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Corporate governance strength and stock market liquidity in Malaysia

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Abstract

Purpose – The purpose of this paper is to examine the impact of corporate governance strength on stock market liquidity in an emerging country, namely, Malaysia, by constructing a corporate governance score that captures both internal monitoring mechanisms (board of directors' characteristics, audit committee's characteristics and internal audit function) and external monitoring mechanism (audit quality).
Design/methodology/approach – The study uses a sample of 2,020 yearly firm observations in Bursa Malaysia over the period 2009-2012. The ordinary least square regression and several estimation methods such as two-stage least squares using instrumental variables (IV-2SLS) and dynamic GMM are employed.
Findings – This study finds a significant positive association between corporate governance effectiveness and stock market liquidity. The finding is robust to alternative liquidity measurements, to alternative estimation methods, and to endogeneity bias.
Research limitations/implications – This result implies that the firms with effective monitoring mechanisms mitigate information asymmetry which leads to less adverse selection problems among traders.
Practical implications – This study provides implications for regulators to help design regulations that enhance stock market liquidity. This study could also help investors and traders to formulate their trading decisions, and enables firms to know the importance of strengthening the corporate governance monitoring mechanisms.
Originality/value – This study constructs a corporate governance effectiveness measure by combining both internal and external monitoring mechanisms. These mechanisms have not been constructed together in one score in the corporate governance literature and the impact of internal audit function, as an internal monitoring mechanism on liquidity, has yet to be examined.
Keywords Malaysia, Stock market liquidity, Corporate governance strength
Paper type Research paper

1. Introduction

Stock market liquidity is a key factor for well-functioning stock markets due to its important repercussions for several parties. Having a liquid market is essential either for developed and emerging countries, as a highly liquid market means efficient allocation and a tool for economic growth (Bencivenga *et al.*, 1996; Levine, 1991). Liquidity is a critical pre-condition for financial market growth and development (Wang, 2013). One of the issues that have been examined in terms of liquidity is corporate governance, in that effective corporate governance is a crucial for enhancing the investors' confidence and broadening and deepening the capital market. Effective corporate governance serves to protect the shareholders' rights by mitigating perverse insider behavior.

It is recognized that developed and developing countries are introducing corporate governance reforms. However, empirical evidence about the impact of corporate governance on stock market liquidity is still limited. For developed countries, a study done by Chung *et al.* (2010) in the USA examined this relationship and found that highly effective governance leads to

high stock liquidity. A recent study by Ali *et al.* (2016) examined the association between corporate governance quality and stock liquidity among Australian firms. However, their findings are based on the four dimensions of corporate governance, namely, board quality, audit committee, nomination committee and remuneration committee. Their study ignores IAF and audit quality as monitoring mechanisms which are more related with financial reporting quality than nomination committee and remuneration committee. In Karmani *et al.*'s (2015) study, the corporate governance effectiveness was found significantly associated with the stock market liquidity of French firms. However, the index included only four themes, namely, board of directors, audit quality, ownership structure and the disclosure of information. This means that IAF has been ignored also in Karmani *et al.*'s (2015) study. Furthermore, one of the key dimensions used to construct the corporate governance index in Chung *et al.*'s (2010) study is the antitakeover provisions. This dimension is not applicable for the Malaysian context as Malaysian firms have few antitakeover provisions available to them. Thus, their findings may not be generalizable to an emerging country, like Malaysia because of several regulatory and institutional differences. Malaysia also has underdeveloped equity markets, which are typified by unique characteristics, such as high agency problems (Kallunki *et al.*, 2007); high earnings management practices (Abdul Rahman and Haneem Mohamed Ali, 2006; Al-Jaifi, 2017); poor information environment (Ball *et al.*, 2003); high ownership concentration (Claessens *et al.*, 2000; Tam and Tan, 2007); and high insider trading (Ali *et al.*, 2011).

For emerging countries, Prommin *et al.* (2014) used a sample of only 100 large Thai companies and their findings also supported the earlier results. However, their finding lack of the generalization as they select only 100 large firms. In addition, the corporate governance score does not include the IAF. In the Malaysian context, Subramaniam *et al.* (2016) examined the association between board size and stock liquidity. However, their study is limited to board size as a corporate governance mechanism and one-year data only (year 2009). Similarly, Foo and Zain (2010) who investigated the association between board independence, board diligence and stock liquidity. However, their study is limited to two individual corporate governance mechanisms and one-year data (only 2007).

The Malaysian Government issued the Malaysian Code on Corporate Governance (MCCG) in 2000 to ensure greater quality practices of corporate governance and to improve transparency as well as investors' confidence. The revised MCCG (2007 and 2012) emphasize the important role of the board of directors, audit committee and internal audit function to enhance financial reporting. Based on the MCCG (2007), internal audit function should be initiated by the firm's board. Further, this function should be directly coordinated by the audit committee, with an aim to enhance financial reporting quality. The amount invested in the internal audit function indicates that firms can obtain control over reporting quality, and consequently, the existence of control problems can be reduced (Lin *et al.*, 2011). In addition, Munisi *et al.* (2014) claimed that external and internal corporate governance mechanisms might complement each other in mitigating agency problems in developed countries. This means that the external mechanism facilitates efficient corporate governance practices by providing protection to shareholders. Choi *et al.* (2014) mentioned that audit quality is positively associated with the credibility of corporate reporting, which is reflected in stock liquidity. Therefore, it is important to investigate the impact of internal and external monitoring mechanisms on stock market liquidity among Malaysian-listed firms.

The contributions of this study is that this study constructs a measure of corporate governance score by combining both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality). These monitoring mechanisms have not been constructed together in one score in the corporate governance literature. In particular, the impact of internal audit function, as an internal monitoring mechanism on liquidity, has been ignored. Thus, including the internal audit function as an effective agency-mitigating mechanism would enrich the

literature. With these contributions, the study can enrich the finance literature, particularly on corporate finance and microstructure. This study also provides policy implications for regulators to help design regulation that enhance stock market liquidity. Further, it can help investors and traders to formulate their trading decisions, and enables firms to know what factors are influence their stock market liquidity. These findings also give managerial implications as firms may improve their stock market liquidity by adopting best practices of corporate governance that mitigate informational asymmetries.

In this study, corporate governance strength is measured by constructing an index of ten factors related to both internal (board of directors, audit committee, internal audit function) and external (audit quality) monitoring mechanisms, to capture the strength of corporate governance monitoring mechanisms. Further, this study captures stock market liquidity by estimating Amihud's illiquidity measure. The study finds that corporate governance has a significantly positive impact on stock market liquidity. This means that better corporate governance can reduce information asymmetry, which in turn, can enhance the investors' confidence and positively influence the firms' stock market liquidity.

In this study, the robustness tests are used to support the findings. The four dimensions (board of directors, audit committee, internal audit function and audit quality) are regressed individually to see which specific dimension of corporate governance is most important for liquidity. Further, regressing based on different liquidity measurements are made, and the results remain robust. Other sensitivity tests are made particularly regressing based on the change in variable rather than the level of variables and regression based on the one-year lag of the independent variables, the findings remain similar. Another strategy to alleviate the endogeneity issue, this study undertakes a regression by using one-year lag of the dependent variables, two-stage least squares using instrumental variables (IV-2SLS) and generalized method of moments using instrumental variables (IV-GMM) analysis. To alleviate the reverse causality issue, dynamic GMM (Arellano-Bond dynamic estimation) is also employed. All these robust tests are remarkably consistent and support the findings of this study. This also supports that reverse causality, simultaneously; endogeneity might not be an issue in this study.

This study proceeds as follows. The literature review and hypotheses development is presented in Section 2, the research methodology is outlined in Section 3. In Section 4, findings and results are presented and conclusion is presented in the last section.

2. Literature review

In the literature, several studies have examined liquidity based on the legal impact and regulatory differences across countries (Bacidore and Sofianos, 2002; Brockman and Chung, 2003; Chung, 2006). They justified that poor shareholder protection is the reason behind the liquidity differences. The main aim of corporate governance is to resolve the conflict between major and minor shareholders, as well as between shareholders and managers, as this can lead to mitigating agency costs. Firms with strong corporate governance are usually associated with a high level of financial and operational transparency, and a high level of information disclosure quality implying less information asymmetry and high stock market liquidity.

In the Malaysian context, the government aims to reduce the occurrence of fraud and deceitful reporting by implementing the MCCG in 2000. This code mainly focuses on the following: board of directors, shareholders and directors' remuneration. Additionally, the Code was revised in 2007. This code focuses on establishing an internal audit function to enforce greater monitoring control. The MCCG was once again revised and reissued in 2012, with the main aim being to pay greater attention to the monitoring mechanisms.

2.1 Hypotheses development

Strong corporate governance enhances transparency, both financially and operationally, by reducing the information asymmetry between managers and large shareholders as inside and

outside owners; and liquidity providers as outside investors (Chung *et al.*, 2010). In terms of good financial transparency, firms with better corporate governance are more likely to disclose relevant information. Effective boards, in terms of monitoring, can improve the frequency and quality of information disclosed (Ajinkya *et al.*, 2005; Karamanou and Vafeas, 2005). Corporate governance mechanisms that enhance managerial monitoring lead to improve the informational environment (Elbadry *et al.*, 2015). In terms of operational transparency, better corporate governance can protect shareholders' interests and limit the activities that are not in line with the shareholders' best interests. Dumitrescu (2010) showed that corporate governance mechanisms affect the market liquidity of the firm's stock, as high monitoring costs, low ownership concentration, effective disclosure regulation and effective shareholder protection, lead to higher market liquidity. Leuz *et al.* (2003) mentioned that corporate governance enhances financial transparency by mitigating the incentives and ability of managers to disclosure misleading information. Diamond (1985) mentioned that the high quality of disclosed information, which is associated with better corporate governance, can reduce information asymmetry. This tends to decrease the traders' incentive to get private information, resulting in low heterogeneity between traders; consequently, market makers would face less adverse selection, leading to enhanced stock market liquidity. Tang and Wang (2011) found a positive relationship in the Chinese stock market over the period 1999-2004. Yun (2008) found that the impact of corporate governance is positively related to liquidity. Bebchuk and Cohen (2005) demonstrated that the strength of a firm's corporate governance limits the management team from expropriating the firm's value.

Therefore, the influence of corporate governance on stock market liquidity is related to the extent to which corporate governance enhances operational and financial transparency and decreases information asymmetry. Therefore, in this study, the four dimensions of corporate governance are used to construct the corporate governance index, as the attributes of the corporate governance index, either internal or external monitoring mechanisms, are likely to influence transparency operationally and financially. Additionally, these internal and external attributes are used at an aggregate level. This is generally the case since that the external mechanism can facilitate efficient corporate governance practices by providing protection to shareholders. Munisi *et al.* (2014) mentioned that corporate governance components might complement each other in mitigating the agency problems in developed countries.

Limited empirical evidence supports the association between corporate governance and liquidity (Bar-Yosef and Prencipe, 2013; Chung *et al.*, 2010; Prommin *et al.*, 2014). Chung *et al.* (2010) examined the impact of the internal corporate governance mechanisms on liquidity and found a positive impact. Prommin *et al.* (2014) used data for an emerging country, namely, Thailand to examine the same issue. Therefore, thus far, in the literature, studies have yet to reach a consensus about the effect of all these corporate governance attributes on stock liquidity. Other studies have found that good corporate governance practices enhance liquidity (Mangena and Tauringana, 2007; Yun, 2008; Tang and Wang, 2011). In Malaysia, corporate governance has received a greater attention from the regulators where in year 2000 the MCCG Code is implemented. It includes board of directors, shareholders and directors' remuneration. Then, the Code was revised in 2007 with more focus on the internal audit function and audit committee effectiveness as monitoring mechanisms. The MCCG was once again revised and reissued in 2012, with the main aim being to pay greater attention to the monitoring mechanisms. Thus, in this study, the four corporate governance monitoring mechanisms (board of directors, audit committee, internal audit function and audit quality) are included to capture the strength of corporate governance.

The hypothesis developed in this study is consistent with the agency problem that states that corporate governance mitigates agency cost by reducing information asymmetry; subsequently, the firms' stock liquidity can be enhanced due to high transparency. Additionally, the association between corporate governance and stock liquidity can be

explained as better corporate governance means more monitoring on managers. This prevents inefficient or opportunistic managers from concealing information, which then leads to improved transparency; consequently, information asymmetry will be reduced (Chung *et al.*, 2010; Prommin *et al.*, 2014). Therefore, the hypothesis of this study is developed as follows:

H1. There is an association between corporate governance strength and stock market liquidity.

3. Methodology
The initial sample of this study consists of 822 firms listed in the Malaysian main market. Then, this study applies the following screening criteria: the firms must be nonfinancial firms, as financial firms have different corporate governance regulations and different annual reports' format; the firms must have complete information over the period of the study (2009-2012). Thus, 2,020 observations (505 firms over four years) is the final data set in this study. The sample period starts at 2009 because the revised corporate governance code became effective and firms are mandated to disclose about the amount invested in internal audit function. The study ends with year 2012 due to the challenge of extending the time frame, as corporate governance attributes are hand-collected from the annual reports. Other variables included in this study are extracted from DataStream.

In this study, the corporate governance score is constructed based on ten corporate governance attributes related to board of directors, audit committee, internal audit function and audit quality, as these attributes enhance operational and financial transparency and reduce information asymmetry. These items tend to minimize the conflict of interests between management and shareholders. Several studies have mentioned that researchers need to focus on how the various governance mechanisms combine effectively for the particular outcomes desired rather than examine the mechanisms in isolation (Misangyi and Acharya, 2014; O'Sullivan *et al.*, 2007; Ward *et al.*, 2009). Srinidhi *et al.* (2014) revealed that the use of aggregates decreases the measurement error that is inherent in the use of any one structural variable. In addition, governance mechanisms might work in a complementary or in a substitutive manner; therefore, it is critical to examine governance mechanisms jointly (Agrawal and Knoeber, 1996; Bowen *et al.*, 2008; Woidtke and Yeh, 2013). For example, a strong audit committee can enhance its effectiveness in internal monitoring, financial control, monitoring and reducing the managers' ability to conceal information about their performance. Therefore, it can be assumed that these attributes can improve financial and operational transparency. In terms of the internal audit function attribute, firms with effective internal audit function can facilitate the audit committee's role. In terms of the audit quality attribute, the claim is that a firm audited by a Big4 firm is more likely to have high-quality reported information[1]. A study performed by Lang *et al.* (2012) found that high-quality auditors are associated with high stock liquidity.

In this study, ten governance items are calculated to reflect corporate governance strength. Prior studies have followed this method to capture the firm's governance strength with other corporate outcomes or policies[2]. In this index, the distribution of all characteristics is split into high and low groups using k-median cluster analysis except for audit quality[3], where a value of "1" is given to audit quality in the case where a Big4 firm audited the company; otherwise "0." Therefore, the index ranges from 1 to 10. The higher the index, the higher the firm's corporate governance strength[4]. This study uses four characteristics for board and audit committee, namely, board independence, board size, frequency of board meetings and financial expertise. These characterizes are the key elements that reflect board and audit committee quality[5] (Goh, 2009; Johl *et al.*, 2013). In addition, for the internal audit function, the amount of investment in internal audit function is used to capture the effectiveness of internal audit function following the works of Al-Rassas and Kamardin (2016); Carcello *et al.* (2005); and Johl *et al.* (2013).

In terms of liquidity, the Amihud's illiquidity measure (ILLIQ) is estimated. It shows in Malaysian Ringgit, the ratio of absolute stock return to trading volume on a daily basis, averaged over a certain period. This means it shows the magnitude of stock price movement due to a given level of trading stocks. The crux of this measure is the fact that it reflects stock's depth and resiliency. Marcelo and Quirós (2006) stated that Amihud's measure is theoretically superior compared to other measure. Shin and Kim (2015) commented that Amihud's measure is simple to calculate and intuitive. It also has advantages as it captures the transaction costs related to trading and it considers the bid-ask spread in the sense that part of the reason for the return being measured in response to trading is the price movement to the bid or ask. Following previous studies such as the works of Ajina *et al.* (2015), Amihud *et al.* (2015), Choi *et al.* (2014), Wang (2013), Kang and Zhang (2014), the measure is normalized by taking the natural logs to alleviate the impact of any extreme value. The following equation shows the estimation method of Amihud's measure:

$$\text{ILLIQ}_{iy} = \frac{1}{D_{iy}} \sum_{t=1}^{D_{iy}} \times |R_{iyd}| / \text{VOLD}_{iyd} \qquad (1)$$

This measure is estimating the absolute price change caused by one thousand ringgit of trading volume on a daily basis. By definition, higher value of this measure indicates less liquidity. In the equation, R_{iyd} represents the return on stock i on day d of year y, while $VOLD_{iyd}$ is the daily volume in ringgit. Lastly, D_{iy} is the number of days when data are available for stock i in year y.

Following previous studies (Chung *et al.,* 1999; Chung *et al.,* 2010; Harris, 1994; Munisi *et al.,* 2014), seven control variables are included. Furthermore, year effect and industry effect are included as dummy variables to capture any possible variations. In terms of the control variables, ownership concentration is added as the percentage of total shares outstanding held by top five shareholders. Firm size is also included, as large firms more likely to have more information available which consequently enhance stock liquidity. To induce the binding constraint, the reciprocal of the end-of-year closing price is included. Leverage measured by dividing total liabilities on total assets while return volatility is captured by estimating the standard deviation of daily closing returns. Lastly, the study includes firms' tangibility as the ratio of net property, plant and equipment to the total assets. This variable is in line with the argument that the tangible asset payoffs are easier to observe, leading to lower information asymmetry.

The regression model used in this study is shown in the following equation, where ILLIQ is the illiquidity measure; CG is the corporate governance index, is calculated based on four categories of corporate governance mechanisms (board of directors, audit committee characteristics, internal audit function and audit quality); SIZE and PROF are the firms' size and profitability, respectively. Both calculated as the book value of total assets and the return on assets (ROA), respectively. Further, LEV is the firm's leverage calculated by dividing total liabilities on the book value of total assets; the volatility of stock is captured by the standard deviation of daily closing returns (VOLATILITY); PRICE is the reciprocal of end of the share price and firms' assets tangibility (TANG) is calculated by dividing net property, plant, and equipment on total assets; and ε is the error term:

$$\text{ILLIQ}_{it} = \beta_0 + \beta_1 \text{CG} + \beta_2 \text{SIZE}_{it} + \beta_3 \text{PROF}_{it} + \beta_4 \text{LEV}_{it} + \beta_5 \text{VOLATILITY}_{it}$$

$$+ \beta_6 1/\text{PRICE}_{it} + \beta_7 \text{TANG}_{it} + \sum_{i=3}^{n} \text{YEAR} + \sum_{i=6}^{n} \text{INDUSTRY} + \varepsilon \qquad (2)$$

4. Analysis

4.1 Summary of statistics

In this section, the descriptive statistics of the variables are explained and shown in Table I. The average of Amihud's illiquidity is 0.0187304 while standard deviation is 0.0652911. For the corporate governance score variable, the mean is 3.475 and standard deviation is 2.162, with minimum 0 and maximum 10. In terms of the control variables, the results are as shown in Table I.

4.2 Regression result based on pooled cross-sectional time-series data

In this section, the pooled cross-sectional time-series data are reported where standard errors are adjusted by clustering firms. Following the works of Ali *et al.* (2016), Choi *et al.* (2014) and Prommin *et al.* (2014), this method is preferred to control potential heteroscedasticity and autocorrelation problems. To control for time and industry variation, dummies variables are included in the model[6]. Table II shows that the model is well-fitted where adjusted R^2 is 64.88 percent and F-statistics is statistically significant. The table also shows that the estimated coefficient for corporate governance is -0.106 ($t = -3.37$), negatively significant at below the 0.01 level with Amihud's illiquidity measure (ILLIQ). This indicates that the relationship between corporate governance and stock liquidity is positive[7]. The result implies that strong corporate governance reduces information asymmetries among market participants (the insiders, e.g. managers/controlling shareholders and outside owners), which enhance stock market liquidity. In other words, firms with effective corporate governance are likely to have high stock market liquidity because of the financial transparency, which eventually decreases information asymmetries. This is consistent with the prior evidence by Chung *et al.* (2010) and Prommin *et al.* (2014), who find that better governed firms have high liquidity. Thus, this study concludes that the hypothesis of this study is supported.

4.3 Regression based on different measurements

To avoid any potential bias toward one measurement and to provide reliable results, this section provides the regression results based on three different measurements for liquidity.

Variable name	Minimum	Maximum	Mean	Median	SD
ILLIQ (log-transformed)	−16.8968	0.729413	−6.92033	−6.64477	3.038
ILLIQ	4.59e-08	0.8172254	0.0187304	0.0013008	0.0652911
CG	0	10	3.475248	3	2.16205
OC	12.16	96.24	54.20	55.34	15.86
SIZE	9.865526	18.29816	12.90626	12.69366	1.45323
ROA	−0.68711	0.471184	0.033993	0.037662	0.08952
LEV	0.003456	1.898633	0.389267	0.374918	0.21698
VOLATILITY	0.004634	0.388373	0.033826	0.026365	0.02707
1/PRICE	0.015913	25	2.416248	1.428571	3.05354
TANG	0	0.980488	0.364566	0.34064	0.20975

Notes: ILLIQ, the daily price response associated with one dollar of trading volume (Illiquidity measure); CG, the corporate governance index calculated based on both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality); ownership concentration (OC), the percentage of total shares outstanding held by top five shareholders; SIZE, the firms' book value of total assets; ROA, the firm's profitability; LEV, the firm's book value of total liabilities divided by the book value of total assets; VOLATILITY, the standard deviation of daily closing returns; 1/PRICE, the reciprocal of end of the share price; TANG (Tangibility), the net property, plant and equipment divided by the total assets

Table I.
Descriptive statistics

Dependent variable	ILLIQ (*t*-statistic)
CG	−0.106*** (−3.37)
OC	0.0351*** (8.19)
SIZE	−1.327*** (−21.62)
ROA	−4.321*** (−4.76)
LEV	0.592* (1.74)
VOLATILITY	24.53*** (5.70)
1/PRICE	−0.0635*** (−2.89)
TANG	−0.177 (−0.61)
Cons	8.545*** (10.90)
Years dummy	Included
Individual dummy	Included
F-value	100.72
Sig	0.000
R^2	0.6488
N	2,020

Table II.
Multivariate
regression analysis

Notes: ILLIQ, the daily price response associated with one dollar of trading volume (Illiquidity measure); CG, the corporate governance index calculated based on both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality); OC or ownership concentration, the percentage of total shares outstanding held by substantial shareholders; SIZE is the book value of total assets; ROA is firm's profitability; LEV, the book value of total liabilities divided by the book value of total assets; VOLATILITY, the standard deviation of daily closing returns; 1/PRICE, the reciprocal of end of the share price; TANG or asset tangibility, the net property, plant and equipment divided by the total assets; and e_t, the error term. The values in parentheses are *t*-statistics based on standard errors that are clustered by firms. *,**,***Significant at 10, 5 and 1 percent levels, respectively

The first measure is bid-ask spread measure which includes the issue of the adverse selection while investing in information asymmetric firms. Equation (1) shows the bid-ask spread measurement where the bid-ask spread is defined as the relative bid-ask spread using daily closing bids and asks:

$$\text{Bid} - \text{ask spread}_{it} = \frac{1}{D_{it}} \sum_{1}^{D_{it}} \frac{ask_i - bid_i}{(ask_i - bid_i)/2} \tag{3}$$

In the above equation, D_{it} denotes the number of days in year t for firm i for which closing daily bids (bid_i) and closing daily asks (ask_i) are available.

The second measure shown in Equation (3) is the turnover ratio measure which captures stock market liquidity by dividing monthly number of shares traded on the total number of shareholders outstanding. For this measure the higher the turnover ratio, the higher liquidity:

$$\text{TURN}_{iy} = \sum_{t=0}^{D_{iy}} \frac{VOL_{iy}}{N_{iy}} \tag{4}$$

In the above equation, $TURN_{iy}$ represents the ratio of the monthly number of shares traded to the total number of shares outstanding where VOL_{iy} represents the number of shares traded and N represents the total number of shares outstanding. In Column 2 of Table III, the results by using another measurement are reported. This measure is called adjusted Amihud measure (AdjILLIQ). This measure is introduced by Kang and Zhang (2014) and considered as an extension for Amihud measure. This measure incorporates the non-trading

Model 1: $\text{SPREAD}_{i,t} = \beta_0 + \beta_1\text{CG}_{i,t} + \beta_2\text{OC}_{i,t} + \beta_3\text{SIZE}_{i,t} + \beta_4\text{LEV}_{i,t} + \beta_5\text{ROA}_{i,t} + \beta_6\text{TANG}_{i,t}$
$\qquad + \beta_7\text{VOLATILITY}_{i,t} + \beta_8\text{PRICE}_{i,t} + \sum\text{YEAR} + \sum\text{INDUSTRY} + e_t$

Model 2: $\text{TURN}_{i,t} = \beta_0 + \beta_1\text{CG}_{i,t} + \beta_2\text{OC}_{i,t} + \beta_3\text{SIZE}_{i,t} + \beta_4\text{LEV}_{i,t} + \beta_5\text{ROA}_{i,t} + \beta_6\text{TANG}_{i,t}$
$\qquad + \beta_7\text{VOLATILITY}_{i,t} + \beta_8\text{PRICE}_{i,t} + \sum\text{YEAR} + \sum\text{INDUSTRY} + e_t$

Model 3: $\text{AdjILLIQ}_{i,t} = \beta_0 + \beta_1\text{CG}_{i,t} + \beta_2\text{OC}_{i,t} + \beta_3\text{SIZE}_{i,t} + \beta_4\text{LEV}_{i,t} + \beta_5\text{ROA}_{i,t} + \beta_6\text{TANG}_{i,t}$
$\qquad + \beta_7\text{VOLATILITY}_{i,t} + \beta_8\text{PRICE}_{i,t} + \sum\text{YEAR} + \sum\text{INDUSTRY} + e_t$

Variables	BID-ask spread (t-statistic)	TURN (t-statistic)	AdjILLIQ (t-statistic)
CG	0.00649** (2.27)	0.00206** (2.21)	−0.117*** (−3.59)
OC	0.000373 (1.04)	−0.00118*** (−6.98)	0.0267*** (6.16)
SIZE	0.0677*** (13.20)	0.000226 (0.12)	−1.073*** (−16.76)
ROA	0.290*** (4.19)	−0.0390 (−1.29)	−3.927*** (−4.50)
LEV	−0.255*** (−8.75)	0.0275** (2.56)	0.438 (1.24)
VOLATILITY	−1.053*** (−4.13)	0.260** (2.28)	25.21*** (4.76)
1/PRICE	−0.00711*** (−3.31)	0.000528 (0.62)	0.00200 (0.09)
TANG	−0.164*** (−5.93)	−0.00503 (−0.42)	−0.162 (−0.57)
Cons	−0.388*** (−5.70)	0.0684** (2.32)	4.431*** (5.38)
Years dummy	Included	Included	Included
Individual dummy	Included	Included	Included
F-value	57.75	7.40	66.96
Sig	0.000	0.000	0.000
R^2	0.3290	0.1452	0.5737
N	2,020	2,020	2,020

Notes: SPREAD, the relative bid-ask spread using daily closing bids and asks; TURN, the ratio of the monthly number of shares traded to the total number of shares outstanding (liquidity measurement); AdjILLIQ, the daily price response associated with one dollar of trading volume, incorporated the non-trading days (Illiquidity measure); CG, the corporate governance index calculated based on both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality); OC or ownership concentration, the percentage of total shares outstanding held by substantial shareholders; SIZE, the book value of total assets; ROA, the firm's profitability; LEV, the book value of total liabilities divided by the book value of total assets; VOLATILITY, the standard deviation of daily closing returns; 1/PRICE, the reciprocal of end of the share price. TANG or asset tangibility is net property, plant, and equipment divided by total assets; and e_t, the error term. The values in parentheses are t-statistics based on standard errors that are clustered by firms. *,**,***Significant at 10, 5 and 1 percent levels, respectively

Table III.
Multiple regression
analysis using
different
measurements

days (zero-volume days) which is potential observed particularly for emerging markets compare to the US market, where zero-volume days rarely occur. Equation below shows the estimation of the modified Amihud measure. As AdjILLIQ is an illiquidity measure, the larger value of this measure implies lower liquidity:

$$\text{AdjILLIQ}_{iy} = \left(\frac{1}{D_{iy}}\sum_{t=0}^{D_{iy}}\frac{|R_{iyd}|}{VOLD_{iyd}}\right) \times \left(1 + \text{ZeroVol}_{iyd}\right) \tag{5}$$

in the above equation, R_{iyd} represents the return on stock i on day d of year y; $VOLD_{iyd}$ is the daily volume in Ringgit; D_{iy} represents the number of days when the data are available for stock i in year y. ZeroVol represents the percentage of zero-volume days in a particular year (calculated by dividing the number of days with zero volumes in a year on total number of trading days in a year).

4.4 Regressions based on the corporate governance dimensions

To provide some complementary evidence, the corporate governance score is examined separately with its four dimensions (board characteristics, audit committee characteristics, internal audit function and audit quality). The aim of this regression is to determine which dimension has the highest influence on liquidity. The results in Table IV show that the audit committee characteristics are significantly related to liquidity. It can be interpreted that the mitigation of information asymmetry is directly related to the strength of the audit committee. In other words, market makers are more concerned with the audit committee characteristics.

4.5 Regression results using changes in the variables

To confirm the robustness of the associations found in this study, the level of study variables are replaced by the level of changes. This method is used by An and Zhang (2013); Chung *et al.* (2010); Prommin *et al.* (2014) who postulated that the regressions based on change in variable are less likely to show spurious association between the study variables. The result in Table V shows that the coefficient of the changes in corporate governance is significant with the same direction of the earlier findings. This implies that any increase in corporate governance is associated with an improvement in liquidity.

Variables	ILLIQ (*t*-statistic)
BOD	−0.0765 (−1.24)
AC	−0.156** (−2.49)
IAF	−0.0678 (−0.50)
AQ	−0.0569 (−0.45)
OC	0.0352*** (8.26)
SIZE	−1.340*** (−20.53)
ROA	−4.310*** (−4.74)
LEV	0.609* (1.77)
VOLATILITY	24.67*** (5.74)
1/PRICE	−0.0626*** (−2.85)
TANG	−0.176 (−0.60)
Cons	8.641*** (10.75)
Years dummy	Included
Individual. dummy	Included
F-value	86.55
Sig	0.000
R^2	0.6491
N	2,020

Notes: ILLIQ, the daily price response associated with one dollar of trading volume (Illiquidity measure); BOD, the score for the board of directors' characteristics (board size (BODSIZE); board independence (BODIND); board meeting (BODMEET); board financial expertise (BODEXPERT)); audit committee' characteristics (audit committee size (ACSIZE); audit committee independence (ACIND); audit committee meeting (ACMEET); audit committee financial expertise (ACEXPER)); Internal audit function, the cost of internal audit function; AQ, the audit quality; OC or ownership concentration, the percentage of total shares outstanding held by substantial shareholders; SIZE, the book value of total assets; ROA, the firm's profitability; LEV, the book value of total liabilities divided by the book value of total assets; VOLATILITY, the standard deviation of daily closing returns; 1/PRICE, the reciprocal of end of the share price. TANG or asset tangibility, the net property, plant and equipment divided by the total assets; and e_t is the error term. The values in parentheses are *t*-statistics based on standard errors that are clustered by firms. *,**,***Significant at 10, 5 and 1 percent levels, respectively

Table IV.
Multiple regression analysis using the CG dimensions

Variables	ΔILLIQ (*t*-statistic)
ΔCG	−0.0724* (−1.84)
ΔOC	0.0416*** (5.04)
ΔSIZE	−0.680*** (−2.83)
ΔROA	−0.313 (−0.54)
ΔLEV	0.489 (0.86)
ΔVOLATILITY	13.94*** (6.94)
Δ1/PRICE	0.216*** (7.55)
ΔTANG	0.0847 (0.18)
Cons	0.172* (1.76)
Years dummy	Included
Individual dummy	Included
F-value	21.08
Sig	0.000
R^2	0.1725
N	1,515

Notes: ΔILLIQ is the change in daily price response associated with one dollar of trading volume (Illiquidity measure); ΔCG is the change in corporate governance index calculated based on both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality); ΔOC or ownership concentration is change in the percentage of total shares outstanding held by substantial shareholders; ΔSIZE is the change in book value of total assets; ΔROA is the change in firm's profitability; ΔLEV is the change in book value of total liabilities divided by the book value of total assets; ΔVOLATILITY is the change in standard deviation of daily closing returns; Δ1/PRICE is the change in reciprocal of end of the share price. ΔTANG or asset tangibility is change in net property, plant, and equipment divided by total assets; and e_t is the error term. *,**,***Significant at 10, 5 and 1 percent levels, respectively

Table V.
Multiple regression analysis using the changes in the variables

4.6 Regression results using lagged independent variables

To confirm that the association found in this study is robust and the reverse causality is not an issue, the one-year lag of the independent variables is used following the works of Alves *et al.* (2015), Miletkov *et al.* (2014) and Udomsirikul *et al.* (2011). The findings as shown in Table VI remain similar.

4.7 Regression results using one-year lagged dependent variables in the regression model

In this section, the one-year lagged dependent variable is included in the regression model. Chung and Zhang (2010); Klein (1998); Klock *et al.* (2005); and Brown and Caylor (2006) argued that this strategy could consider the historical factors that might lead to current differences in the dependent variable. The result in Table VII shows that the relationship between corporate governance and liquidity remain significant even after including the lagged dependent variable.

4.8 Regression results using 2SLS and IV-GMM

As corporate governance might be affected by the liquidity (reverse causality) or both variables might be affected by unobservable third variable (simultaneity). Therefore, additional tests are required to corroborate the earlier findings. In this section, the 2SLS regressions and IV-GMM are employed to alleviate the concern of endogeneity. For these two approaches, instrumental variables are required. In this study, sourcing arrangements of internal audit function (IFASA) is included as a dummy variable where a value of "1" is given when the internal audit function is in-house, and "0" otherwise. The second instrumental variable is a regulatory change in the environment where audit oversight board (AOB) is initiated in the Malaysian context with an aim to enhance the financial

Variables	ILLIQ (*t*-statistic)
CG_{t-1}	−0.0883*** (−2.61)
OC_{t-1}	0.0342*** (7.62)
$SIZE_{t-1}$	−1.364*** (−21.42)
ROA_{t-1}	−6.345*** (−5.82)
LEV_{t-1}	0.500 (1.44)
$VOLATILITY_{t-1}$	13.54*** (4.69)
$1/PRICE_{t-1}$	−0.0919*** (−4.28)
$TANG_{t-1}$	−0.288 (−0.85)
Cons	8.932*** (10.88)
Years dummy	Included
Individual dummy	Included
F-value	68.32
Sig	0.000
R^2	0.6070
N	1,515

Notes: ILLIQ, the daily price response associated with one dollar of trading volume (Illiquidity measure); CG, a one-year lag of the corporate governance index calculated based on both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality); OC or ownership concentration, a one-year lag of the percentage of total shares outstanding held by top five shareholders; SIZE, a one-year lag of the book value of total assets; ROA, a one-year lag of firm's profitability; LEV, a one-year lag of the book value of total liabilities divided by the book value of total assets; VOLATILITY, a one-year lag of the standard deviation of daily closing returns; 1/PRICE, a one-year lag of the reciprocal of end of the share price. TANG or asset tangibility, a one-year lag of net property, plant, and equipment divided by total assets; and e_t is the error term. The values in parentheses are *t*-statistics based on standard errors that are clustered by firms. *,**,***Significant at 10, 5 and 1 percent levels, respectively

Table VI.
Multiple regression analysis using lagged independent variables

reporting quality by providing assurance and strengthening the public confidence. This instrumental variable is measured as dummy variable where a value of "1" is given for years 2011 and 2012 (post-initiating AOB) and "0" otherwise[8].

In untabulated findings, in the first-stage regression, the two instruments are regressed on corporate governance. In the second-stage regression, where stock market liquidity is the dependent variable, corporate governance is replaced with the predicted corporate governance from the first-stage regression. Predicted corporate governance shows a negative and significant coefficient, corroborating the earlier findings.

In Table VIII, the Wu-Hausman test and C-statistic χ^2 are employed to test for the instruments validity of 2SLS and IV-GMM, respectively. The results confirm that the two chosen instruments are appropriate for the models. The results of IV-2SLS and IV-GMM which are presented in Columns 1 and 2 of Table VIII, corroborate the earlier findings. Furthermore, dynamic GMM estimation (Arellano-Bond dynamic panel-data estimation) is employed and this approach is more efficient as it accounts for unobservable heterogeneity, simultaneity, and reverse causality (Miletkov *et al.*, 2014). The results from the dynamic GMM regression, which are presented in Column 3 of Table VIII, lend further support for the hypothesis of this study that there is a positive relationship between corporate governance and stock market liquidity.

5. Summary

It is widely argued that stock liquidity might be affected by the corporate governance. As firms with effective corporate governance mechanisms compel more monitoring on managers and prevent them to do any concealing or distorting for the information. Hence, information asymmetry might be mitigated which lead to less adverse selection

Variables	ILLIQ (*t*-statistic)
ILLIQ$_{t-1}$	0.528*** (20.13)
CG	−0.0577*** (−2.95)
OC	0.0226*** (8.30)
SIZE	−0.545*** (−10.19)
ROA	−3.139*** (−4.93)
LEV	−0.0551 (−0.27)
VOLATILITY	13.68*** (3.90)
1/PRICE	−0.0232 (−1.47)
TANG	−0.237 (−1.20)
Cons	1.862*** (3.32)
Years dummy	Included
Individual dummy	Included
F-value	354.58
Sig	0.000
R^2	0.7449
N	1,515

Corporate governance strength

Notes: ILLIQ, the daily price response associated with one dollar of trading volume (Illiquidity measure); ILLIQ$_{t-1}$, a one-year lag of the daily price response associated with one dollar of trading volume (Illiquidity measure); CG, the corporate governance index calculated based on both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality); OC or ownership concentration, the percentage of total shares outstanding held by top five shareholders; SIZE, the book value of total assets; ROA, the firm's profitability; LEV, the book value of total liabilities divided by the book value of total assets; VOLATILITY, the standard deviation of daily closing returns; 1/PRICE, the reciprocal of end of the share price. TANG or asset tangibility, the net property, plant, and equipment divided by total assets; and e_t is the error term. The values in parentheses are *t*-statistics based on standard errors that are clustered by firms. *,**,***Significant at 10, 5 and 1 percent levels, respectively

Table VII.
Multiple regression analysis using lagged dependent variable

Dependent variable	IV-2SLS ILLIQ	IV-GMM ILLIQ	Dynamic GMM ILLIQ
ILLIQ$_{t-1}$			−0.281*** (−2.83)
CG	−0.249** (−2.01)	−0.257** (−2.12)	−0.116** (−2.40)
OC	0.0354*** (12.71)	0.0348*** (12.12)	0.0465*** (4.63)
SIZE	−1.177*** (−12.66)	−1.165*** (−12.26)	−0.713** (−2.34)
ROA	−4.233*** (−7.92)	−4.146*** (−5.59)	−1.084 (−1.34)
LEV	0.406* (1.87)	0.325 (1.34)	1.018 (1.35)
VOLATILITY	27.76*** (14.54)	29.54*** (6.91)	16.52*** (4.32)
1/PRICE	−0.0656*** (−3.97)	−0.0687*** (−3.56)	0.262*** (7.76)
TANG	−0.0952 (−0.45)	−0.0633 (−0.28)	−0.411 (−0.69)
_cons	6.453*** (7.80)	6.334*** (7.17)	−3.341 (−0.95)
Wu-Hausman	1.40538		
F-statistics	3319.21***	3103.39***	
C-statistic χ^2		1.66232	
Wald χ^2			124.68***
R^2	0.6200	0.6188	

Notes: ILLIQ, the daily price response associated with one dollar of trading volume (Illiquidity measure); CG, the corporate governance index calculated based on both internal monitoring mechanisms (board characteristics, audit committee characteristics and internal audit function) and external monitoring mechanism (audit quality); OC or ownership concentration, the percentage of total shares outstanding held by top five shareholders; SIZE, the book value of total assets; ROA, the firm's profitability; LEV, the book value of total liabilities divided by the book value of total assets; VOLATILITY, the standard deviation of daily closing returns; 1/PRICE, the reciprocal of end of the share price. TANG or asset tangibility, the net property, plant, and equipment divided by total assets; and e_t, the error term. *,**,***Significant at 10, 5 and 1 percent levels, respectively

Table VIII.
Regression analysis using IV-2SLS, IV-GMM and dynamic GMM

problems among traders. Thus far, internal audit function as an internal monitoring mechanism is yet to be examined jointly with other corporate governance monitoring mechanisms on stock market liquidity. The study examines the impact of corporate governance strength on stock market liquidity by constructing a score that capture the internal and external monitoring mechanisms. The results show that there is a significant positive relationship between corporate governance score and stock market liquidity. This means that firms with effective internal and external monitoring mechanisms have better stock liquidity. This implies that maintaining good corporate governance mechanisms is beneficial for firms in terms of their stock liquidity.

The findings of this study provide implications to improve capital market in emerging economies where regulators who enhance internal and external monitoring mechanisms are the norm. Regulators should consider corporate governance reforms to improve stock market liquidity by mandating initiating IAF, such an internal monitoring mechanism might be beneficial to enhance emerging markets financial market where ownership is highly concentrated and protection for minor shareholders is weak. This study also gives implications to the investors to devise their trading strategies through considering corporate governance mechanisms closely. In term of the managerial implications, based on the findings investors might react positively to the corporate governance strength. As a result, firm can enhance its liquidity by increasing the insurance of investors. The corporate governance may be strengthened by the presence of an effective board of directors, audit committee, internal audit function and audit quality. Consequently, in a country like Malaysia, firms experience higher market liquidity in the presence of effective corporate governance mechanisms.

Compared to the prior findings of the significant positive relationship found between corporate governance strength and stock market liquidity. This study provides an additional empirical evidence from a highly ownership concentrated an emerging country, namely, Malaysia by using a score that capture the internal and external monitoring mechanisms. The score includes the IAF which is ignored by previous studies even though it is more related to the information reporting quality and could reduce the information asymmetry among traders. The findings of this study also addressed the issue of endogeneity and showed that the strong relationship between corporate governance strength and stock market liquidity is robust to alternative measurement for the stock liquidity and to alternative estimation methods. However, this study still has a few limitations. The first one is that this study uses data solely based on Malaysia. Thus, it is difficult to generalize the findings. The second one is the time frame where future studies could extend the period of the study. Despite these limitations, the study makes meaningful contributions to the literature and practice.

Notes

1. DeFond and Jiambalvo (1993) documented that Big5 auditors are associated with higher quality accounting data compare to non-Big5 auditors. Fan and Wong (2005) mentioned that dealing with Big5 auditors is a credible indicator of the firm's commitment to transparency. This measure has been widely used by previous studies (Abdul Rahman and Haneem Mohamed Ali, 2006; Alves, 2013; Choi *et al.*, 2014; Davidson *et al.*, 2005; Marra *et al.*, 2011; Rusmin *et al.*, 2014).

2. Several studies have used the score to capture the strength of corporate governance (Al-Jaifi, 2015; Al-Rassas and Kamardin, 2016; Goh, 2009; Johl *et al.*, 2013; Mohd Saleh *et al.*, 2007; Prommin *et al.*, 2014).

3. This approach allows for uneven clusters and is better suited to find breakpoints in the distribution. This approach has been used by several studies (Bushee *et al.*, 2014; Gompers *et al.*, 2003).

4. One point is awarded for each corporate governance characteristic to form this index. A value of "1" is given if the firms has a value above the sample median, otherwise "0."

5. This study follows the works of Brown and Caylor (2006), DeFond *et al.* (2005), Hunton *et al.* (2011) Johl *et al.* (2013), Zaman *et al.* (2011) by including the four board characteristics (board independence, size, financial expertise and meeting). In addition, audit committee characteristics (audit committee independence, size, financial expertise and meeting) were included and these attributes have been used by other studies (Goh, 2009; Mohd Saleh *et al.*, 2007; Xie *et al.*, 2003).

6. Three dummy variables are included to capture the time effects, while seven dummy variables are included to capture the industry effect in the Malaysian context which are construction, consumer and industrial products, plantation, property, technology and trading and services.

7. Amihud's illiquidity measure is a cost per volume ratio that aims to capture the marginal transaction cost per dollar of volume. Thus, a high illiquidity ratio indicates a low level of liquidity.

8. In untabulated results, one-year lag of corporate governance is used as an as instrumental variable; the findings are significant with the same direction.

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