

Dang Tùng Lâm; Hai Ly Ho; Chi Dzung Lam; Thanh Thao Tran; Xuan Vinh Vo

Article

Stock liquidity and capital structure: International evidence

Cogent Economics & Finance

Provided in Cooperation with:

Taylor & Francis Group

Suggested Citation: Dang Tùng Lâm; Hai Ly Ho; Chi Dzung Lam; Thanh Thao Tran; Xuan Vinh Vo (2019) : Stock liquidity and capital structure: International evidence, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 7, Iss. 1, pp. 1-20, <https://doi.org/10.1080/23322039.2019.1587804>

This Version is available at:

<https://hdl.handle.net/10419/245209>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Stock liquidity and capital structure: International evidence

Tung Lam Dang, Hai Ly Ho, Chi Dzung Lam, Thanh Thao Tran & Xuan Vinh Vo |

To cite this article: Tung Lam Dang, Hai Ly Ho, Chi Dzung Lam, Thanh Thao Tran & Xuan Vinh Vo | (2019) Stock liquidity and capital structure: International evidence, Cogent Economics & Finance, 7:1, 1587804, DOI: [10.1080/23322039.2019.1587804](https://doi.org/10.1080/23322039.2019.1587804)

To link to this article: <https://doi.org/10.1080/23322039.2019.1587804>



© 2019 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



Published online: 26 May 2019.



Submit your article to this journal [↗](#)



Article views: 2233



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)



Received: 30 May 2018
Accepted: 16 February 2019
First Published: 10 March 2019

*Corresponding author: Xuan Vinh Vo,
Institute of Business Research,
University of Economics Ho Chi Minh
City, Ho Chi Minh City, Vietnam
E-mail: vxvinh@yahoo.com

Reviewing editor:
David McMillan, University of Stirling,
UK

Additional information is available at
the end of the article

FINANCIAL ECONOMICS | RESEARCH ARTICLE

Stock liquidity and capital structure: International evidence

Tung Lam Dang¹, Hai Ly Ho¹, Chi Dzung Lam¹, Thanh Thao Tran² and Xuan Vinh Vo^{2,3*}

Abstract: Relying on the assumption that equity market provides useful information for firm decision, this study examines the effect of stock liquidity on corporate capital structure decision. We also analyze whether this effect varies according to country-level institutional environments. Using a comprehensive international dataset of 19,939 firms across 41 countries over 2000–2010, the paper offers two key findings. First, firms with higher stock market liquidity tend to have lower leverage. Second, countries with strong institutional environments are more likely to have a weaker (negative) relationship between stock market liquidity and leverage. These results are robust to different liquidity measurement and subsamples.

Subjects: International Economics; Corporate Finance; Investment & Securities

Keywords: capital decision; liquidity; institutional environment; leverage

JEL Classification: G14; G30

1. Introduction

Previous studies establish a potential link between capital structure and stock market activities (Andres, Cumming, Karabiber, & Schweizer, 2014). Beside common factors such as growth

ABOUT THE AUTHORS

Tung Lam Dang is from the *University of Economics, The University of Danang, Vietnam*. Lam's expertise is in Finance. Tung Lam Dang is also a visiting professor and research fellow at the Institute of Business Research, University of Economics Ho Chi Minh City.

Hai Ly Ho is from the *University of Economics, The University of Danang, Vietnam with strong expertise in Finance*. Hai Ly Ho is also a visiting professor and research fellow at the Institute of Business Research, University of Economics Ho Chi Minh City.

Chi Dzung Lam is from the *University of Economics, The University of Danang, Vietnam with strong expertise in Finance*. Chi Dzung Lam is also a visiting professor and research fellow at the Institute of Business Research, University of Economics Ho Chi Minh City

Thanh Thao Tran is a research fellow from the *Institute of Business Research, University of Economics Ho Chi Minh City*.

Xuan Vinh Vo is from the *Institute of Business Research, University of Economics Ho Chi Minh City, Vietnam and CFVG Ho Chi Minh City, University of Economics Ho Chi Minh City*.

PUBLIC INTEREST STATEMENT

This research examines the effect of stock liquidity on corporate capital structure decision using a global dataset to account for different institutional environments. We find that firms with higher stock market liquidity tend to have lower leverage. Further, we report that countries with strong institutional environments are more likely to have a weaker (negative) relationship between stock market liquidity and leverage. These results are robust to different liquidity measurement and subsamples. This research is funded by the University of Economics Ho Chi Minh City.

opportunities, firm size and profitability which are well documented in the literature (Vo, 2017), recent capital structure theories suggest that liquidity is also an essential determinant of capital decision. According to Hennessy and Whited (2005) and Weston, Butler, and Grullon (2005), firms with a lower level of liquid stocks may have higher issuance costs, thereby higher cost of equity compared to firms with more liquid equity. Following the literature, firms always face the issue of trading-off the net cost of equity against the net tax benefit of debt. Therefore, firms with lower liquidity may be financed by less equity and more debt.

In the same stream, a number of previous papers concerning the link between stock liquidity and capital structure (Frieder & Martell, 2006; Lipson & Mortal, 2009; Udomsirikul, Jumreornvong, & Jiraporn, 2011) find that firms with lower stock liquidity tend to be more leveraged. However, the results of these studies focus exclusively on one particular market. It is therefore important to examine whether these findings can be extended to other countries with differences in levels of economics and financial development and information asymmetry. Our study is the first to explore this issue in an international context.

On the other hand, many studies concern about the role of institutional environments in determining the corporate capital structure across countries (Booth, Aivazian, Demircuc-Kunt, & Maksimovic, 2001; Djankov, Hart, McLiesh, & Shleifer, 2008; Fan, Titman, & Twite, 2012; Giannetti, 2003; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997, 1998a; Rajan & Zingales, 1995). Specifically, Jensen (1993) and La Porta et al. (1998a) show that a strong institutional environment, as an external control instrument, may reduce agency conflicts significantly. Thereby, investors are more secure and firms are highly valued in countries offering transparent information environment (Jin & Myers, 2006, 1998b; La Porta et al., 1998a, 2002; Morck, Yeung, & Yu, 2000). Consequently, firms may rely more on equity financing than on leveraging. Nonetheless, there still a light volume of research examining the effect of country-level information environment on corporate capital structure decision.

To fill the literature gap, this paper addresses the following research questions: i) how does stock market liquidity affect corporate capital structure? and ii) does this effect depend on the level of institutional environment? This paper utilizes a comprehensive international data set covering 19,939 firms across 41 countries from 2000 to 2010. Comprising a lot of deviations in corporation information and institution environment, this data set offers better analysis and understanding about the link between liquidity and capital structure under the effect of different institutional environment.

Liquidity is an important stock market quality indicator (Atawnah, Balachandran, Duong, & Podolski, 2018). In this paper, stock liquidity is measured by two common indicators: percentage effective spread and Amihud's illiquidity measure. To construct the proxy for institutional environment, we consider six macro-level variables including good government index (Morck et al., 2000), accounting standard index (La Porta et al., 1998a), disclosure score index (Jin & Myers, 2006), regulatory quality index (Kaufmann, Kraay, & Mastruzzi, 2009), government effectiveness index (Kaufmann et al., 2009), and International Financial Reporting Standard (IFRS) adoption at the country level (Compustat Global database). Our analysis is also controlled for various firm-specific characteristics, country-fixed, industry-fixed, and year-fixed effects to remove the possibility of omitted variables.

Our results suggest that higher stock market liquidity is associated with lower leverage. These results are consistent not only for both market leverage and book leverage but also across subsamples, including the global sample, developed and emerging markets countries sample, the US and non-US markets, and during the crisis period and non-crisis period.

Furthermore, we examine whether institutional environments affect the link between stock liquidity and capital structure. Based on previous studies, in countries with strong institutional environments, agency conflict can be eliminated and firms rely less on debt financing (Jensen, 1993; La Porta et al., 1998a). We thus expect that an increase in the degree of institutional environment weakens

the negative relationship between stock market liquidity and leverage. This impact is explored by incorporating interaction terms between liquidity proxies and country-level institutional environments in our model. The result confirms our expectation about the effect of institutional environment on liquidity-leverage relationship. This finding suggests that by reducing information asymmetry, an improvement in the quality of country-level institutions may reduce the cost of equity.

This research contributes to the existing literature in several perspectives. First, our study offers a better understanding of the relation between stock liquidity and capital structure decision in an international setting. We also show that the impact of stock liquidity on corporate capital structure decision varies significantly across countries with country-level institutional environments. In particular, more transparent information and stronger governance mechanism could mitigate the negative relationship between the stock liquidity and firm's leverage.

The remainder of this study proceeds as follows. Section 2 discusses the literature review and hypotheses development. Section 3 describes our data sources and the variable construction procedure. Section 4 displays and discusses the empirical results of the link among stock liquidity, capital structure decisions of firms, and institutional environments. Section 5 concludes the paper.

2. Literature review and hypothesis development

The current paper is built on the previous work on the relation between stock market liquidity and the leverage of firms, and the effect of institutional environments. Stoll and Whaley (1983) suggest that equity transaction costs may relate to stock investments valuation. This explains the fact that investors investing in small and illiquid stocks might require a higher rate of return to compensate for liquidity risk. The hypothesis on the association between equity liquidity and stock return is also proposed by Amihud and Medelson (1986). They recommend a formal model in which equity investment requires higher return rates due to high transaction costs. They also imply that firm valuation can be explained significantly by this connection. Focusing on the expenses of equity issuance, Butler, Grullon, and Weston (2005) indicate that stocks with high liquidity pay lower fees for investment banks. This kind of costs must be considered as an implicit cost when firms raise equity from external financial sources. A substantial impact of liquidity on firms' expected returns is also provided in many other researches (Acharya & Pedersen, 2005; Easley, Hvidkjaer, & O'Hara, 2002; Easley & O'Hara, 2004; Pástor & Stambaugh, 2003).

Previous studies imply that firms with higher liquidity have smaller equity cost than firms with lower liquidity and this induces the link between equity cost and capital structure. The trade-off theories of capital structure indicate that companies choose optimal leverage by trading off the net cost of equity and the net cost of debt which is influenced substantially by the tax shield. Holding other factors constant, if a factor that increases the equity cost, e.g. a decrease in liquidity, should make financing by equity less attractive than financing by debt, and results in a higher leverage of firms.

There is a growing body of studies support for this theoretical prediction. Frieder and Martell (2006) note that there is a negative link between liquidity and leverage. Lipson and Mortal (2009) assert that the link between liquidity and capital structure is significant. In particular, they find that companies with more liquid stocks should be financed by more equity and have lower leverage. Beside these two studies which offer empirical evidence in US firms, Udomsirikul et al. (2011) examine the impact of liquidity on capital structure in Thailand, where capital markets are less sophisticated, bank credit are more prevalent, and corporate ownership is much more concentrated compared to that of the US. Despite the above differences, the study suggests that firms with high liquidity have significantly lower leverage.

Based on the discussion above, our first hypothesis is stated as follows:

H1. Firms with higher stock market liquidity tend to have lower leverage

This hypothesis is motivated by the trade-off theory which assumes that firms with higher stock liquidity should have lower equity cost and be less leveraged. However, one can also explain this connection by pecking order theory suggested by Myers and Majluf (1984). Under their arguments, debt financing is much less information-sensitive, whereas equity financing is the most sensitive to the adverse selection problem. As a result, equity investors require a higher risk premium. Indeed, lower liquidity may imply higher adverse selection and it possibly ends up with less equity and more leverage.

In an international setting, our story becomes more interesting due to different financing patterns caused by the variations in institutions, legal frameworks and other factors across nations (Djankov et al., 2008; Fan et al., 2012; Jalal, 2007). Specifically, as Jensen (1993) suggests, the institutional environment refers to regulatory, legal and political systems is effective external control factors to deal with asymmetric information problems. Hence, firms in capital markets which have strong institutional environments are protected in macro-level without any incremental cost. It is possible that in these countries, strong institutions temper the impact of information asymmetry on corporate leverage and thereby the negative link between stock market liquidity and leverage could be diminished.

We formalize our second hypothesis as follows:

H2. The negative association between stock market liquidity and leverage is tempered in countries with strong institutions.

3. Variable definition and model

3.1. Variable definition

Our key variables are the measures for stock liquidity, leverage and institutional features. The data are collected from different reliable sources to construct both key and control variables. Particularly, firm's financial information is obtained from Worldscope while the market transaction data which are used to measure liquidity variables are from the TRTH and Datastream. We measure country-level institutional environments in six ways: good government index (Morck et al., 2000), accounting standard index (La Porta et al., 1998a), disclosure score index (Jin & Myers, 2006), regulatory quality index (Kaufmann et al., 2009), government effectiveness index (Kaufmann et al., 2009), and International Financial Reporting Standard (IFRS) adoption at the country level (Compustat Global database. Our final data sample comprises 19,939 companies in 21 developed countries and 20 emerging countries for the period from 2000 to 2010.

3.2. Measures for stock liquidity

We measure stock liquidity by two variables: in two ways: first, the percentage-effective spread which is calculated from trade data (Chordia, Roll, & Subrahmanyam, 2000); and second, the illiquidity measure which is calculated using stock return and trading volume. It is noted that both these measures are inverse measures of liquidity (Amihud, 2002).

The percentage-effective spread is calculated as twice the absolute value of the difference between the trading price and the midpoint of the bid and the asking price, which is then divided by the midpoint of the bid price and the asking price. A higher value of percentage-effective spread for a given stock indicates that the stock is less liquid (more illiquid). According to Gao and Zhu (2015), this measure is the most demonstrable measure to capture overall liquidity. The liquidity estimator used in Amihud (2002) is the daily ratio of the absolute value of stock return to its dollar trading volume. This volume-based liquidity ratio is actually an illiquidity indicator and reflects the response of daily price to one dollar of trading volume. In other words, this illiquidity estimator is also an indicator of stock price impact. Sequentially, price impact reveals the information content

and difficulty of a trade and is a key factor of spreads. A high illiquidity ratio is associated with a high level of adverse selection around firms.

3.3. Institutional variables

To represent for the institutional environment, we consider six macro variables including good government index, accounting standard index, disclosure score index, regulatory quality index, government effectiveness index, and IFRS adoption at the country level.

We use the good government index constructed by Morck et al. (2000) as a proxy to measure private property rights protection. This is calculated as the sum of three indexes from La Porta et al. (1998b) including (i) government corruption, (ii) the risk of expropriation of private property by the government, and (iii) the risk of the government repudiating contracts. These indexes range from 0 to 10. The lower the value of each index is the less the private property is respected. La Porta et al. (1998b) define the corruption index as an assessment of corruption in government by the International Country Risk Guide (ICR) while the risk of expropriation index is the ICR's assessment of the risk of "outright confiscation" or "forced nationalization". The risk of the government repudiating contracts index is ICR's assessment of the risk of a "modification in a contract taking the form of a repudiation, postponement, or scaling down" due to "budget cutbacks, indigenization pressure, a change in government, or a change in government economic and social priorities". The good government index as our measure tends to be quite low for emerging countries and quite high for developed economies.

Another proxy for the institutional environment is accounting standards index which is taken from La Porta et al. (1998a). The measure was developed by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 specific accounting items. These fall into seven categories including general information, income statements, balance sheets, funds flow statement, accounting standards, stock data, and special items.

We also include country ranks on one indicator of transparency, disclosure score index. This index is a measure of the level of financial disclosure and availability of information to investors, which is calculated based on survey results about the level and effectiveness of financial disclosure in the annual Global Competitiveness Report in 1999 and 2000 (Jin & Myers, 2006). It should be noted that a higher value for the disclosure score index indicates a higher degree of transparency.

The next two proxies for institutional environment, i.e. regulatory quality index and government effectiveness index, are two dimensions of governance. Regulatory quality captures investors' perceptions of the government's ability to formulate and implement sound policies and regulations that permit and promote the development of the private sector. Meanwhile, government effectiveness index indicates investors' perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

The adoption of International Financial Reporting Standard (IFRS) in many countries all over the globe from 2005 was a significant event of global capital markets (Cairns, 2004). IFRS is considered as a single set of high-quality accounting standards which improve transparency and comparability. Thus, it improves the overall quality of financial reporting and efficiency of capital markets (EC Regulation No. 1606/2002). Therefore, we include the dummy variable, IFRS adoption at the country level to measure the institutional environment. We set this variable equal to 1 if a country adopts International Financial Reporting Standards in a given year and zero otherwise. This information is taken from Compustat Global database.

3.4. Control variables

Following the literature, our control variables are a set of firm-specific variables that might potentially affect capital structure and the stock liquidity. Asset tangibility (*Tang*) is the ratio of

net property, plant and equipment to the book value of total assets. Firm size (*Size*) is calculated by the natural logarithm of the book value of total assets denominated in US dollars. Book-to-market ratio (*BM*), indicating growth opportunity, is measured by the natural logarithm of book-to-market equity ratio. Return-on-assets ratio (*ROA*) is defined as net income before extraordinary items scaled by the book value of total assets. Research and development (*R&D*) is computed as research and development expenses scaled by the book value of total assets. Cash flow (*CF*) is net income before extraordinary items (minus dividend) divided by the book value of total assets (minus cash and cash equivalent). Analyst coverage (*Ana*) is defined as the natural logarithm of one plus number of financial analysts covering a firm. Finally, industry median of market leverage (*IndLev(M)*) and industry median of book leverage (*IndLev(B)*) are indicated as the median of market and book leverage, respectively, of an industry to which a firm belongs.

3.5. Models

We begin the analyses in this session by investigating how equity liquidity affects market leverage. Particularly, we perform a cross-sectional regression of leverage on the stock liquidity variable in which firm characteristics are controlled. We use two alternative proxies for leverage included market leverage and book leverage. Formally, our baseline regression model is represented as follows:

$$Lev_i = \alpha_0 + \beta_1 Liq_i + Controls_i + \varepsilon_i \quad (1)$$

where Lev_i denotes the market and book leverage of firm i , which is measured as book value of total debt divided by the sum of market value of equity and the book value of total debt, and book value of total debt divided by the book value of total asset, respectively. Liq_i is stock liquidity defined as a log of the average of the daily percentage effective spread. $Controls_i$ is the set of stock i 's firm-specific controls variables, including the asset tangibility (*Tang*), firm size (*Size*), book-to-market ratio (*BM*), return-on-assets ratio (*ROA*), research and development expenses (*R&D*), cash flow (*CF*), analyst coverage (*Ana*), industry median of market leverage (*IndLev(M)*), and industry median of book leverage (*IndLev(B)*). The baseline regression will be estimated in three groups of sample scale: globe, developed countries, and emerging countries. In the regression, we include country fixed effects to control for potential differences across countries and industry fixed effects to account for differences in industry responses to firm leverage. All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms.

Further, in order to examine the impact of institutional environment on the link between stock market liquidity and capital structure, we use the following equation:

$$Lev_i = \alpha_0 + \beta_1 Liq_i + \beta_2 Liq_i * IE + IE + Controls_i + \varepsilon_i \quad (2)$$

where *IE* is the institutional variables as defined in the previous section.

4. Results and discussion of results

4.1. Descriptive statistic

Table 1 presents the summary statistics of firm market leverage, book leverage and stock liquidity for each of 41 countries. As a general rule, emerging markets seem to have higher leverage and lower stock liquidity compared to developed markets. In particular, while the means of market leverage and book leverage of developed economies are 0.170 and 0.204, respectively, the means of these two indicators in emerging economies are 0.231 and 0.260, respectively. Moreover, the mean of liquidity in developed countries and emerging countries are -4.429 and -4.298, respectively. The reasons may be in emerging countries, which are characterized by less-developed capital markets, more concentrated corporate ownership, and higher level of information asymmetry. It means that due to the prevalence of bank loans, companies in emerging markets obtain less finance from capital markets. This fact potentially makes liquidity less relevant in capital structure decision.

Table 1. Summary statistics of firm leverage and stock liquidity

Country	N	Lev (M)		Lev (B)		Illiq	
		Mean	Std	Mean	Std	Mean	Std
Panel A: Developed markets							
Australia	12713	0.098	0.152	0.129	0.198	-3.531	1.029
Austria	531	0.238	0.176	0.274	0.186	-4.551	0.890
Belgium	1070	0.197	0.166	0.240	0.189	-4.740	0.993
Canada	7260	0.132	0.168	0.165	0.204	-3.983	1.246
Denmark	1207	0.221	0.195	0.260	0.202	-4.191	0.974
Ireland	448	0.189	0.172	0.257	0.220	-3.797	0.977
Finland	1285	0.191	0.163	0.243	0.183	-4.351	0.972
France	7025	0.170	0.150	0.210	0.177	-4.566	0.992
Germany	6436	0.162	0.174	0.196	0.203	-3.913	1.023
Hong Kong	8210	0.168	0.175	0.182	0.192	-3.744	0.905
Italy	2154	0.224	0.159	0.271	0.168	-4.850	0.834
Japan	25673	0.217	0.189	0.222	0.194	-5.000	0.830
Netherlands	1201	0.175	0.137	0.232	0.179	-4.931	1.116
Norway	1761	0.257	0.229	0.300	0.239	-4.047	0.975
New Zealand	887	0.171	0.161	0.228	0.199	-3.952	0.832
Singapore	5868	0.184	0.177	0.202	0.188	-3.521	0.936
Spain	990	0.219	0.162	0.279	0.188	-5.553	1.301
Sweden	3408	0.125	0.173	0.167	0.172	-4.179	0.950
Switzerland	1755	0.163	0.147	0.207	0.168	-4.487	0.795
United Kingdom	14185	0.127	0.151	0.176	0.207	-3.576	1.097
United States	15373	0.185	0.170	0.258	0.212	-5.780	1.342
Panel B: Emerging markets							
Argentina	551	0.223	0.214	0.220	0.212	-3.949	0.703
Brazil	777	0.202	0.172	0.285	0.209	-3.880	1.048
China	14513	0.161	0.136	0.268	0.182	-5.620	0.353
Chile	834	0.186	0.151	0.220	0.152	-3.846	0.883
Egypt	736	0.139	0.163	0.179	0.192	-4.050	0.733
Greece	2652	0.264	0.197	0.285	0.193	-4.103	0.667
Indonesia	2628	0.300	0.252	0.322	0.287	-3.349	0.836
India	12534	0.284	0.225	0.311	0.232	-3.827	1.016
Israel	2102	0.264	0.213	0.300	0.232	-3.423	0.953
South Korea	6748	0.306	0.214	0.273	0.201	-4.703	0.679
Mexico	1021	0.208	0.176	0.228	0.179	-4.151	1.152
Malaysia	8339	0.241	0.208	0.231	0.212	-3.796	0.830
Peru	459	0.194	0.184	0.192	0.155	-3.303	0.534
Poland	2290	0.136	0.142	0.169	0.161	-4.209	0.675
Philippines	1196	0.201	0.205	0.207	0.204	-3.287	0.803
Russia	920	0.222	0.186	0.253	0.184	-3.870	1.196
South Africa	2746	0.147	0.159	0.178	0.183	-3.548	1.005
Thailand	3948	0.253	0.231	0.282	0.255	-3.983	0.746
Turkey	2043	0.188	0.185	0.219	0.219	-4.441	0.451
Taiwan	7128	0.216	0.184	0.223	0.167	-5.026	0.542

(Continued)

Table 1. (Continued)

Country	N	Lev (M)		Lev (B)		Illiq	
		Mean	Std	Mean	Std	Mean	Std
DEV	119440	0.170	0.175	0.204	0.202	-4.429	1.294
EMG	74165	0.231	0.203	0.260	0.211	-4.298	1.080
GLB	193605	0.193	0.188	0.226	0.207	-4.376	1.213

The table also offers other important insights. Firms in developed markets, for example, Australia, Sweden and the United Kingdom, on average, rely less on bank loans. Firms in countries like the United States, Spain and Japan where stock markets are relatively larger and more mature tend to be associated with higher stock liquidity. In contrast, firms in Singapore, Australia and Switzerland have the lowest average dependence on public capital markets.

Leverage and stock liquidity measures also exhibit considerable variation across emerging countries. India, Indonesia and South Korea are, on average, most exposed to the debt markets whereas Poland, Egypt and South Africa are the least ones. Moreover, stocks in China, Taiwan and South Korea experience the highest liquidity level whereas Philippines, Peru and Indonesia are present at the lowest group.

Table 2 shows the Pearson correlation coefficients among the variables used in our paper. We observe a positive correlation between market leverage and *Liq* but a negative correlation between book leverage and *Liq*. This result implies there is an ambiguous relationship between capital structure and stock liquidity. Moreover, market and book leverage have negative relationships with all institutional environment variables whereas liquidity indicator has positive correlations with these variables. It indicates that when countries provide better protection to firms as well as capital markets, i.e. protecting private property rights, examining companies' annual accounting reports, disclosing financial information to the investor, formulating and implementing sound policies and regulations, firms tend to make fewer bank loans and rely more on public capital markets.

4.2. Stock liquidity and capital structure

Table 3 presents the regression results for Equation (1). Consistent with the expectation, the coefficients of liquidity variable (represented by effective spread) are positive and significant at the 1% level for both book leverage and market leverage in all three subsamples: globe, developed countries and emerging countries. We note that a higher value of effective spread indicates less liquidity of stock. Consequently, firms with less liquidity employ more debt in their capital structure. Our findings are consistent with those in Frieder and Martell (2006), Lipson and Mortal (2009) and Udomsirikul et al. (2011) although we use a multinational context of sample, including emerging countries in which the information asymmetry is more severe and bank financing is dominant. However, this finding is contrary to the result of a single country study by ElBannan (2017).

Interestingly, as reported in Table 3, the coefficients of liquidity variable in emerging markets subsample are higher in absolute value with respect to developed countries subsample, both for market leverage and book leverage. This result might be explained by the fact that in developed countries with stronger institutional environments and lower degree of information asymmetry, the negative effect of liquidity on leverage becomes weaker than that in emerging countries.

4.3. Robustness checks

In this session, we implement further tests to assess the robustness of our results. First, we use Amihud's (year) estimate as a proxy for the stock liquidity rather than using effective spread. Second, we repeat the analyses with different subsample, i.e. we test the subsample without the US. and non-crisis period.

Table 2. Pearson correlations

Variable	Lev (M)	Lev (B)	Illiq	Tang	Size	BM	ROA	R&D	CF	Ana	IndLev (M)	IndLev (B)	GGov	Accsta	Disc	RQuality	GovEffect	IFRS	
Lev (M)	1.000																		
Lev (B)	0.851	1.000																	
Illiq	0.040	-0.057	1.000																
Tang	0.300	0.273	-0.036	1.000															
Size	0.222	0.220	-0.695	0.167	1.000														
BM	0.301	0.041	0.249	0.154	0.057	1.000													
ROA	-0.005	-0.015	-0.279	0.055	0.282	-0.030	1.000												
R&D	-0.129	-0.091	0.011	-0.155	-0.094	-0.146	-0.245	1.000											
CF	0.068	0.041	-0.191	0.085	0.257	0.096	0.631	-0.265	1.000										
Ana	-0.012	0.033	-0.522	0.016	0.630	-0.185	0.163	0.091	0.099	1.000									
IndLev (M)	0.378	0.272	0.047	0.221	0.186	0.359	0.147	-0.145	0.145	-0.052	1.000								
IndLev (B)	0.354	0.319	-0.105	0.226	0.242	0.166	0.207	-0.163	0.178	-0.019	0.876	1.000							
GGov	-0.138	-0.118	-0.098	-0.148	0.084	-0.107	-0.155	0.139	-0.105	0.269	-0.416	-0.429	1.000						
Accsta	-0.165	-0.128	0.068	-0.095	-0.138	-0.124	-0.156	0.078	-0.120	0.085	-0.410	-0.415	0.638	1.000					
Disc	-0.154	-0.174	0.272	-0.177	-0.131	-0.054	-0.187	0.136	-0.145	0.167	-0.401	-0.508	0.832	0.703	1.000				
RQuality	-0.146	-0.149	0.026	-0.159	0.007	-0.049	-0.152	0.128	-0.113	0.207	-0.421	-0.475	0.830	0.622	0.861	1.000			
GovEffect	-0.142	-0.146	-0.013	-0.163	0.021	-0.037	-0.152	0.128	-0.099	0.196	-0.402	-0.457	0.870	0.687	0.833	0.898	1.000		
IFRS	-0.108	-0.099	0.183	-0.145	-0.117	-0.067	-0.073	0.042	-0.080	0.037	-0.226	-0.241	0.238	0.248	0.357	0.361	0.287	1.000	

Table 3. Stock liquidity and capital structure (Effective spread—Illiq)

Variable	Market leverage			Book leverage		
	GLB	DEV	EMG	GLB	DEV	EMG
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Illiq</i>	0.022*** (18.60)	0.019*** (13.48)	0.036*** (16.00)	0.019*** (15.21)	0.019*** (12.27)	0.025*** (11.06)
<i>Tang</i>	0.093*** (12.27)	0.094*** (9.22)	0.090*** (8.06)	0.105*** (13.50)	0.104*** (9.93)	0.103*** (8.83)
<i>Size</i>	0.067*** (37.49)	0.060*** (27.52)	0.084*** (26.86)	0.058*** (29.27)	0.052*** (20.79)	0.072*** (22.05)
<i>BM</i>	0.013*** (12.89)	0.013*** (10.33)	0.009*** (5.28)	-0.011*** (-10.07)	-0.012*** (-8.52)	-0.012*** (-7.07)
<i>ROA</i>	-0.106*** (-17.87)	-0.095*** (-15.23)	-0.138*** (-9.11)	-0.137*** (-18.62)	-0.117*** (-14.26)	-0.185*** (-11.17)
<i>R&D</i>	0.058*** (3.02)	0.057*** (2.89)	-0.010 (-0.15)	0.057* (1.78)	0.062* (1.83)	-0.041 (-0.70)
<i>CF</i>	0.002 (1.06)	0.005*** (2.69)	-0.021** (-2.13)	0.003 (1.07)	0.005 (1.61)	-0.019* (-1.85)
<i>Ana</i>	-0.003** (-2.06)	-0.002 (-1.00)	-0.006*** (-2.62)	-0.006*** (-3.92)	-0.004** (-2.17)	-0.008*** (-3.47)
<i>IndLev</i>	0.180*** (15.11)	0.207*** (12.36)	0.148*** (8.58)	0.289*** (16.55)	0.257*** (11.10)	0.310*** (12.26)
Fixed effects	FY	FY	FY	FY	FY	FY
Nobs	122,807	76,343	46,464	122,890	76,382	46,508
Adj. R2	76.8%	77.3%	76.2%	77.2%	77.1%	76.8%

Column (1) and (4) of Table 4 present the regression results using Amihud's (year) estimate as a liquidity proxy in pooled analysis. As seen, our findings do not change qualitatively with this alternative measure. Particularly, the coefficients of liquidity variables remain positive and significant at the 1% level for both market leverage and book leverage. For non-US and non-crisis period subsamples (columns (2), (3), (5), (6)), the results remain consistent with those in the primary analyses.

In general, these additional evidences confirm that our finding in the previous section is not affected by different measures of stock liquidity and crisis period, and not driven by the US firm characteristics.

4.4. Impacts of institutional environment on the link between stock liquidity and capital structure

Evidence from previous sections implies that the level of stock liquidity affects firms' financing decisions. However, in the multi-country context, institutional characteristics and information environments vary significantly across countries. To address this issue, we analyze the moderating role of institutional variables with respect to the link between stock liquidity and financing decisions by allowing the interaction of stock liquidity and institutional environment factors on market and book leverage.

In Table 5, we provide regression results of the market leverage and book leverage and liquidity, institutional environments indexes, and the product of liquidity and institutional variables. The interaction terms are used to capture the impact of factors at the country level on the observed impacts of liquidity on firm's capital structure.

Table 4. Stock liquidity and capital structure—Robustness check

Variable	Market leverage			Book leverage		
	Amihud	Non-US	Non-Crisis	Amihud	Non-US	Non-Crisis
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Illiq</i>	0.013*** (29.09)	0.025*** (19.64)	0.027*** (20.08)	0.011*** (24.07)	0.020*** (15.14)	0.021*** (15.33)
<i>Tang</i>	0.099*** (14.31)	0.096*** (12.32)	0.095*** (11.02)	0.117*** (15.95)	0.107*** (13.62)	0.106*** (12.04)
<i>Size</i>	0.067*** (43.55)	0.068*** (37.20)	0.064*** (32.83)	0.059*** (34.33)	0.059*** (29.63)	0.057*** (26.33)
<i>BM</i>	0.008*** (8.82)	0.011*** (10.89)	0.013*** (11.54)	-0.016*** (-15.65)	-0.011*** (-10.28)	-0.011*** (-9.55)
<i>ROA</i>	-0.094*** (-18.30)	-0.104*** (-16.70)	-0.105*** (-15.66)	-0.130*** (-19.52)	-0.138*** (-17.82)	-0.139*** (-16.24)
<i>R&D</i>	0.038** (2.45)	0.056*** (3.38)	0.041** (2.38)	0.042 (1.49)	0.062** (2.24)	0.056* (1.81)
<i>CF</i>	0.003 (1.54)	0.002 (0.88)	0.003 (1.57)	0.005* (1.84)	0.002 (0.80)	0.004 (1.37)
<i>Ana</i>	0.003*** (2.58)	-0.004*** (-3.15)	-0.002* (-1.69)	-0.001 (-0.80)	-0.007*** (-4.47)	-0.006*** (-3.74)
<i>IndLev</i>	0.207*** (19.02)	0.173*** (14.27)	0.177*** (13.81)	0.293*** (19.15)	0.287*** (16.18)	0.280*** (14.51)
Fixed effects	FY	FY	FY	FY	FY	FY
Nobs	139,586	112,386	95,906	139,727	112,445	95,979
Adj. R2	75.4%	77.0%	77.9%	74.8%	77.4%	77.5%

Columns (1) to (6) of Table 5 present the regression results where the dependent variable is market leverage and column (7) to (12) are results of regression where the dependent variable is book leverage. We observe that coefficients of all interaction terms are negative and statistically significant at the 1% level. This suggests the inverse relation between liquidity and firms leverage is weaker in countries with good government index, high accounting standard, rigorous disclosure requirement, effective policies and regulations, high quality of public services, or high financial disclosure requirement. In a country which is characterized by strong institutional factors, investors tend to be better protected and the degree of information asymmetry is reduced. Consequently, investors would rely less on debt as stated in hypothesis H2. In particular firm, leverage is less negatively related to stock liquidity in countries that have strong institutional environments. This is because the asymmetric information problems in these countries are not as serious as those that have weaker institutional environments.

5. Conclusion

This paper investigates the relation between stock liquidity and capital structure and the effect of institutional environments on this link. Using a comprehensive dataset for a sample of 19,939 firms in 21 developed countries and 20 emerging countries worldwide from 2000 to 2010, we first find that stock liquidity negatively affects firm leverage. A possible interpretation is that when the liquidity of stock increases, the cost of equity decreases, making equity more attractive compared to debt. Consequently, firms with high liquidity would tend to have a lower proportion of debt in their capital structure.

Table 5. Stock liquidity, capital structure, and the role of institutional environment

Variable	Market leverage						Book leverage					
	GGov (1)	Accsta (2)	Disc (3)	RQuality (4)	GovEff (5)	IFRS (6)	GGov (7)	Accsta (8)	Disc (9)	RQuality (10)	GovEff (11)	IFRS (12)
Illiq	0.073*** (12.47)	0.118*** (12.90)	0.062*** (7.52)	0.040*** (24.46)	0.039*** (20.84)	0.035*** (26.70)	0.074*** (11.60)	0.126*** (12.66)	0.067*** (7.82)	0.040*** (23.10)	0.039*** (19.25)	0.035*** (24.58)
IE	-0.010*** (-6.60)	-0.005*** (-8.71)	-0.027*** (-3.60)	-0.033*** (-7.32)	-0.027*** (-5.39)	-0.064*** (-8.87)	-0.009*** (-6.06)	-0.005*** (-8.76)	-0.030*** (-3.91)	-0.031*** (-7.00)	-0.023*** (-4.67)	-0.061*** (-7.78)
Illiq*IE	-0.002*** (-7.33)	-0.001*** (-9.59)	-0.004*** (-3.11)	-0.007*** (-7.77)	-0.005*** (-5.10)	-0.014*** (-9.32)	-0.002*** (-6.75)	-0.001*** (-9.55)	-0.006*** (-3.72)	-0.007*** (-7.19)	-0.005*** (-4.49)	-0.013*** (-7.81)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	IY	IY	IY	IY	IY	IY	IY	IY	IY	IY	IY	IY
Nobs	122,807	109,974	105,508	122,807	122,807	122,807	122,890	110,046	105,555	122,890	122,890	122,890
Adj. R2	27.3%	27.6%	27.3%	27.3%	27.3%	27.3%	22.0%	22.1%	22.1%	22.0%	21.9%	21.9%

An important contribution of this paper is examining firm in an international setting. Particularly, developed countries are characterized by sophisticated capital market while emerging countries are dominated by banks. These characteristics prevent the global generalization of previous studies' findings which use the US or any other single country context.

We further document that the negative impact of stock liquidity on firm leverage is weaker in countries with a strong institutional environment. This finding has relevant policy implications. Specifically, to temper the asymmetric information problem and thus reduce transaction cost, countries could improve institutional factors such as accounting standard, financial disclosure, private sector promotion and government effectiveness. In general, we find that stock liquidity is an important determinant of capital structure decisions. Moreover, the role of stock liquidity is affected by the institutional environment.

Funding

The authors received no direct funding for this research.

Author details

Tung Lam Dang¹

E-mail: lamdt@ueh.edu.vn

Hai Ly Ho¹

E-mail: lyhth@due.edu.vn

Chi Dzung Lam¹

E-mail: dunglc@due.edu.vn

Thanh Thao Tran²

E-mail: thanhthaobanking@gmail.com

Xuan Vinh Vo^{2,3}

E-mail: vxvinh@yahoo.com

ORCID ID: <http://orcid.org/0000-0002-4725-6914>

¹ University of Economics, The University of Danang, Da Nang, Vietnam.

² Institute of Business Research, University of Economics Ho Chi Minh City, Ho Chi Minh City, Vietnam.

³ University of Economics Ho Chi Minh City, CFVG Ho Chi Minh City, Vietnam.

Citation information

Cite this article as: Stock liquidity and capital structure: International evidence, Tung Lam Dang, Hai Ly Ho, Chi Dzung Lam, Thanh Thao Tran & Xuan Vinh Vo, *Cogent Economics & Finance* (2019), 7: 1587804.

References

- Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics*, 77, 375–410. doi:10.1016/j.jfineco.2004.06.007
- Amihud, Y. (2002). Illiquidity and stock returns: Cross section and time-series effects. *Journal of Financial Markets*, 5, 31–56.
- Amihud, Y., & Medelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of Financial Economics*, 17, 223–249. doi:10.1016/0304-405X(86)90065-6
- Andres, C., Cumming, D., Karabiber, T., & Schweizer, D. (2014). Do markets anticipate capital structure decisions? — Feedback effects in equity liquidity. *Journal of Corporate Finance*, 27, 133–156. doi:10.1016/j.jcorpfin.2014.02.006
- Atawnah, N., Balachandran, B., Duong, H. N., & Podolski, E. J. (2018). Does exposure to foreign competition affect stock liquidity? Evidence from industry-level import data. *Journal of Financial Markets*, 39, 44–67. doi:10.1016/j.finmar.2017.12.002
- Booth, L., Aivazian, V., Demircug-Kunt, A., & Maksimovic, V. (2001). Capital structure in developing countries. *Journal of Finance*, 56, 87–130. doi:10.1111/0022-1082.00320
- Butler, A. W., Grullon, G., & Weston, J. P. (2005). Stock market liquidity and the cost of issuing equity. *Journal of Financial and Quantitative Analysis*, 40(2), 331–348. doi:10.1017/S0022109000002337
- Cairns, D. (2004). *The implications of IAS/IFRS for UK companies and update to the convergence handbook*. *International Journal of Disclosure and Governance*, 1, 107. Retrieved from <https://doi.org/10.1057/palgrave.jdg.2040017>.
- Chordia, T., Roll, R., & Subrahmanyam, A. (2000). Commonality in liquidity. *Journal of Financial Economics*, 56, 3–28. doi:10.1016/S0304-405X(99)00057-4
- Djankov, S., Hart, O., McLiesh, C., & Shleifer, A. (2008). Debt enforcement around the world. *Journal of Political Economy*, 116, 1105–1149. doi:10.1086/595015
- Easley, D., Hvidkjaer, S., & O'Hara, M. (2002). Is information risk a determinant of asset prices? *Journal of Finance*, 57, 2185–2221. doi:10.1111/1540-6261.00493
- Easley, D., & O'Hara, M. (2004). Information and the cost of capital. *Journal of Finance*, 59, 1553–1583. doi:10.1111/j.1540-6261.2004.00672.x
- ElBannan, M. A. (2017). Stock market liquidity, family ownership, and capital structure choices in an emerging country. *Emerging Markets Review*, 33 (December), 201–231. doi:10.1016/j.ememar.2017.11.001
- Fan, J. P. H., Titman, S., & Twite, D. (2012). An international comparison of capital structure and debt maturity choices. *Journal of Financial and Quantitative Analysis*, 47, 23–56. doi:10.1017/S0022109011000597
- Frieder, L., & Martell, R. (2006). *On capital structure and the liquidity of a firm's stock*. (Working Paper). Purdue University.
- Gao, W., & Zhu, F. (2015). Information asymmetry and capital structure around the world. *Pacific-Basin Finance Journal*, 32, 131–159. doi:10.1016/j.pacfin.2015.01.005
- Giannetti, M. (2003). Do better institutions mitigate agency problems? Evidence from corporate finance choices. *Journal of Financial and Quantitative Analysis*, 38, 185–212. doi:10.2307/4126769
- Hennessy, C. A., & Whited, T. M. (2005). Debt dynamics. *Journal of Finance*, 71(3), 1129–1165. doi:10.1111/j.1540-6261.2005.00758.x
- Jalal, A. M. (2007). *The pecking order and marginal debt issuance: An international perspective*. (Working Paper). Available at SSRN: <https://ssrn.com/abstract=1006251> or <http://dx.doi.org/10.2139/ssrn.1006251>.

- Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance*, 48, 831–880. doi:10.1111/j.1540-6261.1993.tb04022.x
- Jin, L., & Myers, S. C. (2006). R2 around the world: New theory and new tests. *Journal of Financial Economics*, 79, 257–292. doi:10.1016/j.jfineco.2004.11.003
- Kaufmann, D., Kraay, A., & Mastruzzi, M. (2008). *Governance matters VII: aggregate and individual governance indicators 1996–2007 (English)*. (World Bank Policy Research Working Paper No. WPS 4654). Washington, DC: World Bank. Retrieved from <http://documents.worldbank.org/curated/en/810501468338351727/Governance-matters-VII-aggregate-and-individual-governance-indicators-1996-2007>
- La Porta, R., Lopez de-Silanes, F., Shleifer, A., & Vishny, R. W., (1998b). *The quality of government*. (Working Paper No. 6727). Cambridge: National Bureau of Economic Research.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Legal determinants of external finance. *Journal of Finance*, 52, 1131–1155. doi:10.1111/j.1540-6261.1997.tb02727.x
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998a). Law and finance. *Journal of Political Economy*, 106, 1112–1155. doi:10.1086/250042
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (2002). Investor protection and corporate valuation. *Journal of Finance*, 57, 1147–1170. doi:10.1111/1540-6261.00457
- Lipson, M. L., & Mortal, S. (2009). Liquidity and capital structure. *Journal of Financial Markets*, 12, 611–644. doi:10.1016/j.finmar.2009.04.002
- Morck, R., Yeung, B., & Yu, W. (2000). The information content of stock markets: Why do emerging markets have synchronous stock price movement? *Journal of Financial Economics*, 58, 215–260. doi:10.1016/S0304-405X(00)00071-4
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13, 187–221. doi:10.1016/0304-405X(84)90023-0
- Pástor, L., & Stambaugh, R. F. (2003). Liquidity risk and expected stock returns. *Journal of Political Economy*, 111, 642–685. doi:10.1086/374184
- Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance*, 50(5), 1421–1460. doi:10.1111/j.1540-6261.1995.tb05184.x
- Stoll, H. R., & Whaley, R. (1983). Transaction costs and the small firm effect. *Journal of Financial Economics*, 12, 1153–1172.
- Udomsirikul, P., Jumreornvong, S., & Jiraporn, P. (2011). Liquidity and capital structure: The case of Thailand. *Journal of Multinational Financial Management*, 21, 106–117. doi:10.1016/j.mulfin.2010.12.008
- Vo, X. V. (2017). Determinants of capital structure in emerging markets: Evidence from Vietnam. *Research in International Business and Finance*, 40, 105–113. doi:10.1016/j.ribaf.2016.12.001
- Weston, J., Butler, A., & Grullon, G. (2005). Stock market liquidity and the cost of issuing equity. *Journal of Financial and Quantitative Analysis*, 40, 331–348. doi:10.1017/S0022109000002337

Appendix A. Variable definitions

Variables	Acronym	Description	Data sources
A. Firm-level variables			
A.1. Leverage and liquidity measures			
Market leverage	<i>Lev(M)</i>	Book value of total debt divided by the sum of market value of equity and the book value of total debt.	Worldscope
Book leverage	<i>Lev(B)</i>	Book value of total debt divided by the book value of total assets.	Worldscope
Stock liquidity	<i>Illiq</i>	Log of the average of the daily percentage effective spread. The percentage effective spread is defined as twice the absolute value of the difference between the trading price and the midpoint of the bid and the ask price, which is then divided by the midpoint of the bid and the ask price.	TRTH
	<i>Amihud</i>	Log of the average of daily Amihud's (2002) measure, which is calculated as the absolute value of stock return divided by dollar trading volume on a given day, in a given year.	Datastream
A.2. Other firm-level characteristics			
Tangibility	<i>Tang</i>	Ratio of net property, plant and equipment to the book value of total assets.	Worldscope
Firm size	<i>Size</i>	Log of the book value of total assets denominated in U.S. dollars.	Worldscope
Book-to-market ratio	<i>BM</i>	Log of book-to-market equity ratio.	Worldscope
Return-on-assets ratio	<i>ROA</i>	Net income before extraordinary items scaled by the book value of total assets.	Worldscope
Research and development	<i>R&D</i>	Research and development expenses scaled by the book value of total assets.	Worldscope
Cash flow	<i>CF</i>	Net income before extraordinary items (minus dividend) divided by the book value of total assets (minus cash and cash equivalent).	Worldscope
Analyst coverage	<i>Ana</i>	Log of one plus number of financial analysts covering a firm.	I/B/E/S
Industry median of market leverage	<i>IndLev(M)</i>	The median of market leverage of an industry to which a firm belongs.	Worldscope
Industry median of book leverage	<i>IndLev(B)</i>	The median of book leverage of an industry to which a firm belongs.	Worldscope
B. Country-level institutional environments			
Good government index	<i>GGov</i>	A measure of how well a country protects private property rights, which is the sum of three indexes: (i) government corruption, (ii) the risk of expropriation of private property by the government, and (iii) the risk of the government repudiating contracts.	Morck et al. (2000)
Accounting standard index	<i>Accsta</i>	The index was created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 specific accounting items, covering general information, income statements, balance sheets, funds flow statement, accounting standards, stock data, and special items.	LaPorta et al. (2018a, 2018b)

(Continued)

Appendix A. (Continued)			
Variables	Acronym	Description	Data sources
Disclosure score index	<i>Disc</i>	A measure of the level of financial disclosure and availability of information to investors, which is calculated based on survey results about the level and effectiveness of financial disclosure in the annual Global Competitiveness Report in 1999 and 2000.	Jin and Myers (2006)
Regulatory quality index	<i>RQuality</i>	Investors' perceptions of the government's ability to formulate and implement sound policies and regulations that permit and promote private sector development.	Kaufmann et al. (2009)
Government effectiveness index	<i>GovEffect</i>	Investors' perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Kaufmann et al. (2009)
IFRS adoption at the country level	<i>IFRS</i>	A dummy variable that equals one if a country adopts International Financial Reporting Standards in a given year, and zero otherwise.	Compustat Global

Appendix B. Summary statistics of firm-specific controls

Panel A: Developed markets

Country	Tang		Size		BM		ROA		R&D		CF		Ana		IndLev (M)		IndLev (B)	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Australia	0.300	0.265	9.734	2.230	-0.698	0.967	-0.115	0.284	0.011	0.064	-0.494	1.421	0.279	0.641	0.049	0.067	0.067	0.086
Austria	0.329	0.183	12.635	2.081	-0.402	0.864	0.021	0.134	0.011	0.056	-0.007	0.517	0.684	0.873	0.201	0.089	0.242	0.088
Belgium	0.279	0.214	12.226	1.886	-0.554	0.853	0.033	0.138	0.016	0.062	0.013	0.461	0.771	0.916	0.173	0.094	0.232	0.094
Canada	0.410	0.290	11.050	2.172	-0.598	0.967	-0.056	0.225	0.024	0.091	-0.244	1.030	0.605	0.844	0.072	0.079	0.094	0.097
Denmark	0.327	0.225	11.668	2.019	-0.509	0.891	0.017	0.179	0.024	0.079	-0.053	0.756	0.769	0.935	0.188	0.105	0.239	0.096
Ireland	0.309	0.248	12.553	1.989	-0.706	0.951	0.020	0.163	0.014	0.068	-0.082	0.923	0.893	0.832	0.178	0.111	0.228	0.121
Finland	0.277	0.210	12.095	1.944	-0.648	0.782	0.049	0.131	0.028	0.077	0.024	0.406	1.284	1.050	0.169	0.097	0.225	0.090
France	0.172	0.173	11.639	2.388	-0.677	0.924	0.030	0.135	0.011	0.047	0.037	0.401	0.629	0.949	0.141	0.060	0.186	0.056
Germany	0.212	0.191	11.607	2.194	-0.561	0.903	-0.007	0.184	0.017	0.055	-0.043	0.582	0.707	0.962	0.108	0.062	0.143	0.074
Hong Kong	0.270	0.219	11.479	1.825	-0.197	1.095	0.016	0.199	0.005	0.031	-0.037	0.685	0.425	0.809	0.128	0.059	0.143	0.049
Italy	0.232	0.189	12.850	1.729	-0.575	0.785	0.015	0.098	0.004	0.014	0.031	0.210	0.831	0.997	0.198	0.076	0.263	0.058
Japan	0.306	0.177	12.943	1.580	-0.098	0.813	0.020	0.072	0.012	0.024	0.047	0.213	0.691	0.852	0.201	0.078	0.204	0.066
Netherlands	0.248	0.186	12.721	2.429	-0.760	0.864	0.040	0.147	0.013	0.051	0.020	0.392	1.472	1.182	0.161	0.067	0.220	0.071
Norway	0.335	0.290	11.986	2.041	-0.556	0.922	0.000	0.197	0.009	0.050	-0.096	0.806	0.761	0.911	0.247	0.156	0.283	0.145
New Zealand	0.384	0.275	10.875	2.047	-0.634	0.835	0.021	0.202	0.010	0.063	-0.100	0.744	0.661	0.810	0.166	0.081	0.234	0.089
Singapore	0.316	0.226	11.171	1.510	-0.212	0.845	0.046	0.160	0.002	0.014	0.045	0.480	0.363	0.701	0.148	0.055	0.179	0.051
Spain	0.321	0.198	13.479	1.788	-0.726	0.863	0.054	0.091	0.003	0.020	0.063	0.198	1.518	1.161	0.184	0.086	0.250	0.088
Sweden	0.178	0.197	10.829	2.409	-0.824	0.911	-0.028	0.232	0.018	0.067	-0.145	0.805	0.542	0.862	0.085	0.064	0.129	0.080
Switzerland	0.303	0.217	12.679	1.675	-0.617	0.794	0.034	0.132	0.027	0.061	0.013	0.544	1.139	1.027	0.143	0.076	0.194	0.075
United Kingdom	0.254	0.247	11.088	2.360	-0.701	1.054	-0.026	0.225	0.021	0.078	-0.201	0.965	0.595	0.806	0.088	0.055	0.125	0.065
United States	0.318	0.248	13.541	2.266	-0.826	0.964	0.038	0.158	0.018	0.060	-0.002	0.644	1.402	1.112	0.117	0.056	0.188	0.070

Appendix B. Panel B

Country	Tang		Size		BM		ROA		R&D		CF		Ana		IndLev (M)		IndLev (B)	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Panel B: Emerging markets																		
Argentina	0.438	0.234	11.889	1.828	0.122	0.902	0.052	0.135	0.000	0.001	0.045	0.188	0.417	0.690	0.204	0.133	0.193	0.137
Brazil	0.314	0.210	12.531	1.840	-0.827	1.580	0.099	0.136	0.001	0.012	0.033	0.392	0.432	0.755	0.189	0.076	0.228	0.067
China	0.354	0.192	12.098	1.196	-1.052	0.774	0.045	0.088	0.000	0.003	0.058	0.220	0.168	0.425	0.155	0.055	0.257	0.048
Chile	0.470	0.217	12.572	1.549	-0.271	0.820	0.059	0.093	0.000	0.001	0.035	0.370	0.322	0.581	0.174	0.069	0.200	0.074
Egypt	0.392	0.224	11.712	1.692	-0.569	0.810	0.111	0.110	0.000	0.001	0.110	0.346	0.130	0.373	0.158	0.148	0.199	0.156
Greece	0.336	0.207	11.636	1.403	-0.502	1.100	0.036	0.081	0.002	0.008	0.040	0.196	0.495	0.782	0.223	0.119	0.272	0.083
Indonesia	0.424	0.244	11.236	1.682	-0.111	0.977	0.051	0.133	0.000	0.002	0.050	0.211	0.390	0.761	0.310	0.119	0.319	0.116
India	0.378	0.217	10.954	1.739	-0.232	1.131	0.080	0.109	0.001	0.016	0.074	0.204	0.135	0.473	0.285	0.133	0.301	0.091
Israel	0.252	0.218	11.403	1.885	-0.372	0.886	0.016	0.169	0.012	0.060	-0.098	0.845	0.062	0.279	0.217	0.123	0.253	0.127
South Korea	0.384	0.186	12.379	1.573	0.395	0.917	0.036	0.120	0.004	0.011	0.042	0.314	0.398	0.671	0.295	0.109	0.257	0.062
Mexico	0.466	0.219	13.596	1.631	-0.132	0.929	0.058	0.094	0.000	0.000	0.071	0.114	0.909	0.989	0.203	0.090	0.217	0.074
Malaysia	0.383	0.217	11.091	1.462	0.028	0.772	0.030	0.121	0.000	0.005	0.030	0.341	0.352	0.702	0.207	0.063	0.205	0.059
Peru	0.470	0.205	11.870	1.363	0.013	1.083	0.100	0.124	0.000	0.007	0.104	0.135	0.134	0.420	0.214	0.102	0.207	0.081
Poland	0.345	0.212	10.732	1.770	-0.462	0.947	0.051	0.131	0.000	0.002	0.051	0.342	0.162	0.474	0.100	0.062	0.134	0.069
Philippines	0.435	0.256	11.093	2.085	0.113	1.260	0.027	0.158	0.001	0.030	0.030	0.527	0.386	0.766	0.179	0.140	0.181	0.121
Russia	0.474	0.224	13.571	1.992	-0.253	1.133	0.101	0.111	0.000	0.003	0.103	0.402	0.448	0.731	0.201	0.124	0.221	0.094
South Africa	0.289	0.237	11.120	2.276	-0.483	0.979	0.078	0.181	0.002	0.016	0.053	0.546	0.474	0.767	0.104	0.048	0.139	0.044
Thailand	0.414	0.231	11.043	1.479	-0.082	0.818	0.063	0.124	0.000	0.001	0.051	0.310	0.473	0.814	0.251	0.131	0.264	0.106
Turkey	0.368	0.213	11.647	1.519	-0.409	0.870	0.081	0.138	0.003	0.012	0.041	0.304	0.802	0.852	0.146	0.072	0.188	0.085
Taiwan	0.340	0.192	12.246	1.335	-0.209	0.714	0.055	0.089	0.015	0.029	0.070	0.115	0.446	0.711	0.199	0.084	0.215	0.064
DEV	0.285	0.228	11.906	2.352	-0.501	0.967	0.000	0.182	0.014	0.058	-0.081	0.763	0.694	0.938	0.127	0.088	0.159	0.091
EMG	0.370	0.214	11.655	1.693	-0.293	1.012	0.053	0.117	0.003	0.019	0.051	0.311	0.284	0.626	0.218	0.119	0.247	0.095
GLB	0.318	0.226	11.812	2.133	-0.425	0.989	0.020	0.164	0.010	0.046	-0.031	0.636	0.525	0.848	0.164	0.111	0.195	0.102

Appendix C. Country-level institutional and information environments

Country	GGov	Accsta	Disc	RQuality	GovEffect	IFRS
Panel A: Developed markets						
Australia	21.600	75.000	6.300	1.698	1.821	0.455
Austria	21.900	54.000	6.000	1.610	1.801	0.455
Belgium	20.300	61.000	5.900	1.400	1.688	0.455
Canada	22.700	74.000	6.300	1.605	2.107	0.000
Denmark	23.300	62.000	6.200	1.760	2.230	0.455
Ireland	20.600		5.600	1.957	1.564	0.455
Finland	23.500	77.000	6.500	1.765	2.223	0.455
France	20.200	69.000	5.900	1.173	1.724	0.455
Germany	21.800	62.000	6.000	1.475	1.729	0.455
Hong Kong	18.400	69.000	5.800	1.924	1.700	0.455
Italy	21.964	62.000		1.046	0.733	0.455
Japan	20.500	65.000	5.600	1.216	1.563	0.000
Netherlands	23.600	64.000	6.100	1.739	2.009	0.455
Norway	22.600	74.000	5.800	1.171	1.969	0.455
New Zealand	22.300	70.000	6.000	1.710	1.747	0.000
Singapore	20.600	78.000	5.900	1.818	2.316	0.636
Spain	19.400	64.000	5.600	1.275	1.163	0.455
Sweden	22.800	83.000	6.300	1.589	1.973	0.455
Switzerland	23.000	68.000	5.700	1.596	2.111	0.455
United Kingdom	21.500	78.000	6.300	1.867	1.887	0.455
United States	23.563	71.000		1.678	1.780	0.000
Panel B: Emerging markets						
Argentina	17.300	45.000	4.900	-0.535	-0.130	0.000
Brazil	17.226	54.000		0.253	0.010	0.000
China	15.500		3.800	-0.382	0.066	0.000
Chile	18.000	52.000	5.800	1.529	1.128	0.091
Egypt	14.930	24.000		-0.384	-0.451	0.000
Greece	18.705	55.000		0.794	0.835	0.455
Indonesia	15.306			-0.372	-0.328	0.000
India	13.900	57.000	4.800	-0.218	-0.149	0.000
Israel	20.040	64.000		1.122	1.366	0.000
South Korea	19.100	62.000	4.700	0.493	1.040	0.000
Mexico	16.800	60.000	4.600	0.472	0.227	0.000
Malaysia	18.000	76.000	5.100	0.241	1.006	0.000
Peru	15.300	38.000	4.600	0.254	-0.296	0.000
Poland	20.100		4.700	0.681	0.667	0.455
Philippines	14.800	65.000	4.600	-0.069	-0.138	0.455
Russia	13.100		3.800	-0.736	-0.358	0.000
South Africa	17.800	70.000	5.500	0.800	0.703	0.455
Thailand	16.100	64.000	4.300	0.350	0.131	0.000
Turkey	14.000	51.000	5.100	0.115	0.039	0.182
Taiwan	17.700	65.000	5.400	1.060	1.027	0.000
DEV	21.473	70.999	6.006	1.567	1.798	0.291

(Continued)

Appendix C. (Continued)

Country	GGov	Accsta	Disc	RQuality	GovEffect	IFRS
EMG	16.296	61.122	4.684	0.158	0.354	0.056
GLB (Mean)	19.346	67.571	5.462	0.988	1.205	0.195
GLB (Std. dev.)	3.063	8.461	0.767	0.853	0.866	0.396



© 2019 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

You are free to:

Share — copy and redistribute the material in any medium or format.

Adapt — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

No additional restrictions

You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.



***Cogent Economics & Finance* (ISSN: 2332-2039) is published by Cogent OA, part of Taylor & Francis Group.**

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com

