	(4.465)	(4.353)
Observations	1,692	1,708	1,700
R-squared		-0.796	0.044
Industry FE	No	No	N o

5 Robustness Checks

As we have discussed in the previous section that Amihud measure and LM measure for stock liquidity are used in the main analysis. To check robustness for our primary results we have used two alternate proxies for stock liquidity i.e., zero and Amivest. The robustness results are consistent with primary results of the study for board index and stock liquidity. The results are robust to explain the positive moderating role of IQ on board index and stock liquidity. The results are robust to explain the relationship of board index to enhance stock liquidity.

Table 8 Robustness Board Structure and Stock Liquidity

VARIABLES	Amivest	Zero	Amivest	Zero	Amivest	Zero	Amivest	Zero
B_Size	1.231e+09**	-0.166**						
	(2.074)	(-1.871)						
B_Independence			9.035e+07	-0.016***				
			(0.563)	(2.706)				
B_Diversity					7.811e+08	-0.0001*		
					(1.209)	(-1.730)		
CEO_Duality							3.740e+08***	-0.0161*
							(2.801)	(-1.785)
Leverage	4.746e+08	0.00308	7.785e+08**	0.0148	7.362e+08**	0.00719	5.045e+08	0.00259
	(1.543)	(0.284)	(1.981)	(1.296)	(2.320)	(0.642)	(1.598)	(0.240)
Size	6.825e+08***	-0.0282***	8.650e+08***	-0.0233***	7.808e+08***	-0.0271***	7.161e+08***	-0.0288***
	(7.510)	(-10.88)	(6.830)	(-8.005)	(7.491)	(-9.631)	(7.712)	(-11.33)
Age	-1.386e+08	0.0156*	4.200e+08	0.00700	3.457e+08	0.0162*	-3.304e+07	0.0130
	(-0.484)	(1.709)	(1.122)	(0.721)	(1.069)	(1.823)	(-0.110)	(1.450)
S_Price	-6.364e+08***	0.0145***	-7.516e+08***	0.0167***	-6.641e+08***	0.0149***	-6.623e+08***	0.0153***
	(-4.899)	(4.188)	(-5.228)	(4.729)	(-5.650)	(4.257)	(-4.940)	(4.434)
Volatility	-8.896e+08	-0.128**	-1.205e+09	-0.186***	-1.298e+09**	-0.177***	-8.323e+08	-0.133***
	(-1.505)	(-2.573)	(-1.621)	(-2.738)	(-2.141)	(-3.332)	(-1.465)	(-2.619)
Constant	-1.369e+10***	0.649***	-1.761e+10***	0.436***	-1.579e+10***	0.524***	-1.211e+10***	0.612***
	(-6.139)	(9.535)	(-5.828)	(6.177)	(-6.178)	(7.987)	(-5.925)	(9.641)
Observation	2,382	2,404	1,723	1,739	2,382	2,404	2,382	2,404

s								
R-squared	0.116	0.149	0.153	0.223	0.144	0.199	0.115	0.150
Industry FE	No	No	Yes	Yes	Yes	Yes	No	No

Table 9 Robustness Board Structure and Stock Liquidity

VARIABLES	Board-Index	Zero	Amivest
Board_Index		-0.0633***	2.354e+09**
		(-3.229)	(1.972)
Indus_B_Index	-0.280***		
	(-5.301)		
CG_Act	-0.182***		
	(-3.306)		
Leverage	0.154**	-0.000208	5.876e+08*
	(2.054)	(-0.0197)	(1.747)
Size	0.165***	-0.0391***	9.609e+08***
	(10.86)	(-9.297)	(7.079)
Age	0.338***	-0.0115	3.553e+08
	(5.871)	(-1.116)	(1.070)
S_Price	-0.0586***	0.0206***	-8.424e+08***
	(-3.074)	(6.974)	(-8.902)
Volatility	-0.799	-0.117	-2.280e+09
	(-1.560)	(-1.635)	(-1.020)
Constant	-4.512***	0.900***	-1.816e+10***
	(-11.72)	(7.929)	(-4.955)
Observations	1,708	1,708	1,692
R-squared		-0.111	0.056
Industry FE	No	No	No

Table 10 Robustness Institutional Quality, Board Structure and Stock Liquidity

Variables	Board Index	Zero	Amivest
Board_Index X .IQ_Index	0.127***	0.00781**	2.905e+08**
	(5.602)	(2.320)	(2.245)
Board_Index		-0.0103	-4.935e+08
		(-0.575)	(-0.730)
IQ_Index	0.00476	-0.0306***	1.662e+08
	(0.172)	(-10.87)	(1.585)
Indus_CGP	0.275***		
	(5.172)		
CG_Act	-0.186***		
	(-2.839)		
Leverage	0.145*	0.0163*	5.027e+08
	(1.947)	(1.815)	(1.507)

Size	0.167***	-0.0243***	8.921e+08***
	(11.06)	(-6.332)	(6.194)
Age	0.343***	0.00904	2.703e+08
	(5.938)	(1.014)	(0.804)
S_Price	-0.0667***	0.0167***	-8.405e+08***
	(-3.505)	(6.503)	(-8.732)
Volatility	-0.747	-0.169***	-2.237e+09
	(-1.481)	(-2.800)	(-1.016)
Constant	-4.538***	0.516***	-1.633e+10***
	(-11.81)	(5.034)	(-4.235)
Observations	1,692	1,708	1,692
R-squared		0.219	0.096
Industry FE	No	No	No

CONCLUSION

The study had analyzed the influence of board structure on stock liquidity, and the institutional quality's moderating effect. The study figures out the answers for the research questions such as, what are the effects of board structure's characteristics on stock liquidity? Whether IQ influence the link between structure of the board and stock liquidity? For answering these questions, we have used the data of 230 listed non-financial firms for the period of 2009-2019.

Board index and Institutional Quality index are established via PCA. To study the link between structure of the board and stock liquidity. An instrumental variable approach is used to study the association between board structure and stock liquidity, for the institutional quality's moderating effect we have followed the phenomenon of resource complementary. The findings this study demonstrates how IQ moderates the connection between board structure and stock liquidity and how it effects stock market of Pakistan and contributes to the literature of stock market. Our findings propose the link between board index and stock liquidity is positively moderated by IQ. which illustrates that an increase in stability, of politics, corruption index control, efficiency, and law implementation of the country will improve board monitoring quality, thus it results enhances stock liquidity, which consistent with hypothesis.

The results point out that board structure characteristics positively and significantly affect stock liquidity in Pakistan. It means that how much the board independence increases in Pakistan stock liquidity will increase, how much the percentage of female directors will increase so it will increase stock liquidity in Pakistan. The finding also suggests that increase in board meetings will enhance stock liquidity in Pakistan. The results were robust by changing proxies of stock liquidity. All These finding is consisting with agency theory. The findings about the effect of board index on stock liquidity in firms of Pakistan are significant and positive, which are consistent with previous literature. Considering the limitation of the research, larger sample size will reflect more robust results. The larger time span will cover all main occasions such as, first corporate governance code and financial crises and other events as well. Future research could contribute more to the literature by analyzing the protection of shareholder and disclosure quality's impact on stock liquidity. Executives, firms and stockholders should be more laborious in supervision of board structure, with trade laws, corporate environments and sound trading techniques.

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