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**Article**

## Liquidity, corporate governance and firm performance: A meta-analysis

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## ACCOUNTING, CORPORATE GOVERNANCE & BUSINESS ETHICS | RESEARCH ARTICLE

# Liquidity, corporate governance and firm performance: A meta-analysis

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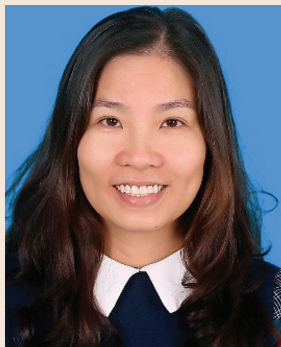
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**Abstract:** Our study investigates the interlink between liquidity, corporate governance and firm value with the adoption of meta-analysis. The final sample consists of 428 studies extracted from 55 papers, covering 632,196 firm-year observations in a worldwide scope. The diversity in data is believed to reduce possible homogeneity due to regional or time period concentration. Using random-effects model, it is reported that both illiquidity factors (Spread and Amihud illiquidity) can significantly worsen the performance of a firm, while the corporate governance-firm value connection is significantly positive via three out of four factors (Corporate governance index, Board size and Institutional ownership). Besides studying the overall relationship direction, the paper also looks into its heterogeneity. The existence of heterogeneity is confirmed in both liquidity-firm value and governance-firm value relationships. The running of meta-regression indicates that both illiquidity factors are significantly moderated by most of the examined paper characteristics, whilst only two out of four corporate governance indicators (Corporate governance index and Institutional ownership) are significantly altered.

**Subjects:** Economics; Finance; Corporate Governance

**Keywords:** meta-analysis; liquidity; corporate governance; firm performance; moderators

### ABOUT THE AUTHORS



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### PUBLIC INTEREST STATEMENT

The liquidity – firm value link as well as the corporate governance – firm value link has been center of numerous research papers. However, there are few papers that combine these elements to investigate the interlink between them in depth, and the results of these connections remain mixed in the literature world. Therefore, our paper "Liquidity, corporate governance and firm performance: A meta-analysis" is conducted with a view to inspecting the interrelationship between these three factors by synthesizing various studies to reach a final result. The sample consists of 428 studies extracted from 55 papers, covering 632,196 firm-year observations in a worldwide scope. Meta-analysis technique is adopted as the statistical method to combine and analyze the huge data. The detailed methodology and outcomes are outlined in our paper, clearly stating the direction and statistical significance of the relationship.

## 1. Introduction

Liquidity has long been centered in a wide range of studies in the literature of finance. Liquidity is referred to “the extent to which a market, such as a country’s stock market or a city’s real estate market, allows assets to be bought and sold at stable, transparent prices” (Hayes, 2021). The market is said to hold a good liquidity position if the bid price is quoted fairly as the ask price. The drying up of liquidity in the 2008 global financial crisis has divulged its significance to the entire market. In an illiquid market, commodities are not readily saleable because of buyers’ uncertainty about its underlying value. The trade-off between the valuation of an asset and the speed at which it can be traded is striking. This illiquidity discourages trade and investment, thus hindering “the efficient allocation of risk and capital in the economy” (Adrian et al., 2016). As a result, after the crisis various firms strived for establishing better liquidity strategies to improve their financial position, which happens to impact firm performance normally presented by the financial metric measuring the firm’s market valuation, or the firm’s market-to-book ratio (Ezzine & Olivero, 2015).

The downturn also drew investors’ attention to the limitations within corporate governance—the area previously of little knowledge and interest to them. Another definition suggests that corporate governance is “a combination of structures and mechanisms that align the interests of all parties involved and which ensures the voice of stakeholders is heard and information is fairly distributed” (Deloitte, 2016). Shleifer and Vishny indicated that effective governance is likely to create a favorable impact on firm performance (Shleifer & Vishny, 1997). Improved corporate governance decreases the chances of management override, which in turn raises the possibilities that the board makes informed decisions on profit-yielding projects.

Moreover, corporate governance is considered as the channel through which liquidity exerts the influence on firm value in varying theories. The pay-performance sensitivity theory advocates that higher liquidity ameliorates governance and firm value as a result, thanks to performance monitoring. On the other hand, the activist exit theory favors that liquidity may lower the quality of governance due to low cost exits for vigilant shareholders. Most likely, the corporate would observe a diminution in its value.

As a matter of fact, the findings regarding the relationship between liquidity, corporate governance and firm performance are varied across studies; however, there is lack of synthesized work papers that examine all three elements and their interdependence. Hence our paper is made with a view to fulfilling this gap in the literature of finance. We opt for meta-analytic procedure to evaluate the connections in our study, as the method meets the criteria of being able to sufficiently synthesize an enormous quantity of studies to reach a final conclusion.

In short, our study is designed to clarify the association between liquidity, corporate governance and firm value with the utilization of meta-analysis method. Specifically, we conduct a quantitative meta-analysis on previous empirical data related to liquidity-firm value and corporate governance-firm value relationships. Subsequently, we would determine direction and strength of these connections by analyzing the results. Lastly, we check if there exist any study-characteristic factors that affect the magnitude of the relationship between liquidity and firm value as well as that between corporate governance and firm value.

The paper is discussed in major sections. The *Introduction* part will give a brief summary of each component and how they are associated altogether. Next, five theoretical frameworks on which the interlink between liquidity, governance and firm value are based are inclusive in the *Literature review* section, followed by the *Methodology* for testing our research hypotheses. The fourth part is *Descriptive analysis and Forest plot* which are numerically and graphically the traditional descriptive analysis of summary effect sizes. In the *Meta-analysis model results* section, the direction and statistical power between each liquidity/governance proxy and firm value are derived from the analysis. The *Meta-regression analysis results* part are designed to test the impact (if any) of paper-characteristic factors on the relationships of interest. In the last part, we reflect some *Limitations*

of our study and reach the *Conclusion* so that readers could have a summary review on the research, with significant points noted.

## 2. Literature review

### 2.1. Theoretical framework

Theoretical framework on liquidity, corporate governance and firm performance can be represented through five main theories.

**Feedback theory.** Subrahmanyam and Titman (2001) stated that there are two major elements in the feedback model. The first component would be the financial network, or interdependence, between firm stakeholders. For this reason, a small decision of a stakeholder could bring about a situation where firm value is susceptible. The other component of the model is the stock information and trading environment. With increased liquidity, the aggressive trade of stocks among investors is stimulated. Other investors see this as a positive feedback, together with the aforementioned interdependence between stakeholders, leading to a positive cascade and thereby increasing firm value.

**Liquidity-based pricing theory.** For investors who purchase illiquid securities, they assume stock prices should incorporate costs of illiquidity, namely exogenous trading costs, demand pressure, inventory risk, etc., as they need to be compensated for bearing them (Amihud et al., 2005). Therefore, the price discount due to illiquidity equals to the present value of future cash flows of transaction expenses during its lifetime. Converting this into the expected rate of return, the authors found that the return is equivalent to that of a perfectly liquid security plus the expected transaction cost. Accordingly, the higher the illiquidity, the higher the discount rate and the lower the corporate value.

**Signaling theory of underpricing.** Signaling theory of underpricing proposes that board of management have a thorough understanding of firm's quality; thus they should opt for underpricing their newly issued securities to signal their true underlying value. With signals sent out from firms mitigate information asymmetry—which is among the main sources of illiquidity, boosting the level of trading and liquidity on the market (Easley & O'Hara, 2004). The greater the number of investors involved in the ownership of high-quality firms, the more firms can reveal about their quality through earnings and dividends. In turn, investors react to these policies by positively valuing firm's equity.

**Agency problem and Pay-performance sensitivity.** Managerial stock-based compensation is believed to bring managers' objectives in alignment with shareholders' benefits, which solves the principal-agent problem.

Pay-performance sensitivity was developed by Jensen and Murphy in 1990 to test the influence of managers' wealth on firm performance. It is concluded that stock liquidity adds up to firm valuation through the influence of enhanced pay-performance sensitivity on operating performance (Fang et al., 2009). When a manager decreases his holding, liquidity increases and more investors involve in monitoring activities. As a result, this curbs management misbehaviors, improves corporate governance and firm value.

**Activist exit.** If the exit is achievable at low cost, which occurs when the securities market is liquid, rational stakeholders are less willing to exercise a costly voice. The opposite is also applicable: when entities fail to maintain its stock liquidity on the market, leading to a highly priced exit cost, members have a tendency of expressing their voice in governance decisions. By actively giving constructive criticism to the board and orchestrating a change when any corporate governance issue is detected, they help enhance firm value (Coffee, 1991 & Bhide, 1993). Table 1 below gives a summary of the indicated relationships in each theory as well as their directions.

**Table 1. Summary of relationship directions indicated in each theory**

<b>Theory</b>	<b>Indicated relationship and its direction</b>
Feedback theory	Liquidity—firm value: <i>Positive</i>
Liquidity-based pricing theory	Liquidity—firm value: <i>Positive</i>
Signaling theory of underpricing	Liquidity—firm value: <i>Positive</i>
Agency problem and Pay-performance sensitivity	Liquidity—firm value: <i>Positive</i> Governance—firm value: <i>Positive</i>
Activist exit	Liquidity—firm value: <i>Negative</i> Governance—firm value: <i>Positive</i>

## **2.2. Literature review on liquidity, corporate governance and firm performance**

For a long time, studying the connection between liquidity and firm performance has been a question attracting plentiful research work in financial economics. Although the results seem to be mixed, the number of papers reporting the positive outcome tend to dominate. In one of the pioneering empirical research that examines this association by Fang et al. (2009), the researchers collected a sample of US firms for the period 1993–2004 to test the hypotheses. The paper proposes several theoretical models that account for the positive link between liquidity and firm performance (Liquidity premium, Investors’ sentiment, Positive feedback, Pay-for-Performance sensitivity and Blockholder intervention) along with some that indicate the negative link (Activist exit and Negative feedback). The finding concludes that liquidity favorably influences on firm performance through generating a higher operating profitability. The underlying mechanism for that is positive feedback model and performance-sensitive management compensation. Other research conducted by Huang et al. (2013), Chia et al. (2020), and Pham et al. (2020) are documented to share similar findings that there exists a positive relation between liquidity and firm value. Moreover, it is observed from the empirical research that spread and Amihud illiquidity are widely adopted as liquidity indicators for testing the bearing of liquidity on firm entity value.

Based on the theoretical framework and empirical studies, we propose the following hypotheses:

**H1: Stock liquidity has a significantly positive relationship with firm value.**

The hypothesis can then be divided into two sub-testable hypotheses:

**H1a: Spread has a significantly negative relationship with firm value,**

**H1b: Amihud illiquidity has a significantly negative relationship firm value.**

On the other hand, corporate governance can be deemed as a channel through which liquidity exerts an impact on firm value. Put simply, a change in liquidity results in a change in corporate governance, which in turn influences performance of an entity. However, due to the limit of available quantitative research—which is necessary input for meta-analysis, we focus on testing two causalities: liquidity-firm value and governance-firm value.

The literature on corporate governance and firm value is fairly in accord. Using a dataset of firms in developed countries, Ammann et al. (2011), using corporate governance index that incorporates 64 attributes, arrive at the conclusion that better corporate governance practices are reflected in significantly higher firm’s market value, in both statistical and economic terms. It is observed that at least for medium-sized firms, it costs them less to implement governance mechanisms rather than monitoring. This leads to higher cash inflows to investors and lower costs of capital to the

corporate. A similar finding is reached in the paper by Ochejo et al. (2019) when the authors recommended that banks should pay attention to corporate governance policies if they aim at enhancing bank valuation. Regarding which attribute of corporate governance should be considered to understand the influence of corporate governance on firm value, we focus on general index (corporate governance index), board composition (board size and CEO duality) and ownership identity (institutional ownership).

With respect to governance—firm value, there is an agreement of a positive relation in both theories. Combined with literature review, the following hypotheses are given:

**H2: Corporate governance has a significantly positive relationship with firm value.**

The hypothesis can then be divided into four sub-testable hypotheses:

H2a: Corporate governance index has a significantly positive relationship with firm value,

H2b: Board size has a significantly positive relationship with firm value,

H2c: CEO duality has a significantly positive relationship with firm value,

H2d: Institutional ownership has a significantly positive relationship with firm value.

**3. Methodology**

**3.1. Data collection and variable construction**

For meta-analytical procedures, it is important to establish a set of criteria for the selection of research papers since the quality of the data would decide the success of the analysis. Firstly, the data needs to be relevant to the calculation of effect size (i.e. coefficients, standard errors/ Student's t-statistic/ p-value). Secondly, the information of moderators that affect the focal relationships and potential sources of heterogeneity should be clearly disclosed. Also, the academic papers should be collected from reliable information sources such as Elsevier, JSTOR, Science Direct, Wiley Online Library.

Subsequent to the process of data collecting and screening, a total of **428** studies are selected from 55 research papers, in which 174 studies are concerned with the liquidity-firm value relationships and 254 studies are for governance-firm value one. In depth, there is a huge quantity of 632,196 firm-observations inclusive in our analysis, with the period of data collection ranging widely from 1980 to 2018. Data in empirical studies are assembled on a worldwide scope, extending to more than 40 countries. The diversity in data is believed to reduce possible homogeneity due to regional or time period concentration.

We eventually yield a total of ten variables which could be divided into three main groups: *Dependent variable*, *Independent variables* and *Control variables* that help minimize confounding impact on the outcome, thereby raising study validity. The detail of each variable is provided in Table A1 in the Appendix. To specify:

- The liquidity-firm value causality employs *Tobin's Q* as *dependent variable*, *Amihud illiquidity* and *Spread* as *independent variables*, and *Firm size* and *Firm age* as *control variables*.
- The corporate governance-firm value causality utilizes *Tobin's Q* as *dependent variable*, *Corporate governance index*, *Board size*, *CEO duality* and *Institutional ownership* as *independent variables*, and *Firm size* and *Leverage* as *control variables*.

### 3.2. Methodology for meta-analysis

A practical guide written by Cuijpers (2016), the method is viewed as “a specific type of systematic review”. It meets all criteria for being a systematic view, that is gathering relevant studies, evaluating all the collected papers and systematically synthesizing outcomes. But it outperforms a systematic review in the sense that inclusive studies are statistically synthesized using a special estimate—effect size.

Huedo-Medina et al. (2006) reveal three significant goals to be achieved by conducting a meta-analysis. Firstly, data is tested to see whether homogeneity exists or not. The second objective is to obtain a common index on the effect magnitude of the investigated relationship, expressed via confidence interval and statistical power. Finally, if heterogeneity is found across studies, there raises a demand for identifying potential studies-moderated characteristics.

Bearing this in mind, we divide our meta-analysis procedure into three steps. We start by calculating *Effect size* of separate studies, then applying *Meta-analysis model* to obtain the summary effect estimate, confidence interval, statistical significance and degree of heterogeneity from combining all selected studies. The procedure ends up with carrying out *Meta-regression analysis* to figure out paper characteristics as possible sources of heterogeneity that moderate the relation result.

**Effect size** is referred to as “the magnitude of the difference between groups” (Sullivan & Feinn, 2012). Since it is considered as the dependent variable of the analysis, our target is to compute the effect sizes of every single study, then combine them into a summary effect size. Due to our data type, *effect sizes based on correlation* is anchored to derive the final figure.

Firstly, we would estimate the correlation (denoted as  $r$ ), or “a point-biserial correlation between dummy-coded groups and scores on a continuous variable”, from Student’s t-distribution (Cohen, 1965).

$$r_i = \pm \sqrt{\frac{t^2}{t^2 + df_{within}}} \quad (1)$$

This is followed by the computation of Fisher’s  $z$  which is treated as *effect size* in our study since it mitigates some problems related to the use of correlation such as skewness (Hedges & Olkin, 1985).

$$z_i = 0.5 \times \ln\left(\frac{1 + r_i}{1 - r_i}\right) \quad (2)$$

The summary effect size, or  $\bar{z}$ , is then calculated and weighted based on characteristics of the study-specific, with larger weight assigned to more precise study.

$$\bar{z} = \frac{\sum_1^k z_i w_i}{\sum_1^k w_i} \quad (3)$$

**Meta-analysis model** plays a vital role in calculating and interpreting the analysis outcome, overall effect size included. There are two dominant models that are widely used for this kind of analysis: fixed-effect model (FEM) and random-effects model (REM).

*FEM* is applicable when all the studies in the synthesis share a single true effect size. The assumption is plausible when all the samples/ studies are drawn from one population, when they have similar procedures and treatment, or when they have their outcome consistently measured. To assign the weight of each study under fixed-effect model, we use the inverse-variance method.

$$w_{i,FEM} = \frac{1}{v_i} = \frac{1}{se_i^2} \quad (4)$$



Under REM, the assumption is that two components are included in effect size variability. Specifically, there exists within-study variation or sampling error as in FEM, plus between-study variation, or variation across study findings, beyond random sampling error. As a result, true effect sizes of each study will vary from one another as they are sampled from different distributions. The weight under REM therefore incorporates both variations and is computed as follows:

$$w_{i,REM} = \frac{1}{v_i + \tau^2} = \frac{1}{se_i^2 + \tau^2} \quad (5)$$

$\tau^2$ , or tau-squared, represents the between-study variability. Though estimators for tau-squared are varied in terms of popularity and complexity, we lean on Hunter-Schmidt method in our estimation for their reliability and relevancy.

Hunter—Schmidt method estimates  $\tau^2$  based on Cochran’s Q-test via the formula:

$$\tau^2 = \frac{Q - k}{\sum w_{i,FEM}} \quad (6)$$

$$Q = \sum w_{i,FEM} \times z_i^2 - \frac{[\sum (w_{i,FEM} \times z_i)]^2}{\sum w_{i,FEM}} \quad (7)$$

Summary effects under two models can be then estimated by applying equation (3) once we obtain FEM and REM weights of individual studies. Subsequently, the 95% confidence interval for the summary effect estimate and Z-test statistics for testing the null hypothesis are computed:

$$CI_{95\%} = \bar{z} \pm 1.96 * se_{overall} \quad (8)$$

$$se_{overall} = \frac{1}{\sqrt{\sum w_i}} \quad (9)$$

$$Z - test = \frac{\bar{z}}{se_{overall}} \quad (10)$$

Heterogeneity appears to be important when we pool effect sizes, and assessing the degree of between-study heterogeneity is one of the main purposes for carrying out meta-analysis. We adopt Cochran’s Q-test for testing the existence whether the between-studies variance exceeds expected amount under the null hypothesis of no heterogeneity (Huedo-Medina et al., 2006). The calculation of Q-test is already provided in equation (7). After that, Higgins and Thompson’s  $I^2$  index is utilized since it informs us of the magnitude of heterogeneity.

$$I^2 = \frac{Q - (k - 1)}{Q} \times 100\% \quad (11)$$

The “rule of thumb” for the use of  $I^2$  is detailed by Higgins and Thompson (2002), that is 25%, 50% and 75% indicating the low, medium and high level of heterogeneity respectively.

**Meta-regression analysis** comes into play to explicate the unexplained between-study variability in case heterogeneity is present. Similar to regression analysis, the variable x which symbolizes study-related characteristics in meta-regression will serve as pieces of information for the prediction of the variable y, or study’s summary effect size in this case (Harrer et al., 2021).

Like meta-analysis models, meta-regression can be performed in two ways as well: *fixed-effect meta-regression* and *random-effects meta-regression*.

Under fixed-effect meta-regression model, the whole heterogeneity between study findings could be accounted for by specific moderators due to the existence of solely within-study variance

(Dao & Nguyen, 2020). However, when there exists some variability that goes beyond the explanation of study-specific features, the adoption of fixed-effect regression is likely to induce type I error. Therefore, this type of model is not employed in our analysis.

On the other hand, random-effects regression admits the existence of both within- and between-study variance. By incorporating the latter variance, the model accepts the chances that some degree of heterogeneity cannot be clarified by moderators, making it more conservative in comparison with fix-effect regression (Dao & Nguyen, 2020).

$$\hat{y}_j = \mathbf{x}_j\beta + u_j + \epsilon_j \tag{12}$$

After the appropriate type of regression is chosen, we continue estimating  $y$  and  $\beta$ . In meta-regression, it is conventional that researchers use weighted least squares method as it enables the weighting process—the lower the standard error, the higher the weight given to that study. The explained variable  $y$  is accordingly produced as weighted effect sizes.

The next step in computing the meta-regression bears resemblance to the one of random-effects meta-analysis, i.e. estimating between-study variance  $\tau^2$ . Hunter-Schmidt is chosen, once again, in our estimation for that it works well when the heterogeneity of effects between studies are trusted to be large (Veroniki et al., 2016).

Dummy variables in Table 2 are included as covariates in our paper. When comparing them to the equation (12), they correspond to the vector of moderators  $\mathbf{x}_j$ . The vector  $\beta$  is, accordingly, composed of mean coefficients in accordance with these covariate variables.

#### 4. Descriptive analysis and forest plots

##### 4.1. Descriptive analysis of variables from empirical studies

This part is to bring a big picture of the collected samples to readers from a statistic viewpoint. Descriptive analysis is conducted on beta coefficients of variables concerning two interrelationships. To specify, traditional descriptive measures are included, namely measure of central tendency (mean and median), measure of variation (standard deviation) and measure of relative standing (1<sup>st</sup> quartile and 3<sup>rd</sup> quartile). We give a description of gathered studies as well, which includes the proportion of positive, negative and insignificant results they arrive at. This allows readers to have some slightest idea about the dominant sign that each variable may bear.

The traditional descriptive analysis may provide some potential results on our focused topic. However, it should not be based on as the main reference as it does not take in account between-studies variabilities beyond normal explanation, which in turn possibly inducing biased findings.

Table 2. Dummy variables definition	
Dummy variables	Definition
d_Asia	A dummy variable that is coded 1 for samples collected within the region of Asia only and coded 0 for otherwise
d_2010	A dummy variable that is coded 1 for data collected from the beginning 2010 till now and coded 0 for otherwise
d_Scopus	A dummy variable that is coded 1 for papers published in Scopus-indexed journal and coded 0 for otherwise
d_Listed	A dummy variable that is coded 1 for data collected from publicly-listed companies and coded 0 for otherwise

**Table 3. Descriptive analysis on liquidity-firm value relationship variables**

	Variables included in liquidity-firm value relation				
	Overall	AMIHUD	SPREAD	FSIZE_LIQ	AGE
Mean	-0.237	-0.151	-0.183	-0.500	0.041
1 <sup>st</sup> quartile	-0.515	-0.321	-0.546	-0.669	-0.110
Median	-0.248	-0.232	-0.460	-0.518	-0.015
3 <sup>rd</sup> quartile	-0.033	-0.123	-0.159	-0.362	0.065
Standard deviation	0.605	0.330	1.008	0.379	0.596
Positive beta (%)	15 (8.62%)	4 (10.81%)	1 (4.00%)	3 (4.55%)	7 (15.22%)
Negative beta (%)	116 (66.67%)	31 (83.78%)	18 (72.00%)	54 (81.81%)	13 (28.26%)
Insignificant beta (%)	43 (24.71%)	2 (5.41%)	6 (24.00%)	9 (13.64%)	26 (56.52%)
Total	174	37	25	66	46

**Table 4. Descriptive analysis on corporate governance-firm value relationship variables**

	Variables included in corporate governance-firm value relation						
	Overall	CGI	BFSIZE	DUAL	INST_OWN	FSIZE_CG	LVG
Mean	0.243	0.533	0.081	0.113	1.192	-0.123	0.149
1st quartile	-0.056	0.030	-0.038	-0.056	0.001	-0.179	-0.008
Median	0.020	0.110	0.039	0.027	0.008	-0.082	0.060
3rd quartile	0.195	0.973	0.168	0.107	0.356	0.031	0.412
Standard deviation	1.072	0.680	0.378	0.802	2.545	0.254	0.349
Positive beta (%)	95 (37.40%)	24 (72.73%)	14 (28.00%)	5 (12.20%)	21 (70.00%)	11 (19.64%)	20 (45.45%)
Negative beta (%)	58 (22.84%)	-(0.00%)	5 (10.00%)	12 (29.27%)	-(0.00%)	32 (57.14%)	9 (20.45%)
Insignificant beta (%)	101 (39.76%)	9 (27.27%)	31 (62.00%)	24 (58.53%)	9 (30.00%)	13 (23.20%)	15 (34.10%)
Total	254	33	50	41	30	56	44

Therefore, another analysis on summary effect sizes are presented to transmit a more reliable result.

#### 4.2. Descriptive analysis of summary effect sizes

As discussed earlier, effect size, denoted as ES, is calculated based on an intermediate known as correlation to reduce the probability of heterogeneity between studies. In this section, we will analyze, from a descriptive standpoint, summary effect sizes that we obtain from adopting different meta-analysis models, namely *Inverse variance under FEM* and *Hunter–Schmidt estimator under REM*. A statistical description of intermediates consisting of mean correlation and unweighted ES are also provided. The details of the descriptive analysis are given in the tables 5 and 6. We also present traditional descriptive analyses of beta-coefficients of each variable in two interrelationships, including mean, median, and standard deviation in table 3 and 4 so that readers can have the slightest idea about possible sign that each variable may bear.

**Table 5. Descriptive analysis on summary effect sizes of liquidity-firm value relationship**

Variables	Calculation method	Number of studies	Mean	Standard error	95% confidence interval
AMIHUD	Mean correlation	37	-0.102	0.031	[-0.162, -0.042]
	Unweighted ES	37	-0.103	0.032	[-0.166, -0.039]
	Weighted ES—FEM	37	-0.153	0.002	[-0.156, -0.149]
	Weighted ES—REM	37	-0.126	0.014	[-0.154, -0.098]
SPREAD	Mean correlation	25	-0.120	0.019	[-0.158, -0.082]
	Unweighted ES	25	-0.122	0.020	[-0.161, -0.082]
	Weighted ES—FEM	25	-0.100	0.001	[-0.102, -0.097]
	Weighted ES—REM	25	-0.131	0.012	[-0.154, -0.108]
FSIZE_LIQ	Mean correlation	66	-0.214	0.025	[-0.263, -0.165]
	Unweighted ES	66	-0.240	0.035	[-0.308, -0.171]
	Weighted ES—FEM	66	-0.848	0.001	[-0.850, -0.847]
	Weighted ES—REM	66	-0.241	0.068	[-0.374, -0.107]
AGE	Mean correlation	46	-0.008	0.020	[-0.046, 0.031]
	Unweighted ES	46	-0.011	0.023	[-0.056, 0.033]
	Weighted ES—FEM	46	0.027	0.001	[0.025, 0.029]
	Weighted ES—REM	46	0.011	0.008	[-0.004, 0.026]

#### 4.3. Forest plots

Another way to express meta-analysis results is forest plot. Basically, the amount of information provided by a forest plot is equivalent to that given by the numerical models in the section above, but is visually illustrated. Therefore, we can compare the individual effect sizes and variabilities with bare eyes at ease.

Tables 7 and 8 summarize the forest plot results of the combined effects of liquidity and governance on firm value, which are constructed on Excel using meta-analysis results under random-effects model. Each variable of the focal relations is depicted by a diamond representing the overall effect size and a line indicating the width of confidence interval.

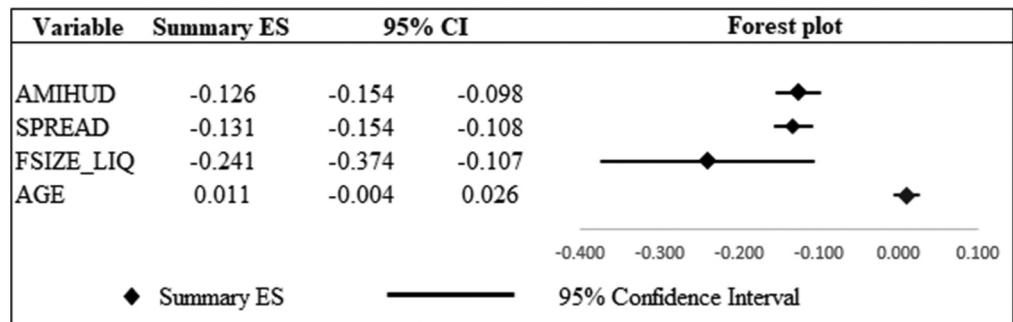
#### 5. Meta-analysis model results

To test the bearings we have so far employed two models to estimate the combined effect of each variable and its standard error. In this part, we further add a column of Z-test with its p-value in the parenthesis for hypothesis testing, and two columns of Q-test and Thompson and Higgins' I<sup>2</sup> for heterogeneity quantification.

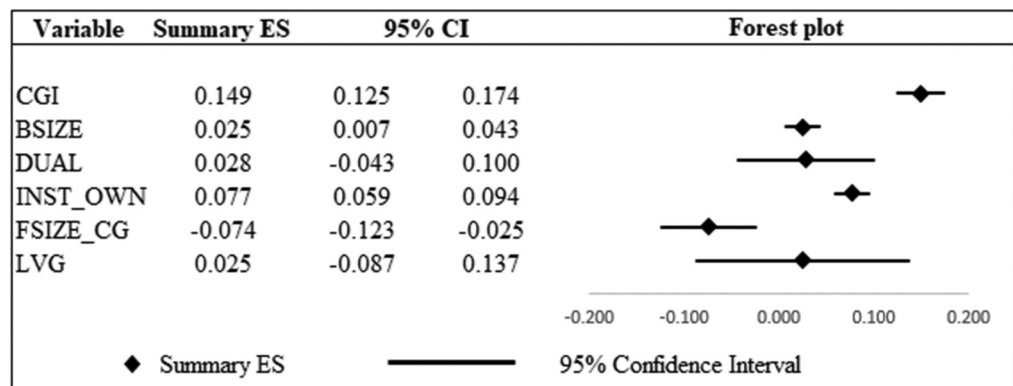
**Table 6. Descriptive analysis on summary effect sizes of corporate governance–firm value relationship**

Variables	Calculation method	Number of studies	Mean	Standard error	95% confidence interval
CGI	Mean correlation	33	0.163	0.016	[0.132, 0.194]
	Unweighted ES	33	0.166	0.016	[0.134, 0.198]
	Weighted ES—FEM	33	0.049	0.001	[0.047, 0.052]
	Weighted ES—REM	33	0.149	0.013	[0.125, 0.174]
BSIZE	Mean correlation	50	0.014	0.011	[−0.007, 0.034]
	Unweighted ES	50	0.014	0.011	[−0.008, 0.035]
	Weighted ES—FEM	50	0.024	0.005	[0.013, 0.034]
	Weighted ES—REM	50	0.025	0.009	[0.007, 0.043]
DUAL	Mean correlation	41	0.025	0.019	[−0.012, 0.062]
	Unweighted ES	41	0.027	0.020	[−0.013, 0.066]
	Weighted ES—FEM	41	0.549	0.001	[0.546, 0.552]
	Weighted ES—REM	41	0.028	0.036	[−0.043, 0.100]
INST_OWN	Mean correlation	30	0.074	0.016	[0.043, 0.105]
	Unweighted ES	30	0.075	0.016	[0.043, 0.107]
	Weighted ES—FEM	30	0.048	0.000	[0.048, 0.048]
	Weighted ES—REM	30	0.077	0.009	[0.059, 0.094]
FSIZE.CG	Mean correlation	56	−0.066	0.024	[−0.112, −0.020]
	Unweighted ES	56	−0.068	0.024	[−0.115, −0.020]
	Weighted ES—FEM	56	0.115	0.001	[0.113, 0.117]
	Weighted ES—REM	56	−0.074	0.025	[−0.123, −0.025]
LVG	Mean correlation	44	0.018	0.023	[−0.026, 0.063]
	Unweighted ES	44	0.020	0.024	[−0.027, 0.066]
	Weighted ES—FEM	44	0.197	0.001	[0.196, 0.199]
	Weighted ES—REM	44	0.025	0.057	[−0.087, 0.137]

**Table 7. Forest plot results: Liquidity to firm value**



**Table 8. Forest plot results: Corporate governance to firm value**



Based on the discussion in the previous section, we agree that among two models, fixed-effect model versus random-effects model, the latter is likely to produce the fairer and more unbiased outcome. Results of both models are, still, fully presented for readers' reflection and comparisons. If any difference arises between two models, the developed hypothesis is then tested and concluded in accordance with random-effects model.

**5.1. Meta-analysis model results on Liquidity-firm value relationship**  
**6. Hypothesis testing**

In terms of liquidity indicator, Amihud illiquidity and spread are recorded to be both negative and statistically significant. In detail, Table 9 shows that the Hunter-Schmidt measure under REM generates summary effect sizes equaling  $-0.126$  for AMIHU and  $-0.131$  for SPREAD, and p-value of the Z-test approximating 0.000 for two of them. The results are in support of **Sub-hypothesis 1a** and **1b**, meaning that spread and Amihud illiquidity, as measures of stock illiquidity, have significantly negative impacts on firm performance. Put differently, stock liquidity has a significantly positive association with firm value (**Hypothesis 1**).

Regarding control variables, only firm size is believed to be significantly reflected in firm value. To be specific, the indicator has a negative summary effect size (REM summary ES =  $-0.241$ ). In other words, the smaller the firm size, the better the firm valuation. On the other hand, it does not matter to the firm valuation whether the corporate age is old or young (p-value = 0.161).

**Table 9. Meta-analysis model results on Liquidity to firm value**

Variables	REM							
	Summary ES (Standard error)	Z-test(p-value)	Q-test(p-value)	I2	Summary ES (Standard error)	Z-test(p-value)	Q-test(p-value)	I2
AMIHU	-0.153 (0.002)	-88.895*** (0.000)	2,047.779 (0.000)	98.24%	-0.126 (0.014)	-8.893*** (0.000)	2,047.779 (0.000)	53.04%
SPREAD	-0.100 (0.001)	-86.085*** (0.000)	1,433.739 (0.000)	98.33%	-0.131 (0.012)	-11.089*** (0.000)	1,433.739 (0.000)	96.67%
FSIZE_LIQ	-0.848 (0.001)	-1,099.520*** (0.000)	505,456.079 (0.000)	99.99%	-0.241 (0.068)	-3,542*** (0.000)	505,456.079 (0.000)	99.98%
AGE	0.027 (0.001)	24.185*** (0.000)	747.737 (0.000)	93.98%	0.011 (0.008)	1.400 (0.161)	747.737 (0.000)	74.41%

(\*), (\*\*), (\*\*\*) statistically significant at the level of 10%, 5% and 1% respectively

## 7. Heterogeneity quantification

The result in Table 9 also reveals that for all variables, independent or control, p-values of Cochran's Q-test based on REM result to be extremely modest, approximating 0.000. This indicates that there exists homogeneity in none of the variables.

We further determine the degree of these between-study heterogeneity by calculating the index Thompson and Higgins' I<sup>2</sup>. Those of Amihud illiquidity and firm age are recorded between 50% and 75%, which signifies a moderate-level heterogeneity. The other variables, spread and firm size, have very high heterogeneity among studies (I<sup>2</sup> = 96.67% and 99.98% respectively).

### 7.1. Meta-analysis model results on corporate governance-firm value relationship

## 8. Hypothesis testing

On the basis of REM, three out of four corporate governance variables are reported to have significant associations with firm value, in accordance with Table 10. To clarify, there are positive summary effects derived from meta-analyzing corporate governance index, board size and institutional ownership, at 0.149, 0.025 and 0.077 respectively. Alongside, the p-values of CGI and INST are approximately 0.000, while that of BSIZE is computed at 0.007. The figures are without doubt much smaller than the 5% significance level. This account serves as advocate of *Sub-hypothesis 2a, 2b* and *2d*. In contrast, there is not enough statistical evidence to conclude that CEO duality has a significantly positive influence on firm performance (p-values = 0.442). In other words, we cannot confirm the veracity of *Sub-hypothesis 2c*.

Turning to control variables, firm size is found to be significantly and positively associated with Tobin's Q. Specifically, combined effect of the variable is -0.074, with p-value being smaller than 0.05. Meanwhile, firm valuation reflects a positive yet insignificant impact of leverage (p-values = 0.659).

## 9. Heterogeneity quantification

We first look at Cochran's Q-test statistic and its p-value in Table 10 to determine the presence of heterogeneity across studies. With extremely small p-values in six variables, varying from 0.000 to 0.005, it is inferred that between-study variances are existent in both corporate governance and control variables summary effects.

Our focus then moves to Thompson and Higgins' I<sup>2</sup>, the index used for quantifying the level of heterogeneity. Overall, the smallest value of I<sup>2</sup> on the list belongs to board size (I<sup>2</sup> = 34.61%). Since the number is between 25% and 50%, this is the signal of low heterogeneity. Apart from board size, the remaining have I<sup>2</sup> higher than 95%, varying from 95.78% to 99.97% regarding Hunter-Schmidt measure. It is hinted that there exist extremely high variabilities across studies in these five variables.

## 10. Meta-regression analysis results

Having estimated extremely high heterogeneity beyond comprehension in both focal relations, we further conduct a meta-regression analysis. This is to detect possible sources of heterogeneity that originate from study-within characteristics. In table 11 and 12 below, we present detailed results of meta-regression analysis on both liquidity-firm value and corporate governance-firm value causalities.

Almost all dummy variables can explain the Amihud illiquidity-firm value and spread-firm value linkages. Looking at the detail, d<sub>Asia</sub> and d<sub>Scopus</sub> have a positive and significant impact on the Amihud illiquidity-firm value liaison (p-values = 0.000 and 0.015 < 0.05 respectively). Meanwhile, d<sub>Listed</sub> is estimated to exert a significantly negative bearing on the strength of summary effects of this connection (p-value = 0.000 and coefficient = -0.197). No figures are reported in the variable d<sub>2010</sub> since all studies own homogeneous features regarding data collection period, therefore it has no explaining power in the relation. By contrast, in the linkage between spread and firm performance Tobin's Q, d<sub>2010</sub> is found to be significantly and inversely associated (p-value < 0.05



**Table 10. Meta-analysis model results on Corporate governance to firm value**

Variables	FEM						REM					
	Summary ES (Standard error)	Z-test(p-value)	Q-test(p-value)	I2	Summary ES (Standard error)	Z-test(p-value)	Q-test(p-value)	I2	Summary ES (Standard error)	Z-test(p-value)	Q-test(p-value)	I2
CGI	0.049 (0.001)	35.935*** (0.000)	1,286.424 (0.000)	97.51%	0.149 (0.013)	11.852*** (0.000)	1,286.424 (0.000)	95.78%	0.149 (0.013)	11.852*** (0.000)	1,286.424 (0.000)	95.78%
BFSIZE	0.024 (0.005)	4.344*** (0.000)	78.673 (0.005)	37.72%	0.025 (0.009)	2.712*** (0.007)	78.673 (0.005)	34.61%	0.025 (0.009)	2.712*** (0.007)	78.673 (0.005)	34.61%
DUAL	0.549 (0.001)	371.306*** (0.000)	18,723.167 (0.000)	99.79%	0.028 (0.037)	0.769 (0.442)	18,723.167 (0.000)	98.96%	0.028 (0.037)	0.769 (0.442)	18,723.167 (0.000)	98.96%
INST_OWN	0.048 (0.000)	365.096*** (0.000)	80,069.869 (0.000)	99.96%	0.077 (0.009)	8.523*** (0.000)	80,069.869 (0.000)	99.96%	0.077 (0.009)	8.523*** (0.000)	80,069.869 (0.000)	99.96%
FSIZE_CG	0.115 (0.001)	121.168*** (0.000)	33,074.907 (0.000)	99.83%	-0.074 (0.025)	-2.958*** (0.003)	33,074.907 (0.000)	99.63%	-0.074 (0.025)	-2.958*** (0.003)	33,074.907 (0.000)	99.63%
LVG	0.197 (0.001)	227.693*** (0.000)	171,245.739 (0.000)	99.97%	0.025 (0.057)	0.442 (0.659)	171,245.739 (0.000)	99.97%	0.025 (0.057)	0.442 (0.659)	171,245.739 (0.000)	99.97%

(\*), (\*\*), (\*\*\*) statistically significant at the level of 10%, 5% and 1% respectively

**Table 11. Meta-regression analysis results on Liquidity-Firm value**

Variables	AMIHU	SPREAD	FSIZE_LIQ	AGE
d_Asia	0.172*** (0.000)	0.321*** (0.000)	0.031 (0.663)	-0.016 (0.104)
d_Scopus	0.060** (0.015)	-0.008 (0.843)	0.117** (0.010)	0.106*** (0.000)
d_Listed	-0.197*** (0.000)	-0.340*** (0.000)	-0.200*** (0.004)	-0.229*** (0.000)
d_2010	- (0.000)	-0.216*** (0.000)	0.187** (0.046)	0.065*** (0.000)
Constant	-0.159*** (0.000)	0.141** (0.024)	-0.399*** (0.000)	0.097*** (0.000)
R-squared	59.11%	19.51%	91.19%	87.61%
Observations	37	25	66	46

(\*), (\*\*), (\*\*\*) statistically significant at the level of 10%, 5% and 1% respectively

**Table 12. Meta-regression analysis results of Corporate governance-Firm value**

Variables	CGI	BFSIZE	DUALITY	INST_OWN	FSIZE_CG	LVG
d_Asia	0.045*** (0.002)	-0.118*** (0.000)	0.100** (0.029)	0.105*** (0.000)	0.080*** (0.000)	-0.141*** (0.000)
d_Scopus	-0.253*** (0.000)	-0.012 (0.489)	-0.018 (0.813)	0.058** (0.022)	-0.087*** (0.000)	0.105*** (0.000)
d_Listed	-0.257 (0.583)	0.140 (0.452)	-0.034 (0.793)	0.075*** (0.003)	-0.375*** (0.000)	- (0.000)
d_2010	-0.283 (0.544)	0.044 (0.698)	-0.023 (0.838)	-0.242 (0.861)	-0.271*** (0.000)	0.078** (0.013)
Constant	0.571 (0.223)	-0.047 (0.829)	0.042 (0.776)	0.150 (0.914)	0.455*** (0.000)	-0.012 (0.698)
R-squared	93.87%	70.98%	75.84%	33.79%	95.81%	96.55%
Observations	33	50	41	30	56	44

(\*), (\*\*), (\*\*\*) statistically significant at the level of 10%, 5% and 1% respectively

and coefficient = -0.216). There is a negative coefficient in d\_Scopus, yet its statistical power is insignificant. An analogous point to the influence of Amihud illiquidity on firm value is that d\_Asia is significantly positively reflected and d\_Listed has a significantly negative power on modifying the spread—firm performance link.

With regard to control variables, the effects created by FSIZE\_LIQ and AGE on firm's market valuation can be both explained by d\_Scopus, d\_Listed and d\_2010. In fact, the two moderators experience exactly the same pattern. That is, studies from a published Scopus-ranking journal and sampled data gathered from 2010 onwards positively and significantly contribute to the effects. The status of firm's going public has a significantly negative contribution to the relations.

In terms of independent variables in the corporate governance-firm performance analysis, d\_Asia is an important source of heterogeneity since it holds the explaining power in all four predictors. To clarify, the moderator significantly and positively alters the corporate governance

index-firm value, CEO duality-firm value and institutional ownership-firm value relations. Put differently, the magnitude of summary effects goes up with data collected solely within Asian countries. On the other hand,  $d\_Asia$  has a negative and significant impact on the effect size of board size. It is also the only variable with statistical significance in the board size-firm value relation.

Meanwhile,  $d\_Scopus$  helps account for the controversial results in two predictor variables: CGI and INST\_OW. While the former is negatively affected with a coefficient equaling  $-0.253$  ( $p$ -value = 0.000), a positive coefficient of 0.058 is spotted in the latter ( $p$ -value = 0.022).  $d\_Listed$  is only significant in the relationship between institutional ownership and Tobin's Q ( $p$ -value = 0.075 and coefficient = 0.003). This means that if a firm goes publicly traded, the participant of institutional owners favorably benefits firm value. The inclusion of  $d\_2010$  is not of great assistance as its power in four corporate governance variables is all insignificant.

FSIZE\_CG and LVG seem to effectively control their relationships with firm value. Four moderators are statistically significant in the magnitude of effect size of firm size. They could be divided into two categories: one with positive sign ( $d\_Asia$ ), and one with negative sign ( $d\_Scopus$ ,  $d\_Listed$  and  $d\_2010$ ). In terms of leverage, apart from  $d\_Listed$  with homogeneous firm data, the other three covariates have statistical significance in explaining the impact of leverage on firm valuation.

## 11. Conclusion

### 11.1. Summary of findings

We would like to run through the research questions to see whether or not our data analysis has fully answered those questions:

- What are the summary effect sizes of liquidity-firm value relation and corporate governance-firm value relation?
- Is the relationship between liquidity proxies and firm value statistically significant? Is the relationship between corporate governance proxies and firm value statistically significant?
- Does between-study heterogeneity exist in the focal relationships? If it does, what is the level of the heterogeneity?
- What are possible sources of the heterogeneity that may exert an impact on the focal relationships?

In response to the 1<sup>st</sup> and 2<sup>nd</sup> question, the part **Meta-analysis model results** presents the sign (displayed through summary effect sizes) and the statistical power of the focal relationships. It is concluded that both illiquidity proxies are significantly and inversely associated with company market valuation Tobin's Q, which supports *sub-hypothesis 1a* and *1b*. The absolute confirmation of *hypothesis 1* can be accounted for by feedback effect, liquidity-based pricing theory, signaling theory or pay-performance sensitivity theory. On the other hand, corporate governance index, along with board size and institutional ownership, is recorded to have a statistically significantly positive linkage with firm value. This is advocates of *sub-hypothesis 2a*, *2b* and *2d*. There is not enough statistical evidence to deduce that CEO duality has a significantly positive bearing on firm value, thus *sub-hypothesis 2c* is not supported. In the same section, the 3<sup>rd</sup> question is also covered, discussing the existence of heterogeneity in the investigated connections. Regarding liquidity overall effect sizes, Amihud illiquidity and spread are found to have a respectively medium and high degree of between-study variability. The case is slightly different for corporate governance summary effect sizes. There is an extremely high level of heterogeneity in corporate governance index, CEO duality and institutional ownership, while only a small magnitude of heterogeneity is reported in board size summary effects.

The final question is illustrated in the **Meta-regression analysis results**, indicating that some study-specific characteristics ( $d\_Asia$ ,  $d\_Scopus$ ,  $d\_Listed$  and  $d\_2010$ ) are potential sources of heterogeneity. Regarding the relation between liquidity and firm value, both liquidity indicators are

strongly explained by three out of four moderators. At the same time, the corporate governance—firm value link is not equally accounted for. Solely institutional ownership combined effect has most significant moderators (3/4 moderators), followed by that of corporate governance index. Meanwhile, only *d\_Asia* has the explaining power in both the impacts of board size and CEO duality on firm value.

### 11.2. Limitations and future research opportunities

We admitted that there remain several limitations in our research. Firstly, as our topic is to explore the interlink between liquidity, corporate governance and firm value, it is better that the studies collected on the liquidity–firm value association and the governance–firm value association should come from the same data samples. However, due to the limit of empirical research on the this interlink, studies for the investigation of both interested linkages are gathered separately and almost independent. This causes a lack of interaction between the independent variables (liquidity and corporate governance), which may result in some biasedness in the generation of overall effect sizes. It is proposed that, as a result, other scholars should conduct more studies working on the interrelationship between liquidity, corporate governance and firm value.

Secondly, our research would be more fulfilled with the analysis of the liquidity effect on corporate governance. Although the reverse causality is popular in the empirical literature, only few researchers carry out studies on the impact of liquidity on firm governance. The number of quantitative ones are even more modest, which is not sufficient enough for conducting our meta-analysis since the method requires a large enough quantity of data to well reflect the controversial findings. Therefore, researchers are recommended to gain more insights on this causality in a quantitative way.

Finally, our study incorporates 428 studies in 55 papers as input for the meta-analytical procedure, which is a quite modest figure compared to the incredibly significant number of research in the literature world. Therefore, broader sample data with wider time range should be employed to study the interlink between liquidity, corporate governance and firm performance in order to generate a clearer and fairer result.

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#### Availability of data and materials

This study brought together existing data obtained upon request and subject to license restrictions from a number of different sources. Full details of how these datasets were obtained are available in the documentation of each paper. Details of all papers included in the meta-analyses are available in Table A2 in the Appendix.

#### Disclosure statement

The authors have no conflicts of interest to declare that are relevant to the content of this article.

#### Authors' contributions

Thi Thanh Binh Dao contributed to the study conceptualization. Design of methodology, data collection and formal analysis was conducted by Ngoc Phuong Anh Nguyen. The first draft of the manuscript was then written by Ngoc Phuong Anh Nguyen and Thi Thanh Binh Dao commented on previous versions of the manuscript. Both authors read and approved the final manuscript.

#### Correction

This article has been republished with minor changes. These changes do not impact the academic content of the article.

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## APPENDIX

Table A1. Variables definition and measurement

No.	Variable	Definition and measure	Number of studies	Notation
<i>Dependent variable</i>				
1	Tobin's Q	A financial metric that expresses market valuation of a firm; is calculated by the ratio of the market value of assets over the book value of assets, where the market value of assets equals the market value of equity plus the market value of debt	432	Q
<i>Independent variables</i>				
2	Amihud illiquidity	A proxy for measuring illiquidity developed by Yakov Amihud in 2002; measures how much absolute stock return changes with one dollar of trading volumeMeasure: Natural logarithm of Amihud illiquidity	38	AMIHUD
3	Spread	Effective spread captures liquidity costs of a share; is calculated by the difference between execution price and the midpoint of the bid-ask quote divided by the midpoint of the bid-ask quoteMeasure: Natural logarithm of Effective SpreadAnnual Effective Spread  Quoted spread captures liquidity costs of a share; is calculated by the difference between ask and bid price divided by the midpoint of the bid-ask quoteMeasure: Annual Quoted Spread	16  9	SPREAD

(Continued)

**Table A1. (Continued)**

No.	Variable	Definition and measure	Number of studies	Notation
4	Corporate governance index	A metric for measuring corporate governance health of a firm as a whole through combining several dimensions of business administration features: Corporate governance index score	33	CGI
5	Board size	Indicates the number of directors on a board Measure: Total number of directors on a board Natural logarithm of total number of directors on a board	50	BSIZE
6	CEO duality	Indicates the situation when the CEO of a firm is simultaneously a chairperson Measure: If the CEO is also the chairperson of the board (Dummy)	41	DUAL
7	Institutional ownership	Represents the fraction of shareholding by institutional investors Measure: Percentage of institutional holdings to the total share amount	30	INST_OWN
<i>Control variables</i>				
8	Firm size	Measure: Natural logarithm of total book value of assets Natural logarithm of total annual sales	66 56	FSIZE_LIQ FSIZE_CG
9	Firm age	Measure: Total number of years since firm establishment Natural logarithm of total number of years since firm establishment	46	AGE
10	Leverage	Measure: Ratio of total debt over total book value of assets Ratio of total liabilities over total book value of assets Ratio of total debt over total book value of equity	44	LVG

**Table A2. Sampled papers in the meta-analyses**

No.	Author	Journal	Country	No. of firms	Year of publication
1	Fang, V. W., Noe, T. H., & Tice, S.	Journal of Financial Economics	USA	8,290	2009
2	Pham, C. H. et al.	Academy of Accounting and Financial Studies Journal	UK, France, Germany and Italy	18,319	2020
3	Dalvi, M. R. & Baghi, E.	International Journal of Academic Research in Accounting, Finance and Management Sciences	Iran	770	2014
4	Cheung, W., Chung, R. & Fung, S.	Journal of Corporate Finance	USA	1,167	2015
5	Asle, H., Valahzaghard, M. & Ahranjani, B.	Management Science Letters	Iran	2,147	2012
6	Hidayat, R. et al.		Indonesia	635	2019
7	Loukil, N., Zayani, M. & Abdelwahed, O.	Macroeconomics and Finance in Emerging Market Economies	Tunisia	205	2010
8	Singh, H., Nguyen, T. & Duong, H. N.	International Review of Finance	Australia	10,712	2016
9	Jawed, M. S. & Kotha, K. K.	International Review of Finance	India	109	2018
10	Jonathan, B. & Vo, X. V.	The Singapore Economic Review	Vietnam	1,909	2017
11	Zhang, L. et al.	Applied Economics Letters	China	480	2017
12	Panu, P. et al.	Global Finance Journal	Thailand	400	2016
13	Chia, Y. E., Lim, K. P. & Goh, K. L.	North American Journal of Economics and Finance	Malaysia	12,349	2020
14	Huang, T. et al.	SSRN Electronic Journal	Worldwide	133,008	2013
15	Sidhu, M.	IOSR Journal of Business and Management	India	128	2016

(Continued)



**Table A2. (Continued)**

No.	Author	Journal	Country	No. of firms	Year of publication
16	Tahir, M.	Journal of Economic and Business Studies	Pakistan	165	2020
17	Chen, J., Liu, Y. & Gu, X.	Emerging Markets Review	China	4,010	2011
18	Li, W. X., Chen, C. C. S. & French, J. J.	World Applied Sciences Journal	Russia	308	2012
19	Salehi, M., Talebnia, G. & Ghorbani, B.	Journal of Business Ethics	Iran	3,139	2011
20	Jo, H. & Harjoto, M.	Journal of Empirical Finance	Various	11,741	2011
21	Ammann, M., Oesch, D. & Schmid, M. M.	Corporate Governance: An International Review	Worldwide	5,453	2011
22	Garay, U. & Gonzalez, M.	SSRN Electronic Journal	Venezuela	33	2008
23	Chong, A. & Lopez-de-Silanes, F.	Journal of Transnational Management	Mexico	102	2006
24	Huang, J.	Advances in Economics, Business and Management Research	US	112,003	2014
25	Ritab, A. K.	Journal of Accounting and Public Policy	Jordan	267	2008
26	Ika, S. R. et al.	Accounting and Finance Research Association	Indonesia	170	2020
27	Lawrence, D. B. & Marcus, L. C.	Journal of Laws, Economics and Governance	US	1,868	2006
28	Emeka-Nwokeji, N.	Pakistan Development Review	Nigeria	920	2017
29	Black, B., Jang, H., & Woochar, K.		Korea	495	2006
30	Javid, A. & Iqbal, R.		Pakistan	360	2008

(Continued)

**Table A2. (Continued)**

No.	Author	Journal	Country	No. of firms	Year of publication
31	Javed, A. & Iqbal, R.	Pakistan Development Review	Pakistan	150	2006
32	Yasser, Q. R.	Pakistan Development Review	Pakistan	804	2011
33	Akshita, A. & Chandan, S.	Emerald Insight	India	10,182	2016
34	Kyere, M. & Ausloos, M.	Wiley Online Library	UK	252	2019
35	Siwadi, P., Miruka, C. & Ogutu, F. A.	Corporate Ownership and Control	Zimbabwe	352	2015
36	Mohamed, E. K. A., Basuony, M. A. & Badawi, A. A.	Corporate Ownership and Control	Egypt	88	2013
37	Buallay, A. & Hamdan, A. & Zureigat, Q.	Australasian Accounting, Business and Finance Journal	Saudi Arabia	513	2017
38	Gupta, P., Kennedy, D. & Weaver, S.	Corporate Ownership and Control	Canada	158	2009
39	Ficici, A. & Aybar, B.	Emerging Markets Journal	Asia, Eastern Europe and Latin America	216	2012
40	Perez-de Toledo, E.	SSRN Electronic Journal	Spain	106	2009
41	Sabsombat, N. et al.	WMS Journal of Management	Thailand	200	2020
42	Huang, T. et al.	Journal of International Business Studies	40 countries	235,426	2018
43	Arman, N. A. & Ahmad, A. C.	Journal of Financial Reporting and Accounting	Malaysia	896	2020
44	Simkins, B. & Simpson, W.	The Financial Review	African America, Asia	638	2003
45	Kumar, N. & Singh, J. P.	Asian Journal of Finance & Accounting	India	157	2012
46	Leung, N. W. & Cheng, M. A.	China Journal of Accounting Research	China	423	2013

(Continued)

**Table A2. (Continued)**

No.	Author	Journal	Country	No. of firms	Year of publication
47	Li, K. et al	International Review of Financial Analysis	China	6,823	2015
48	Rashid, A.	Future Business Journal	Bangladesh	857	2018
49	Chang, S. J., & Jin, S.	Report sponsored by the Chartered Institute of Management Accountants	China	19,039	2016
50	Melvin, J., Andrew P. & John, P.	Journal of Corporate Finance	India	1,796	2014
51	Surya Bahadur, G. C.	Journal of Business and Management Research	India	250	2016
52	Lin, Y. R. & Fu, X. M.	International Review of Economics and Finance	China	18,698	2017
53	Thanatawee, Y.	Asian Journal of Business and Accounting	Thailand	1,451	2014
54	Chen, J., Blenman, L.P., & Chen, D.	Journal of Finance and Accounting	New Zealand	234	2008
55	Rashid, A.	Corporate Ownership and Control	Bangladesh	825	2010



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