Foreign Investor Heterogeneity and Stock Liquidity Around the World

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Abstract

This paper examines whether foreign investor heterogeneity plays a role in stock liquidity on a sample of 27,976 firms from 39 countries. Results show that foreign direct ownership is negatively, while foreign portfolio ownership is positively, associated with various measures of stock liquidity. Furthermore, during the 2008 market downturn, liquidity also worsens more (less) in firms with larger foreign direct investment FDI (foreign portfolio investment, FPI). Consistent with theoretical predictions, our results also show that foreign investors influence stock liquidity through both trading activity and information channels. Our findings also indicate that the presence of FDI investors improves firm valuation and operating performance even at the expense of an increase in the firm's cost of capital, suggesting that the value-enhancing benefits from FDI investors' monitoring efforts outweigh the liquidity costs and high adverse selection premium demanded by less informed investors. In contrast, the positive impacts of FPI ownership on firm performance, as previously documented in existing literature, becomes negative and also are not robustly significant after controlling for liquidity.

Keywords: Foreign Investors, Stock Liquidity, Cost of Capital, Firm Performance

JEL Classification Number: G11, G12, G23

1. Introduction

Over the past two decades, capital market liberalizations have led to a dramatic growth in international equity flows in the form of foreign direct investments and portfolio investments. According to the 2010 World Investment Report, the world foreign direct investments went up from $154 billion in 1991 to $1.14 trillion in 2009, and correspondingly, foreign portfolio equity inflows increased from $106 billion to $744 billion. Prior research shows that these two forms of foreign investments generate different implications about the stability and efficiency of international capital markets and of host countries.[1] Given that liquidity is important for the functioning of world equity markets, our study explores whether the observed foreign investor heterogeneity (in terms of direct investments and portfolio investments) exhibits differential impacts on stock liquidity and also attempts to explain their liquidity effects. Further, we test how the dominant presence of foreign investors globally influences the change in stock liquidity during the 2008 global credit crunch. Finally, we examine the economic consequences of foreign investors' impacts on stock liquidity.

There is much theory and empirical evidence to support that financial liberalizations generate significant economic benefits.[2] For example, they enable investors worldwide to share risks better by reducing the cost of capital (Bekaert and Harvey, 2000; Henry, 2000a, b; Chari and Henry, 2004), enhance firm valuation (Ferreira and Matos, 2008; Chan, Ng, and Covrig, 2009) and economic growth (Bekaert, Harvey, and Lundblad, 2005; and Gupta and Yuan, 2009), and promote better governance (Aggarwal, Erel, Ferreira, and Matos, 2011). Of particular interest to this study is the existing work on how market liberalizations affect stock liquidity. Specifically, Tesar and Werner (1995) and Vagias and van Dijk (2010) find that increases in foreign holdings estimated from accumulated capital flows improve local stock market liquidity, and Wei (2010) reaches the same conclusion using holdings data of foreign institutional investors. While their results are consistent with the theoretical argument that globalization of shareholder bases could enhance liquidity (Merton, 1987; Amihud and Mendelson, 2008), our current study intends to show whether foreign

[1] For example, Lipsey (2001) shows that during financial crises, inflows of direct investment have been much more stable than inflows of portfolio or other forms of foreign investment. The reason is that foreign portfolio investors tend to liquidate their investments and flee from the host country during crises. Goldstein, Razin, and Tong (2010) show that liquidity shocks have a strong effect on the composition of foreign equity investments.

[2] See Stulz's (2005) American Finance Association Presidential Address.

investor heterogeneity matters in stock liquidity and whether there is a liquidity-control tradeoff in the foreign ownership of a firm.

In their theoretical model, Goldstein and Razin (2006) show that there is a trade-off between foreign direct investments (FDI) and foreign portfolio investments (FPI), or between management efficiency and liquidity. Both trade-offs are driven by asymmetric information. FDI investors take both ownership and control positions in domestic firms and therefore have access to private information of the firms that enables them to monitor the management efficiently. However, their privy to inside information comes with a liquidity cost associated with the price impact of their trade, suggesting that foreign direct investments reduce stock liquidity.[3] FPI investors, on the other hand, gain ownership without control of local firms and also enlarge firms' shareholder bases, hence improving liquidity through trading activity.[4]

Goldstein and Razin's (2006) model offers testable implications for how the presence of foreign investor heterogeneity in a firm would affect the firm's stock liquidity and management. Our analysis focuses on two different groups of foreign investors who, respectively, contribute to the observed foreign direct investments and foreign portfolio investments across 39 countries globally. We hypothesize that the presence of FDI investors would reduce, while of FPI investors would increase, stock liquidity. Our study employs the newly available information provided by Thomson Reuters Datastream on strategic holdings (at least 5% of a firm's outstanding shares) of foreign investors as a proxy for FDI.[5] Datastream defines these strategic holdings as the fraction of a firm's share capital not freely available to ordinary investors. We also use the holdings of foreign institutional investors who hold less than 5% of a firm's outstanding shares from the Factset Lionshares database as a measure of FPI.

Our study represents the first to test whether foreign investor heterogeneity plays a role in

[3]Bolton and von Thadden (1998) also analyze a liquidity-control trade-off between direct investments and portfolio investments and argue that dispersed ownership generates greater stock liquidity whereas ownership concentration with large blockholding achieves efficient management control at the cost of reducing liquidity.

[4]Also, see Merton (1987) and Amihud and Mendelson (2008).

[5]One conventional way to distinguish between portfolio investment and direct investment is to determine whether the stake of foreign investors in companies is above or below 10%. Foreign direct investors typically hold a minimum of 10% of a firm's outstanding shares, and foreign portfolio investors have holdings lower than that threshold level. Using an alternative database, Orbis, on foreign financial institutional investors, we find that our results are insensitive to the choice of foreign direct investors' holdings of greater than 5% level.

stock liquidity on a sample of 27,976 firms from 39 countries for the period 2003-2009. Consistent with theoretical predictions, we find that foreign direct ownership reduces stock liquidity, whereas foreign portfolio ownership improves liquidity. These results are robust to various measures of liquidity, including Amihud's (2002) illiquidity measure, the proportion of zero daily stock returns, and effective spreads and to a multitude of control variables, including firm-level characteristics and domestic institutional ownership, that have previously shown to affect stock liquidity. The evidence that foreign investor heterogeneity generates differential liquidity effects suggests that it is not the "foreign" nature of ownership that matters in stock liquidity. A closer analysis indicates that their opposing liquidity effects are driven also not by the type of foreign investors (institutions vs. non-institutions), but by the size of their ownership stakes. The larger the foreign direct (portfolio) ownership, the greater (smaller) is its effect on stock illiquidity. We perform several tests to confirm that our results are robust to the potential endogenous concerns between foreign ownership and liquidity. More specifically, we examine the causal effect of foreign ownership on liquidity by analyzing cross-border mergers and acquisitions; the results confirm that the increase in foreign direct ownership from these cross-border transactions displays an adverse effect on liquidity.

Further, we exploit the 2008 global credit crunch to test how foreign investor heterogeneity is related to the change in liquidity. We observe a persistent sharp fall in liquidity across all countries during this large market downturn. Consistent with our main results, we find that foreign direct ownership aggravates, while foreign portfolio ownership exacerbates, the change in stock illiquidity during this crisis period.

We next attempt to explain the differential liquidity effects of foreign ownership in local firms. Implied by existing theory, we test two different channels through which foreign investors can affect liquidity. First, an increase in ownership stake by FDI investors adversely affects stock liquidity through a fall in their trading activity of a firm's stock, whereas an increase in ownership of FPI investors positively influences liquidity through a rise in their trading activity. The latter is also consistent with the general notion that globalization increases a firm's investor base and hence improves stock liquidity. Second, other theoretical arguments suggest that foreign investors can influence a firm's liquidity through an information channel (Goldstein and Razin, 2006). Domestic

firms with FDI investors, who have superior information and control positions in the firms, suffer from information asymmetry between insiders and outside uninformed investors. Further, these foreign investors bring their unique skills, international expertise, and knowledge to the firms, and domestic investors may be unfamiliar with such "foreign inputs." Thus, the presence of controlling FDI investors induces an adverse selection problem, making the stock less liquid (Kyle, 1985; Easley and O'Hara, 2004). Unlike FDI investors, FPI investors have no control of the firm but they are generally investment-savvy. They improve liquidity by increasing competition among other sophisticated investors and hence contribute to an increase in liquidity trading, thereby lowering the information asymmetry associated with the firm (Wei, 2010).

In line with the above theoretical predictions, our analysis shows that foreign investors affect liquidity through both their trading activity and information advantage. First, FDI investors reduce, while FPI investors improve, stock liquidity through trading activity. Results suggest that the negative effect of foreign direct ownership on liquidity is more pronounced among firms whose stocks have low trading activity and that foreign portfolio ownership plays a more important role in improving liquidity of less actively traded stocks. Second, our findings indicate that a firm's level of information asymmetry (measured by the probability of information-based trading, nonsynchronicity, analyst forecast error, and analyst coverage) increases in foreign direct ownership but decreases in foreign portfolio ownership. Interestingly, the effects of FDI and FPI on stock liquidity are mitigated when these proxies for information asymmetry are added to the regression analysis.

Finally, we find that foreign direct ownership improves both firm valuation and operating performance, but at the same time, increases the cost of capital, even after controlling for stock liquidity. With concentrated ownership and control positions in domestic firms, FDI investors have greater desire to improve governance quality, and their monitoring benefits have more than offset the increase in liquidity costs and in the cost of capital associated with adverse selection. Conversely, we show that the positive impact of foreign portfolio ownership on firm performance, as previously documented in Ferreira and Matos (2008) and Chan, Covrig, and Ng (2009), is mainly driven by the liquidity effect on firm performance. Specifically, the significantly positive effect of foreign

portfolio ownership on Tobin's Q becomes significantly negative after we control for liquidity in our analysis. Similarly, the significantly positive effect of foreign portfolio ownership on a domestic firm's operating performance becomes negative but statistically insignificant. Moreover, we provide no robust evidence that the relationship between foreign portfolio ownership and the cost of capital is positive. This result is in accord with Goldstein and Razin's (2006) argument that due to agency problems between managers and shareholders, portfolio investment projects tend to be managed less efficiently than direct investment projects.

This study makes several contributions to the literature. First, our paper highlights the importance of foreign investor heterogeneity across the world. While the role of foreign investment has received much attention in the literature, a large body of work focuses mainly on analyzing the impacts of foreign investors as a group. Only a few distinguish the types of foreign investments (i.e., FDI and FPI) (Lipsey, 2001; Goldstein and Razin, 2006; Ferreira, Massa, and Matos, 2010). However, their analyses rely on either country-level aggregated foreign investment data or a subsample of the data. Additionally, despite significant differences between FDI and FPI, the economic impacts of foreign investor heterogeneity and potential sources of such impacts remain unexplored. Using more comprehensive datasets, our study offers a direct evidence on the economic consequences of foreign investor heterogeneity on liquidity at the firm level and across countries. By differentiating foreign ownership stakes and control positions in domestic firms, we are able to demonstrate the markedly distinct roles of these two forms of international capital flows in stock liquidity and subsequently in firm performance and cost of capital.

Second, our work adds new evidence to the long-standing discussion on the role of foreign investors and their impacts on the cost of capital, firm valuation, and economic growth of domestic capital markets (e.g., Bekaert and Harvey, 2000; Ferreira and Matos, 2008; Gupta and Yuan, 2009). Existing evidence finds value-enhancing benefits of foreign institutional investors and suggests that these benefits are likely to arise from foreign investors' specialties in business intervention and management expertise (Aggarwal, Erel, Ferreira, and Matos, 2011). Our results show that these benefits are derived at the expense of high liquidity costs and high cost of capital which compensates for the adverse selection premium demanded by uninformed investors. Further, Ferreira and

Matos (2008) and Chan, Covrig, and Ng (2009) confirm the monitoring role of foreign institutional investors by showing that the presence of these investors improves firm performance and boosts firm value. But we find that such impacts become statistically insignificant when we introduce liquidity in our analysis, suggesting that foreign institutional investors enhance firm performance through their liquidity effects.

Finally, our study extends our understanding of the impacts of ownership structure on stock liquidity in an international setting. Prior substantial evidence that ties ownership concentration to stock illiquidity focuses mainly on U.S. markets (Heflin and Shaw, 2000; Gaspar and Massa, 2007; Rubin, 2007; Brockman, Chung, and Yan, 2009; Agarwal, 2010), with the exception of Rhee and Wang (2009) who examine foreign ownership concentration using Indonesian data. We extend this strand of literature with a focus on one pivotal group of shareholders – foreign investors and more importantly, their heterogeneity. We show that the size of foreign ownership stakes and not type of foreign investment matters in stock liquidity and that trading activity and asymmetric information are two channels through which foreign ownership affects stock liquidity.

The rest of the paper is organized as follows: Section 2 describes the data and construction of variables. Section 3 examines the role of foreign investor heterogeneity in stock liquidity, and Section 4 explores the possible explanations for foreign investor heterogeneity effects on liquidity. Section 5 examines the economic consequences of the liquidity-control trade-off in foreign ownership structure of a firm, and the final section concludes the paper.

2. Data and Variable Construction

We construct our key variables, together with control variables, using information from several different databases: a) foreign direct ownership from Datastream; b) financial institutional ownership from the Factset Lionshares database; c) daily stock trading data from Datastream; d) effective spreads from transactions data managed by Thomson Reuters Tick History (TRTH); and e) financial variables from Worldscope. The foreign direct ownership data first became completely available from June 2002. Constrained by the availability of this key information, our sample period ranges

from January 2003 to December 2009. In this section, we describe the construction of our sample and summarize their basic statistics.

2.1. Foreign Investor Holdings

Datastream provides information on free float shares and strategic holdings. The free float number of shares represents the total amount of equity capital available to ordinary investors and is expressed as a percentage of total number of outstanding shares. The balance of the outstanding shares is in the form of strategic holdings, where such holdings refer to any disclosed holding exceeding 5% of total number of outstanding shares. Datastream's strategic ownership information comes from different sources, including Securities and Exchange Commission filings, the UK register, and information declared by companies in response to legislative requirements in each country. Datastream provides a detailed breakdown of strategic holdings as a percentage of total number of outstanding shares, as follows: (i) corporations; (ii) pension or endowment funds; (iii) investment banks or institutions; (iv) employees/families, or those with a substantial position in the firm; (v) foreign investors domiciled in a country other than that of the firm; (vi) others (outside the above categories) with a disclosed holding over 5%.

Strategic holdings data are updated monthly at month end. Our analysis uses the year-end level of foreign strategic holdings in a company, as defined in category (vi) above, as a proxy for FDI. Note that the computation of foreign direct ownership (data item "NOSHFR" in Datastream) can be different before and after March 1, 2005. Before this date, certain holders such as "controlling" individuals are counted as strategic even with a less than 5% holding, but from this date onwards, foreign strategic holders must have at least 5% of the firm's total outstanding shares. To address this concern about quality of foreign direct ownership information, we set any foreign strategic holdings of less than 5% to zero. For robustness, we also conduct our empirical analyses on foreign strategic ownership data before and after March 2005, and our main findings remain materially unaffected by this change of ownership computation. On the other hand, information about foreign institutional investors, who mainly have less than 5% holdings, is taken from the FactSet Lionshares database.

After merging firms with all the available key variables from the different databases, we end up with a final sample of 27,976 firms from 39 different countries worldwide. Table 1 summarizes mean statistics of variables for the 39 countries in our sample. The number of unique firms included in the sample varies from 57 in Ireland to 5,670 in the U.S., and for every country, except China, at least 10% of its firms have foreign direct ownership (FDI), indicating the prevalence of financial globalization of these countries. Excluding China with the lowest proportion of firms with FDI of 6.4%, Greece has the next lowest proportion of firms with FDI (10.7%) and Ireland has the largest (93.0%). The average FDI ranges from 0.7% (China) to 40.1% (Hong Kong), with an aggregate cross-country average of 6.3%. Further, for firms with foreign direct ownership, the average FDI varies from 13.8% (Taiwan) to 50.1% (Hong Kong), suggesting the non-trivial role of foreign direct investors in firms' ownership structure. Compared with FDI, the average proportion of foreign portfolio ownership (FPI) is relatively lower, with values varying from 0.2% (China) to 11.3% (Ireland); its aggregate cross-country average is 3.1%. The lower FPI is not surprising, since foreign portfolio investors usually own a small fraction of shares in domestic firms and exercise no management control. These investors typically would take the Wall Street walk if they were dissatisfied with management.

2.2. Liquidity measures

It is argued that none of existing stock liquidity measures can accurately capture stock liquidity (Korajczyk and Sadka, 2008). Therefore, for robustness, we employ three different annual stock liquidity measures based on averages of daily measures over a given year. For each firm, we construct (i) the daily Amihud's (2002) illiquidity measure, (ii) the proportion of zero daily stock returns, and (iii) the daily dollar-volume weighted average of effective spreads. The effective spreads are constructed using transactions data from TRTH,[6] while all the other liquidity measures are computed using daily stock trading data from Datastream. Note that the TRTH database is available from January 2003 to December 2007 and that a smaller number of firms are merged with those from TRTH. As a result, the number of firm-year observations available using effective

[6]In unreported results, we also run our empirical analysis using a relative quoted spread as a proxy for stock liquidity. The relative quoted spread is defined as the difference between bid and ask prices scaled by the midpoint of bid and ask prices. Our main results remain unchanged using this stock liquidity proxy.

spreads is relatively smaller. Nevertheless, given that the three measures yield qualitatively similar results, to conserve space we report mainly results using the Amihud illiquidity ratio. We select the Amihud measure because it incorporates the price impact of trade, which is a key factor affecting investors' stock investment decisions.

The Amihud illiquidity ratio is defined as the absolute value of stock return divided by dollar trading volume on a given trading day. We transform the daily liquidity measure into an annual measure by taking a natural log of the simple average of daily illiquidity measure in each year. The proportion of zero stock returns is equal to the proportion of days with zero stock returns in each year. For each trade, we compute the round-trip effective spread as twice the absolute value of the difference between trading price and midpoint of bid and ask prices scaled by trading price using high frequency transactions data. The annual effective spread is the simple average of daily dollar-volume weighted average of effective spreads. Table 1 reports only the mean annual value of Amihud's illiquidity measure, $Illiq$. It varies across countries, with stocks in China (-4.311), Spain (-4.318), and the U.S. (-3.974), on average, having the lowest $Illiq$ and those in Indonesia (2.519) and the Philippines (2.615) the highest.

2.3. Control variables

Our regression models also include a host of control variables that have previously shown to be correlated with a stock's liquidity. They are: domestic institutional ownership ($DInst$),[7] firm size measured by the log of market capitalization in U.S. dollars ($Size$), log of book-to-market ratio (BM), log of stock price ($Price$), 12-month stock returns (Ret), stock return volatility (σ_{ret}), an American Depository Receipt (ADR) dummy variable for U.S. cross-listings, a dummy variable for the inclusion of the MSCI all-country world index ($MSCI$), and finally the number of financial analysts following the company ($\#Ana$). The construction of these variables is detailed in the appendix. Their mean statistics are shown in Table 1, with coefficients of their cross correlation in Table 2.

Several interesting observations emerge from Table 1. Across all the 39 countries, stocks, on av-

[7] A recent study by Agarwal (2010) finds evidence that in the U.S., the presence of domestic institutions with less than 35%-40% improves stock liquidity of firms.

erage, experience positive market returns in the previous year (Ret), with several emerging markets exhibiting the highest average annual returns (e.g., 20.2% in Brazil; 17.9% in South Africa). Most countries display strong preference for U.S. stock exchange cross-listings. In Argentina, Ireland, Israel, and Mexico, more than 15% of their local stocks are cross listed on U.S. stock exchanges. Finally, it appears that our sample of firms is rather diverse based on two noticeable observations. One, a majority of countries (i.e., 22 countries) have less than 50% of their companies included in the MSCI all-country world index, suggesting that large firms are not predominant in the sample. Two, the average firm size measured by log of market capitalization in millions of U.S. dollars ranges from 10.429 (Australia) to 13.965 (Spain).

Table 2 presents Pearson correlation coefficients between variables employed in our regression models. It shows that the illiquidity measure $Illiq$ has a positive correlation coefficient of 0.121 with FDI and a negative correlation of -0.361 with FPI. These statistics suggest that foreign investor heterogeneity exhibits differential stock liquidity effects. Overall, the correlation between the variables is only moderate, thereby ruling out concerns about multicollinearity issues in subsequent regression analyses.

3. The Role of Foreign Investors in Stock Liquidity

In the preceding section, we document the prevalence of foreign direct investors and foreign portfolio investors across our sample of 39 countries. Over our seven-year sample period, the average annual aggregate market value of foreign direct holdings is about $71.9 billion and of foreign portfolio holdings is about $131.4 billion.[8] Given their large capital flows, there is little research on how these two distinct forms of foreign investments contribute to stock liquidity of domestic firms. In this section, we first test whether foreign investor heterogeneity has similar or disparate liquidity effects and whether such effects are due to the "foreign" nature of ownership, size of ownership stakes, or type of foreign ownership. We also address the endogenous ownership-liquidity relationship, as well as impacts of foreign ownership on the change in liquidity during the 2008 global financial crisis.

[8]It is necessary to point out that our sample of foreign direct holdings excludes those held in privately-owned firms.

3.1. Foreign Investor Heterogeneity and Stock Liquidity

Table 3 reports the results of the following panel regression model,

$$\text{Stock Liquidity}_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}, \quad (1)$$

where Stock Liquidity is a proxy for a firm's liquidity at year t (measured using Amihud's illiquidity measure ($Illiq$), the proportion of zero daily stock returns ($ZRet$), and effective spread ($ESpread$)), FDI is total foreign direct ownership, FPI is total foreign portfolio ownership, and X is the set of lagged control variables. X includes domestic institutional ownership ($DInst$), the log of market capitalization ($Size$), the log of book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), annualized monthly stock return volatility (σ_{ret}), an ADR dummy (ADR), the MSCI country index membership variable ($MSCI$), and number of financial analysts following ($\#Ana$). The panel regression model (1) also includes unreported country, year, and industry fixed effects, but the table reports only regression coefficients of key and control variables from the full sample using three different liquidity proxies (Models 1-3) and from various subsamples of firms (Models 4-9), with their associated t-statistics calculated based on standard errors adjusted for heteroscedasticity and firm-level clustering.

The table reveals a consistently strong evidence that foreign investor heterogeneity plays a role in stock liquidity – foreign direct investors and foreign portfolio investors exhibit opposite effects on stock liquidity. Results show that FDI has a significantly positive, while FPI exhibits a significantly negative, impact on stock illiquidity. For the full sample regressions, the coefficient of FDI varies from 0.060 (t=9.62) for $ZRet$ in Model 2 to 0.930 (t=17.71) for $Illiq$ in Model 1. The coefficient of FPI is between -0.310 (t=-19.53) for $ZRet$ in Model 2 and -3.018 (t=-20.63) for $Illiq$ in Model 1. From an economic perspective, the results based on the Amihud illiquidity measure suggest that a one-standard-deviation increase in FDI leads to as much as a 13.9% increase in stock illiquidity while a one-standard-deviation increase in FPI corresponds to a 15.1% decrease in stock illiquidity. Given that the different proxies of stock liquidity produce substantially similar results, we employ the Amihud illiquidity measure throughout our subsequent analyses.

At this juncture, it is important to draw a comparison between our cross-country evidence and

those of related studies. Our FPI but not FDI results are consistent with the few existing studies that have looked at the impact of market liberalizations on stock liquidity. For example, Tesar and Werner (1995) and Vagias and van Dijk (2010) rely on accumulated capital flows and valuation adjustments to estimate the aggregate amount of foreign equity investments in a country, and they show that foreign equity investments have a positive effect on stock market liquidity. Unlike our firm-level analysis, these studies examine for country level evidence. However, one major shortcoming of these studies is that their estimates of country-level foreign equity investments from underlying flow data, as opposed to security-level data, may be way off the mark (Warnock and Cleaver, 2001).

The recent availability of detailed foreign holdings information, especially from the Factset Lionshares database, facilitates firm-level analyses. Our results on FPI (i.e., foreign financial institutional investors) are generally consistent with those of existing studies. Wei (2010) studies 27,916 foreign financial institutions from 40 countries for the period from 2000 to 2007. Similar to our study that employs the Factset Lionshares database, Wei (2010) reports that financial institutions contribute to the increase in stock liquidity worldwide. In contrast to our work, his study focuses only on this group of foreign portfolio investors. Focusing only on the Indonesian market, Rhee and Wang (2009) document that foreign large institutional investors induce adverse liquidity effects.

One may argue that our above main results are driven by (i) the relatively large proportion of U.S. firms in our sample (about 20%), (ii) firms from developed or developing countries, or (iii) the change in how Datastream classifies foreign direct investors. To rule out all these possibilities, we divide our sample into two subsamples of U.S. vs. non-U.S. firms (Models 4-5), of firms from developed vs. emerging markets (Models 6-7), and of subsample periods before and during 2006 vs. after 2006 (Models 8-9).[9] Results from these subsample analyses yield the same conclusion that foreign direct ownership has an adverse effect on stock liquidity, while foreign portfolio ownership has a favorable effect.

[9]We use this breakpoint of year 2006 so as to align with the lagged foreign direct ownership, whose classification was changed in March 2005.

Furthermore, the coefficients of all firm characteristic variables are mostly statistically significant, and their signs are broadly consistent with those of existing literature (Wei, 2010; Rhee and Wang, 2009). The negative coefficients on $Size$ and BM suggest that stock liquidity tends to be lower for small firms and value stocks. $Price$ is mainly negatively related to stock illiquidity except for stocks in emerging markets (Model 7). The negative and significant coefficient of σ_{ret} suggests that firms with greater return variability tend to have larger stock liquidity, but the effect is not robust across the different liquidity measures. The coefficient on Ret is negative and significant, suggesting that good stock market performance improves stock liquidity. ADR has a negative coefficient, implying that companies whose stocks are cross-listed in the U.S. exhibit high stock liquidity in local markets. Stocks with MSCI all-country world index memberships display high stock liquidity. The signs of ADR and $MSCI$ are consistent with the notion that firms with expanded shareholder bases, through foreign listings and greater visibility, enjoy greater liquidity (Amihud, Mendelson, and Uno, 1999; Foerster and Karolyi, 1999). Finally, we observe the negative sign on $\#Ana$, indicating that financial analyst coverage improves stock liquidity.

3.2. Insights on the Liquidity Effects

This subsection examines the impacts of varying sizes and types of foreign ownership on liquidity. Our earlier analysis follows those of U.S. existing studies on block ownership by using Datastream's definition of FDI as at least 5% strategic ownership of outstanding shares. We now test the sensitivity of this definition by varying the share of foreign direct ownership and report the results in Table 4. In Model 1, we replace FDI by $5\% \leq FDI < 30\%$ and $FDI \geq 30\%$, where $FDI < 30\%$ ($FDI \geq 30\%$) is equal to FDI if the percentage of foreign direct ownership is less than (greater than or equal to) 30% and zero otherwise. The coefficients on both $FDI < 30\%$ and $FDI \geq 30\%$ are negative and statistically significant, but the size of the former is lower than that of latter. It is evident that the adverse foreign direct ownership effect on liquidity becomes stronger for firms with higher level of foreign direct ownership, indicating that the size of ownership stakes matters – the larger the stake, the greater is its effect on liquidity. This finding largely confirms the persistent negative foreign direct ownership effect on liquidity, suggesting a potentially greater liquidity cost

as foreign direct ownership increases.

We further analyze the importance of the size of foreign direct ownership in Models 2-4. Model 2 introduces an FDI indicator, $Dummy(FDI)$, in place of FDI, whereas Model 3 shows the joint impact of FDI and $Dummy(FDI)$. $Dummy(FDI)$ is equal to one if the firm has a non-zero FDI and zero otherwise. The coefficient of $Dummy(FDI)$ in Model 2 is positive and statistically significant, but becomes negative when it is estimated jointly with FDI in Model 3. To ensure robustness, Model (4) examines the effects of foreign investor heterogeneity on a subsample of firms with foreign direct ownership. The coefficient of FDI remains robustly positive and statistically significant. Overall, it is evident that the size of foreign ownership stake matters in stock liquidity and that the foreign portfolio ownership also persistently improves liquidity in the presence of its counterpart.

We now turn to examining the effect of type of foreign ownership on liquidity and report the results in Models 5-7 of Table 4. We combine Datastream and FactSet Lionshare database to identify foreign financial institutional ownership $FDI(Inst)$ and non-financial institutional direct ownership $FDI(NInst)$. $FDI(Inst)$ is the total foreign financial institutional direct holding of more than 5% of a firm's outstanding shares, and $FDI(NInst)$ is calculated as the difference between FDI and $FDI(Inst)$. When estimated separately, the coefficient of $FDI(Inst)$ in Model 5 and of $FDI(NInst)$ in Model 6 are positive and highly significant at conventional levels. When estimated jointly, the coefficients of $FDI(Inst)$ and $FDI(NInst)$ in Model 7 remain qualitatively similar, suggesting that the adverse foreign direct ownership-liquidity relation is irrespective of foreign direct ownership type.

In summary, we have established that foreign investor heterogeneity generates differential liquidity effects. This evidence implies that it is not the "foreign" nature of ownership or type of foreign ownership but the size of foreign ownership matters. Our finding on foreign direct ownership effects on liquidity is broadly consistent with those of U.S. studies, but it does not necessarily imply that we can draw any inferences about the joint impact(s) of foreign and domestic direct ownerships on liquidity. This issue, while interesting, is not within the scope of the current study, but we will leave it for future research.

3.3. The Endogeneity Issue

In this section, we perform several different tests to address endogenous concerns, particularly whether our main results are driven by omitted correlated variables or by the endogenous relationship between foreign ownership and stock liquidity. Table 5 summarizes the results from these analyses.

(i) Firm fixed effects

Foreign ownership and stock market liquidity might be jointly determined by certain omitted firm characteristics, which possibly drive our key results. To address this issue, we incorporate firm fixed effects into our baseline specification model (1) as an endogeneity control if the unobservable omitted variables correlated with stock liquidity and foreign ownership remain constant through time. Results of Model 1 in Panel A, Table 5 indicate that introducing firm fixed effects in our panel regression analysis does not materially alter our key findings: FDI displays a strongly positive impact on stock illiquidity, whereas FPI exhibits a strongly negative impact. The coefficients of FDI and FPI are 0.310 (t = 6.08) and -1.955 (t = -10.97) and statistically significant at the 1% level. The magnitude of these coefficients and their associated level of statistical significance have fallen, compared with their counterparts in the baseline specification shown in Model 1 of Table 3.

(ii) Lagged stock illiquidity

The relationship between foreign ownership and stock liquidity is endogenously determined as foreign investors may self-select based on certain firm characteristics including stock liquidity. To rule out this effect, we introduce a lagged stock illiquidity variable in our baseline specification (1). Controlling for the lagged stock illiquidity helps mitigate concerns that an unobservable variable in the previous period is correlated with both stock liquidity and foreign ownership in the current period. If our primary results are due to any omitted time invariant determinant of stock liquidity, one would expect the statistical significance on FDI and FPI to disappear after the inclusion of the lagged liquidity variable. Estimates of Model 2 in Panel A remain qualitatively similar to the baseline specification estimates shown in Table 3.

(iii) Two-stage least squares (2SLS) regression

We conduct a 2SLS regression to address the endogeneity issue. Drawn from existing literature, in the first stage, we regress FDI and FPI ownership separately on the following instrumental variables: (i) A dummy variable, $Big\ 4$, which equals one if the firm is audited by one of the big four accounting firms,[10] and zero otherwise. Chou, Ng, Zaiats, and Zhang (2011) identify auditor quality as a driving factor for foreign institutional investors. (ii) An IAS dummy, which equals one if the firm adopts the international accounting standards and zero otherwise. Covrig, DeFond, and Hung (2007) posit that the voluntary adoption of international accounting standards attracts foreign mutual fund investors. (iii) Debt-to-assets ratio ($Debt$); Ferreira and Matos (2008) show that foreign institutional investors tend to invest in firms with low financial leverage. (iv) Dividend yield (DY); Ferreira, Massa, and Matos (2010) find that foreign investors, particularly foreign institutional investors prefer firms that pay less dividends. (v) Foreign sales as a proportion of total assets ($FSales$); foreign investors prefer firms with more exports and have greater visibility (Covrig, Lau, and Ng, 2006; Ferreira and Matos, 2008). In the second-stage estimation, we regress the stock liquidity measure on the respective fitted value of foreign ownership variables estimated from the first-stage regression. Models 3 and 4 show statistically significant coefficients of the fitted FDI and FPI, respectively, at the 1% level.

(iv) Difference on difference approach

From our main findings, we expect that when foreign direct (portfolio) ownership increases over time, then liquidity should increase correspondingly. To further corroborate our key findings, we regress the difference in stock illiquidity between year t and year $t+1$ on the difference in foreign ownership as well as in control variables between year $t-1$ and year t. This regression analysis also helps alleviate any possible effect of time-invariant unobservable firm characteristics that drive the relationship of stock liquidity and foreign ownership. Model 5 of Table 4 presents estimates of this difference on difference regression and shows that the coefficient of FDI remains positive and significant and of its FPI counterpart is negative and significant. Therefore, these results reinforce our main evidence that foreign direct and portfolio ownerships produce differential effects on liquidity.

[10]The big four accounting firms include Deloitte Touche Tohmatsu, Ernst & Young, KPMG, and Pricewaterhouse-Coopers.

(iv) An event study – cross-border M&A analysis

As a final robustness check on endogeneity, we look at the effects of a change in foreign direct ownership on a change in stock liquidity in cross-border mergers and acquisitions (M&A). We identify all M&As of publicly listed firms that were announced during our sample period. The information is available from the Securities Data Corporation (SDC) Platinum database. Following Ferreira, Massa, and Matos (2010), we choose M&A deals that are completed by the end of our sample period but exclude leveraged buyouts, spin-offs, recapitalizations, self-tender offers exchange offers, repurchases,and privatizations from the sample. Then we calculate the proportion of shares acquired through the cross-border M&As. We regress the change in stock illiquidity ($\Delta Illiq$) on varying proportions of shares acquired through M&A (the actual proportion of shares acquired, less than 30% of shares acquired, or at least 30% of shares acquired) and on the change of FPI and of all control variables. Results are reported in Panel B of Table 5. Model 6 focuses only on target firms and Models 7-10 are on the full sample of firms. The coefficient of the proportion of shares acquired by foreign direct investors is consistently positive, except for that associated with deals involving less than 30% of shares acquired. The latter is negative but statistically insignificant.

We therefore conclude that our key findings are not due to omitted correlated variables or to endogenous relationship between liquidity and foreign ownership.

3.4. Liquidity Shocks and Foreign Investors

The liquidity effect of foreign ownership during financial crises seems inherently interesting for two reasons. First, in times of crisis, it is argued that foreign investors tend to liquidate their positions in local stocks and flee to their home countries, thereby spreading one country's financial crisis to others (e.g., Boyer, Kumagai, and Yuan, 2006; Calomiris, Love, and Peria, 2010).[11] When faced with sudden liquidity dry-up and capital constraints during market turmoil, one would expect foreign investors to play a different role in local stock liquidity, especially for FPI investors who own relatively small stakes in firms and are less committed to business monitoring. Second, if FDI

[11]For instance, Boyer, Kumagai, and Yuan (2006) observe the contagion effect of asset holdings of international investors in the 1997 Asian financial crisis. In the recent 2008 global financial crisis, Calomiris, Love, and Peria (2010) show that the collapse of foreign demand, the contraction of credit supply, and selling pressure for local firm equity are jointly attributable to capital depreciation in non-U.S. stocks in the 2008 global crisis.

investors introduce an informational barrier to local investors and heighten information uncertainty of local firms, its adverse liquidity effect could become more pronounced during the crisis period when market participants tend to be more risk averse to uncertainty (Vayanos, 2004; Brunnermeier and Pedersen, 2009; Lang and Maffett, 2011).[12] Motivated by these studies, we examine whether liquidity effects of foreign investors vary during heightened market conditions, specifically the 2008 global financial crisis period.

Panel A of Table 6 displays the change in *Illiq* one year before and one year after June 2008 by country. We observe a persistent sharp decline in stock liquidity across all countries. During this crisis period, Singapore has the largest liquidity drop (2.049), whereas China has the smallest (0.400). In Panel B of the table, we examine the effects of FDI and FPI on the change in local stock liquidity by regressing the change in *Illiq* on foreign ownerships and other control variables. We perform analyses on the full sample (Model 1), samples of U.S. vs. non-U.S. firms (Models 2-3), and firms from developed and emerging countries (Models 4-5). Model 1 shows that FDI aggravates, while FPI reduces, the change in stock illiquidity during the crisis period. Models 2-5 reveal a few distinct results. The magnitude of the FDI coefficient is much lower in non-U.S. firms than in U.S. firms ($FDI = 0.429$ in Model 2; $FDI = 0.136$ in Model 3). Similarly, the FDI coefficient drops from 0.186 in firms from developed markets to 0.005 in those from emerging markets; the latter is statistically insignificant. Collectively, these results suggest that the adverse liquidity effect of FDI remains robust during the crisis period for developed economies but seems weak for emerging markets.

The effect of FPI on the change in liquidity is consistently negative, except for that of U.S. sample. The coefficient of FPI is negative and statistically significant for all models, except for Model 2, where the coefficient is positively significant. The results seem to suggest no evidence that foreign portfolio investors consume local market liquidity and destabilize markets in financial crises. Instead, it suggests that foreign portfolio investors mitigate their effects on liquidity when local financial markets become turbulent.

[12] Vayanos (2004) and Brunnermeier and Pedersen (2009) theoretically establish the "flight-to-quality" in market downturns, with the underlying reason of liquidity providers unwinding stocks with high levels of uncertainty. Empirically, Lang and Maffett (2011) document an international evidence of an increased importance of firm transparency in lessening stock illiquidity stress during extreme market downturns for the period 1996-2008.

4. Explaining the Differential Liquidity Effects of Foreign Investors

Thus far, we have established that only the presence of foreign portfolio investors generates greater liquidity, while that of foreign direct investors reduces liquidity. Our main findings therefore contradict existing empirical evidence that globalizing firms' shareholder bases by allowing foreign investors to hold shares of domestic firms improves stock liquidity. In this section, we test two plausible explanations for why foreign direct investors and foreign portfolio investors affect stock liquidity of domestic firms differently. We examine whether, as implied by existing theory, trading activity and information are two possible channels through which foreign investors can affect liquidity.

4.1. Trading Activity and Foreign Investors

In existing international finance literature, it is generally recognized that globalization increases a firm's investor base, thereby enhancing stock liquidity. This assertion, however, ignores the heterogeneity of foreign investors. In a recent study, Goldstein and Razin (2006) consider two types of foreign investors in their model – foreign direct investors with concentrated ownership stakes in local firms whereas foreign portfolio investors with diffused ownership. Their theoretical results imply that varying trading intensities by the two types of foreign investors induce disparate liquidity effects. Bolton and von Thadden (1998) provide similar implications about direct investors with block holdings and portfolio investors with non-block holdings. These studies suggest that FDI investors decrease stock liquidity through decreased trading activity whereas FPI investors improve liquidity through active trading.

We measure the intensity of stock trading activity by using (1) stock turnover ($Turn$), defined as the average daily number of shares traded divided by the number of shares outstanding in a given year; and (2) the number of trades per day ($NTrades$), defined as the log of the average number of trades on each trading day in a given year. Note that $NTrades$ is obtained from the TRTH database from January 2003 to December 2007, and as a result, our regression analysis based on $NTrades$ is reduced to 69,773 firm-year observations, compared with 138,546 firm-year

observations for the full sample period. We first test whether there is any association between stock trading activity and foreign ownership and next examine how these two variables jointly affect stock liquidity.

Models 1 and 2 of Table 7 report the results from panel regressions of stock trading activity against FDI and FPI holdings, while controlling for firm-specific variables employed earlier in regression specification (1). Consistent with the theoretical predictions, trading activity decreases with FDI, but increases with FPI. The coefficients on FDI and FPI are statistically significant at conventional levels. For example, Model 1 shows that the coefficient of FDI is -0.328 (t=-11.37) and of FPI is 1.182 (t=7.63).

Models 3-8 of Table 7 incorporate trading activity and its interactions with FDI and FPI into our baseline panel regression (1). Results from these models show strong and consistent evidence that trading activity contributes to the differential liquidity effects displayed by foreign investors. For example, for Models 3-5, after including $Turn$ in the baseline regression model, the magnitude of FDI coefficient drops from 0.930 in Model 3 to 0.797 in Model 4, while the FPI coefficient changes from -3.042 to -2.564. The coefficient of $Turn$ is -0.405 (t=-69.52) and strongly significant at the 1% level. It is apparent that stock trading activity in part subsumes the effects of FDI and FPI on liquidity, suggesting that the adverse (favorable) effect of FDI (FPI) on stock liquidity is driven partly by trading activity. This interpretation is further confirmed in Model 5 with the inclusion of interactions between $Turn$ and FDI and between $Turn$ and FPI.

If the low trading activity of foreign direct investors explains the decrease in stock liquidity, then we should observe a weaker negative effect of FDI on liquidity of stocks with active trading. Conversely, if FPI globalizes a shareholder base and hence increases trading activity of a firm's stock, then we expect FPI to have a stronger impact on liquidity of stocks with low trading activity. Consistent with our expectations, the coefficient of $FDI \times Turn$ in Model 5 is negative and statistically significant, whereas the coefficient of $FPI \times Turn$ is positive and significant. The results suggest that the negative effect of foreign direct ownership on liquidity is more pronounced among firms with low stock trading activity and that foreign portfolio investors play a more important role in improving liquidity of less active stocks. These findings are further reinforced by the results

of Models 6-8, where $NTrades$ is used in place of $Turn$.

4.2. Asymmetric Information and Foreign Investors

Goldstein and Razin (2006) contend that concentrated ownership and control positions enable foreign direct investors to have access to private information of a firm. The presence of these controlling foreign direct investors induces adverse selection bias, making the stock less liquid. Furthermore, these investors typically bring their foreign expertise, knowledge, and experiences to the firm, and such foreign monitoring efforts induce asymmetric information between the firm and outside, especially local, investors. Foreign portfolio investors, on the other hand, face competition from other sophisticated investors and thus have strong incentives to exploit and trade on the superior information they gather on the stock. Such trading enhances liquidity and increases the informational efficiency of stock prices. Therefore, we predict that the presence of FDI investors raises, while the presence of FPI investors lowers, the level of information asymmetry of a firm.

This section employs several proxies to measure the information environment of a firm, namely Easley, Hvidkjaer, and O'Hara's (2002) probability of information-based trading (PIN), Morck, Yeung, and Yu's (2000) stock price non-synchronicity ($NSync$), financial analyst coverage ($\#Ana$), and financial analyst forecast error ($FErr$).[13] We posit that higher levels of PIN, $NSync$, and $FErr$, while lower level of $\#Ana$, reflect higher information asymmetries. The description of these information environment proxies is detailed in the appendix. The sample size for each information proxy is mainly constrained by its availability as well as by the merged sample of firms from various data sources. For example, PIN, computed from intraday data, is only available for the period from 2002 to 2007 and also, the number of firm-year observations for $FErr$ is smaller because financial analysts cover mainly large firms in each country.

Similar to the analysis in the preceding section, we begin by regressing each information environment measure on the holdings of foreign investors, with the earlier employed control variables in place. Models 1-4 of Table 8 report our panel regression results. We find a robustly consistent pattern that a firm's information asymmetry increases in FDI ownership but decreases in FPI

[13] We also consider analyst forecast dispersion and obtain similar results.

ownership. Specifically, FDI ownership is positively associated with PIN, $NSync$, and $FErr$, while negatively associated with $\#Ana$. In line with the theoretical argument, the presence of FDI investors suggests the existence of more private information associated with the firm (high PIN and high $NSync$), discourages financial analyst coverage (low $\#Ana$), and produces less precise analyst forecasts (high $FErr$). By contrast, FPI ownership yields opposite effects, except for its effect on $FErr$. It is apparent that FPI ownership reduces the amount of private information in the firm (low PIN and low $NSync$) and encourages more analyst coverage (high $\#Ana$), suggesting that FPI investors' trades improve stock price efficiency and hence reduce the level of information asymmetry. It is, however, puzzling that $FErr$ increases in FDI and FPI.

We now turn to examining whether the disparate effects of foreign investors on liquidity are through the information channel, as implied by theoretical models. We address this issue by regressing stock liquidity measure on FDI and FPI, with combinations of each information proxy and its interactions with FDI and FPI; the results are reported in Models 5-16 of Table 8. Models 5, 8, 11, and 14 replicate Model 1 of Table 3 using the same sample of firms with the available information variables, and these models form the basis for us to evaluate incremental as well as interaction effects of the variables of interest on stock liquidity.

Table 8 shows a distinct decline in the coefficients of FDI and FPI when all information variables, except $FErr$, are employed. For instance, using PIN as the information variable, the coefficient of FDI falls by about 12% from 0.832 in Model 5 to 0.730 in Model 6 and correspondingly, the coefficient of FPI decreases in absolute value by about 7%. Taken together, the decrease in the magnitude of FDI and FPI coefficients and the significantly positive PIN coefficient suggest that FDI and FPI investors also influence stock liquidity through the information channel. Model 7 further supports this argument – the foreign investors' varying impacts on liquidity are more pronounced in firms with a high degree of information asymmetry. This evidence is persistent across all proxies for the firm-level information environment. The coefficient on $FDI{\times}IEnv$ is positive and statistically significant at conventional levels when $IEnv$ is proxied by PIN, $NSync$, and $FErr$ and is negative and statistically significant when $\#Ana$ is the information proxy. Similarly, the coefficient of $FDI{\times}IEnv$ bears a consistently opposite sign to that of the coefficient of $FPI{\times}IEnv$

for most of the information environment proxies used.

Overall, we find that (i) foreign direct investors influence liquidity through their access to private information of a local firm or foster a foreign information environment that domestic investors are unfamiliar with, and (ii) foreign portfolio investors affect liquidity through competition with other informed investors over trading profits and thus transaction prices reflect stock fundamentals quickly. Together with our previous findings, the results therefore suggest that we show that both trading activity and information play important roles in the liquidity effects of foreign investors.

5. Economic Consequences of Foreign Ownership Effects on Liquidity

This section evaluates the economic consequences of foreign ownership effects on liquidity. Specifically, we test whether foreign direct and foreign portfolio investors affect firm performance and cost of equity capital.

There is a large body of evidence that increasing a company's shareholder base will enhance the liquidity of its stock. Empirical research also shows that an increase in stock liquidity is associated with a rise in the company's market value as well as a fall in its expected return.[14] Furthermore, international studies provide consistent evidence that globalizing a firm's shareholder base by increasing the level of foreign institutional ownership improves firm valuation and firm performance and reduces the expected return. For example, Ferreira and Matos (2008) and Aggarwal, Erel, Ferreira, and Matos (2011) find that firms held by foreign and independent institutions have higher valuations and are associated with better operating performance. They therefore argue that foreign institutional investors are effective monitors of the firms they invest in. Chan, Covrig, and Ng (2009) show that globalizing an investor base by allowing foreign mutual funds to invest in domestic firms improves firm valuation, via Tobin's Q, at both country and firm levels. Unlike our current work, however, these studies do not consider foreign ownership heterogeneity and the economic implications of their impacts on liquidity.

Another strand of literature shows the relationship among ownership, liquidity, and gover-

[14]See Amihud and Mendelson (2008) and the references within.

nance and also evaluates the relative costs and benefits of concentrated ownership (Amihud and Mendelson, 1988; Bolton and von Thadden, 1998; Goldstein and Razin, 2006). They model a governance-liquidity tradeoff – a tradeoff between reducing agency costs (through higher amount of monitoring) by increasing ownership concentration and reducing liquidity costs by increasing dispersion (through greater float). Moreover, Kahn and Winton (1998) show that there is a tradeoff between monitoring of management and the adverse selection associated with trading of the firm's stock. Empirically, Gaspar and Massa (2007) provide evidence supporting the theoretical implications of Kahn and Winton's model. They show that informed ownership improves governance and increases firm valuation, but at the same time, lowers liquidity. These opposing effects explain why ownership seems unrelated to performance.

Motivated by existing evidence, this section provides an integrated framework to test the role of foreign investor heterogeneity in firm performance (measured by a firm's Tobin's Q and operating performance) and cost of capital, while controlling for their liquidity effects.

5.1. Effects of Foreign Investor Heterogeneity on Firm Performance

The first two panels of Table 9 present results showing the impacts of foreign direct and portfolio holdings on a firm's Tobin's Q (Models 1-3) and on its operating performance, ROA (Models 4-6). The panel regression in Model 1 and Model 4 is given by

$$\text{Tobin's Q}_{i,t}/ROA_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t} + \delta X_{i,t-1} + \varepsilon_{i,t}. \quad (2)$$

Tobin's Q is defined as the market value of total assets scaled by book value of total assets, and ROA is the operating income scaled by total assets. When Tobin's Q is used as the dependent variable, the regression analysis includes additional control variables such as firm operating profitability (ROA, calculated as operating income scaled by total assets), foreign sales ($FSales$) and total assets (log (TA), calculated as the natural log of total assets).[15] In regression models using ROA as the dependent variable, we substitute ROA with Tobin's Q as the control variable. We also

[15]We do not control for book-to-market ratio (BM) in Models 1-3, because of its strong mechanical correlation with Tobin's Q. Market capitalization is substituted with total assets, because Tobin's Q reflects the market expected valuation of the whole firm.

expand the regression model (2) to include stock illiquidity as well as its interactions with FDI and FPI in Models 2-3 and 5-6.

There emerge several interesting findings from the two panels of results. First, foreign direct ownership exhibits a significantly positive impact on both firm valuation and operating performance, even after controlling for stock liquidity. The coefficient of FDI varies from 0.010 (t=2.76) in Model 4 to 0.424 (t=6.51) in Model 3. While foreign direct ownership induces high liquidity costs as shown in Tables 3 and 4, Models 2 and 4 show that such costs mitigate their value-enhancing benefits through effective management monitoring. This interpretation is in accord with Fang, Noe, and Tice's (2009) finding that liquidity enhances performance of US firms. Also, consistent with theoretical predictions (Goldstein and Razin, 2006; Amihud and Mendelson, 1988; Bolton and von Thadden, 1998), our evidence suggests that with both concentrated ownership and control positions in domestic firms, FDI investors have more incentives to improve the quality of governance. The effect of $FDI \times Illiq$ on Tobin's Q in Model 3 and on ROA in Model 6 are positive and statistically significant, indicating that the value-enhancing effects are more pronounced in firms whose stocks are more illiquid. Foreign direct investors appear to take a more active role in monitoring firms, especially when stock liquidity of the firms is low, and hence, their liquidation costs are high.

Second, it is apparent that the positive impacts of FPI ownership on Tobin's Q and ROA, as previously documented in Ferreira and Matos (2008) and Chan, Covrig, and Ng (2009), are mainly driven by the effect of stock liquidity on firm performance. The coefficient on FPI is positive and statistically significant in Models 1 and 4, but becomes negative and statistically significant in Models 5-6 and negative and insignificant in Models 2-3 after controlling for liquidity. Such evidence is in line with Goldstein and Razin's (2006) argument that FPI investors gain ownership without control of domestic firms and therefore must delegate decisions to local managers. These managers may not make decisions that are aligned with the interests of FPI investors, and as a result, due to agency problems between managers and shareholders, portfolio investment projects are managed less efficiently than direct investment projects.

It is important to emphasize that our results contradict previous findings by Ferreira and Matos (2008), Chan, Covrig, and Ng (2009), and Aggarwal, Erel, Ferreira, and Matos (2011). Using the

same Factset Lionshares database, Ferreira and Matos as well as Aggrawal, Erel, Ferreira, and Matos show that foreign institutional ownership has a significant and positive impact on Tobin's Q and operating performance. On the other hand, Chan, Covrig, and Ng focus only on foreign mutual fund ownership from Thomson Reuter's database and reach the same conclusion. One crucial difference between these studies and ours is that their analysis does not factor in the strong link between foreign ownership and liquidity. As evidenced in our study, foreign portfolio ownership enhances liquidity and liquidity, in turn, leads to positive performance. Hence, after we control for liquidity, the positive association between foreign portfolio ownership and firm performance disappears. In fact, if we exclude liquidity from our regression analysis, we produce qualitatively similar results that a larger foreign portfolio ownership generates better firm performance.

5.2. Effects of Foreign Investor Heterogeneity on Cost of Equity Capital

Models 7-9 of Table 9 report regression results of foreign direct and portfolio holdings on a firm's cost of equity capital, ICOC. For these models, we perform a similar regression as in (2) above, except we replace firm performance with ICOC and include two additional control variables, the world market beta (β_W) and local market beta (β_C).[16] Following Pastor, Sinha, and Swaminathan (2008), we employ the implied cost of equity capital as a proxy for a firm's ICOC, computed using earnings forecasts. ICOC is the internal rate of return that equates current stock price to the present value of expected future sequence of residual incomes or abnormal earnings.

We find consistent evidence that a firm's cost of capital increases with foreign direct ownership, even when it is jointly estimated with $Illiq$. The coefficient of FDI is 0.007 (t=3.34) in Model 7 and is 0.005 (t=2.59) in Model 8. These results suggest that the benefits arising from foreign direct investors' monitoring efforts come with a cost – the higher adverse selection premium demanded by less informed investors when trading in the firm's stock. Model 8 indicates that the larger cost of capital impact of FDI is through liquidity. The interaction between FDI and $Illiq$ in Model 9 is positive and statistically significant with a coefficient of 0.003 (t=4.61), suggesting that foreign direct ownership induces a larger cost of capital for firms with highly illiquid stocks.

[16] β_W and β_C are estimated from regressing individual stock returns on the world and local market return indexes.

In contrast, the effect of FPI on ICOC is not clearly evident from the results. FPI has a significantly positive effect on the cost of capital with the presence of stock liquidity in Model 8, but becomes negatively significant when its interaction with $Illiq$ is included in the regression. We are inclined to interpret that the increased liquidity induced by foreign portfolio investors helps reduce a domestic firm's cost of capital, especially for firms whose stocks are highly illiquid. But this reduction in cost of capital is not large enough to offset their lack of monitoring efforts in the management decisions, resulting in weak firm performance and low firm valuation, as shown above.

Consistent with finance theory (Amihud and Mendelson, 1986; Acharya and Pedersen, 2005; Liu, 2006), our results show a positive and strongly significant relationship between $Illiq$ and ICOC, suggesting that investors demand compensation in terms of higher expected returns for illiquid stocks. Furthermore, effects of the remaining control variables are broadly consistent with those obtained in existing literature, with traditional risk proxies bearing their theoretically expected signs. β_C and β_W yield a positive and significant relationship with ICOC. $Size$ is negatively associated with the cost of capital, while BM is positively related to the cost of capital.

6. Conclusion

This study evaluates whether foreign direct and portfolio equity investments have any differential impacts on the stock liquidity of 27,976 domestic firms from 39 countries worldwide and their economic consequences. Results show that these two forms of foreign investments display opposing effects on stock liquidity: stock liquidity decreases with foreign direct ownership but increases with foreign portfolio ownership. A closer analysis suggests that it is not the foreign nature of ownership or type of foreign ownership (financial institutional vs. non-financial institutional ownership) but the size of foreign equity holdings that matters in stock liquidity. Our main finding is robust to the inclusion of country, industry, year, and firm fixed effects, the use of alternative measures of liquidity, a control for lagged stock illiquidity, a control for endogenous liquidity using two-stage least squares, and the change in liquidity. To further examine the causal effect of foreign ownership on liquidity, we study the impact of foreign ownership on stock liquidity associated with cross-border mergers and acquisitions and show that the increase in foreign direct ownership from the

cross-border transactions adversely affects liquidity.

Our study further provides evidence that foreign investors influence stock liquidity through trading and information channels. We show that the presence of foreign direct (portfolio) ownership worsens (improves) stock liquidity of a domestic firm through their reduced (increased) trading activity (measured by stock turnover and number of trades per day). We also find that foreign direct (portfolio) investors increase (decrease) the degree of asymmetric information between the firm and outside investors, and that such asymmetric information effects in turn affect the firm's stock liquidity. Foreign direct investors, who take concentrated ownership and control positions in domestic firms, are privy to private information of the firms, but their informational advantage induces an adverse selection bias, making their stock more illiquid. On the other hand, foreign portfolio investors, who are sophisticated investors with no control positions in domestic firms, face competition from other sophisticated investors over trading profits. As a result, the speed at which information gets impounded into the stock price increases, thereby enhancing the visibility and liquidity of the stock.

Finally, we examine the economic consequences associated with the differential liquidity effects of foreign investors. Our findings indicate that increases in foreign direct investments but not foreign portfolio investments lead to better firm performance (measured by Tobin's Q and operating performance). Furthermore, foreign direct ownership is robustly associated with a higher cost of equity capital, whereas foreign portfolio ownership is not robustly associated with the cost of capital. Our overall results suggest that the value-enhancing benefits from monitoring efforts of foreign direct investors outweigh their liquidity costs, and that foreign portfolio investors influence firm performance through their effect on liquidity.

Our findings highlight the impact of foreign direct ownership on local stock market liquidity and underscore the importance of foreign ownership stakes in the role of foreign equity investments. These findings carry significant implications for both academics and practitioners. When modeling the stock price impact of foreign equity investments, researchers have to consider the potential adverse effect of foreign investments on stock market liquidity. When promoting foreign investments in the hope of developing local capital markets, policymakers ought to weigh the benefits and costs

that foreign equity investments bring to their local stock markets. How to efficiently balance the cost-benefit tradeoff in large foreign investments is the question for future research.

References

Acharya, Viral V., and Lasse Heje Pedersen, 2005, Asset pricing with liquidity risk, *Journal of Financial Economics* 77, 375-410.

Agarwal, Prasun, 2010, Institutional ownership and stock liquidity, Working paper, Cornell University.

Aggarwal, Reena, Isil Erel, Miguel Ferreira, and Pedro Matos, 2011, Does governance travel around the world?, Evidence from institutional investors, *Journal of Financial Economics* 100, 154181.

Amihud, Yakov, 2002, Illiquidity and stock returns: Cross-section and time-series effects, *Journal of Financial Markets* 5, 31-56.

Amihud, Yakov, and Haim Mendelson, 1986, Asset pricing and bid-ask spread, *Journal of Financial Economics* 17, 223-249.

Amihud, Yakov, and Haim Mendelson, 1988, Liquidity and asset prices: Financial management implications, *Financial Management* 17, 5-15.

Amihud, Yakov, and Haim Mendelson, 2008, Liquidity, the value of the firm, and corporate finance, *Journal of Applied Corporate Finance* 20, 32-45.

Amihud, Yakov, Haim Mendelson, and Jun Uno, 1999, Number of shareholders and stock prices: Evidence from Japan, *Journal of Finance* 54, 1169-1184.

Bekaert, Geert, and Campbell R. Harvey, 2000, Foreign speculators and emerging equity markets, *Journal of Finance* 55, 565-613.

Bekaert, Geert, Campbell R. Harvey, and Christian Lundblad, 2005, Does financial liberalization spur growth? *Journal of Financial Economics* 77: 3-56.

Bolton, Patrick, and Ernst-Ludwig von Thadden, 1998, Blocks, liquidity, and corporate control, *Journal of Finance* 53, 1-25.

Boyer, Brian, Tomomi Kumagai, and Kathy Yuan, 2006, How do crises spread? Evidence from accessible and inaccessible stock indices, *Journal of Finance* 61, 957-1003.

Brockman, Paul, Dennis Y. Chung, and Xuemin (Sterling) Yan, 2009, Block ownership, trading activity, and market liquidity, *Journal of Financial and Quantitative Analysis* 44, 1403-1426.

Brunnermeier, Markus, and Lasse Heje Pedersen, 2009, Market liquidity and funding liquidity, *Review of Financial Studies* 22, 2201-2238.

Calomiris, Charles W., Inessa Love, and Maria Soledad Martinez Peria, 2010, Crisis "shock factors" and the cross-section of global equity returns, NBER Working Paper No. 16559.

Chan, Kalok, Vicentiu Covrig, and Lilian Ng, 2009, Does home bias affect firm value? Evidence from holdings of mutual funds worldwide, *Journal of International Economics* 78, 230-241.

Chari, Anusha and Peter Blair Henry, 2004, Risk sharing and asset prices: evidence from a natural experiment, *Journal of Finance* 59, 1295-1324.

Chou, Julia, Lilian Ng, Nataliya Zaiats, and Bohui Zhang, 2011, Does auditor quality matter to foreign investors? Evidence from mutual fund holdings worldwide, Working paper.

Covrig, Vicentiu, Mark DeFond, and Mingyi Hung, 2007, Home bias, foreign mutual fund holdings, and the voluntary adoption of international accounting standards, *Journal of Accounting Research* 45, 41-70.

Covrig, Vicentiu, Sie Ting Lau, and Lilian Ng, 2006, Do domestic and foreign fund managers have similar preferences for stock characteristics? A cross-country analysis, *Journal of International Business Studies* 37, 407-429.

Easley, David, and Maureen O'Hara, 2004, Information and the cost of capital, *Journal of Finance* 59, 1553-1583.

Easley, David, Soeren Hvidkjaer, and Maureen O'Hara, 2002, Is information risk a determinant of asset returns?, *Journal of Finance* 57, 2185-2221.

Fang, Vivian W., Thomas H. Noe, and Sheri Tice, 2009, Stock market liquidity and firm value, *Journal of Financial Economics* 94, 150-169.

Ferreira, Miguel A., and Pedro Matos, 2008, The colors of investors' money: The role of institutional investors around the world, *Journal of Financial Economics* 88, 499-533.

Ferreira, Miguel A., Massimo Massa, and Pedro Matos, 2010, Dividend clienteles around the world: Evidence from institutional holdings, Working paper.

Ferreira, Miguel A., Massimo Massa, and Pedro Matos, 2010, Shareholders at the gate? Institutional investors and cross-border mergers and acquisitions, *Review of Financial Studies* 23, 601-644.

Foerster, Stephen, and Andrew Karolyi, 1999, The effects of market segmentation and investor recognition on asset prices: Evidence from foreign stocks listing in the United States, *Journal of Finance* 54, 981-1013.

Gaspar, Jose-Miguel, and Massimo Massa, 2007, Local ownership as private information: Evidence on the monitoring-liquidity trade-off, *Journal of Financial Economics* 83, 751-792.

Goldstein, Itay, and Assaf Razin, 2006, An information-based trade-off between foreign direct investment and foreign portfolio investment, *Journal of International Economics* 70, 271-295.

Goldstein, Itay, Assaf Razin, and Hui Tong, 2010, Liquidity, institutional quality and the composition of international equity flows, NBER Working Paper No. 15727.

Gupta, Nandini, and Kathy Yuan, 2009, On the growth effect of stock market liberalizations, *Review of Financial Studies* 22, 4715-4752.

Heflin, Frank, and Kenneth W. Shaw, 2000, Blockholder ownership and market liquidity, *Journal of Financial and Quantitative Analysis* 35, 621-633.

Henry, Peter Blair, 2000a, Do stock market liberalizations cause investment booms?, *Journal of Financial Economics* 58, 301-334.

Henry, Peter Blair, 2000b, Stock market liberalization, economic reform, and emerging market equity prices, *Journal of Finance* 55, 529-563.

Kahn, Charles, and Andrew Winton, 1998, Ownership structure, speculation, and shareholder intervention, *Journal of Finance* 53, 99-129.

Korajczyk, Robert, and Ronnie Sadka, 2008, Pricing the commonality across alternative measures of liquidity, *Journal of Financial Economics* 87, 45-72.

Kyle, Albert S., 1985, Continuous auctions and insider trading, *Econometrica* 53, 1315-1335.

Lang, Mark, and Mark Maffett, 2011, Transparency and liquidity uncertainty in crisis periods, Working paper at the University of North Carolina at Chapel Hill.

Lipsey, Robert, 2001, Foreign direct investors in three financial crises, NBER Working Paper No. 8084.

Liu, Weimin, 2006, A liquidity-augmented capital asset pricing model, *Journal of Financial Economics* 82, 631-671.

Merton, Robert C., 1987, A simple model of capital market equilibrium with incomplete information, *Journal of Finance* 42, 483-510.

Morck, Randall, Bernard Yeung, and Wayne Yu, 2000, The information content of stock markets: Why do emerging markets have synchronous stock price movements?, *Journal of Financial Economics* 58, 215-260.

Rhee, S. Ghon, and Jianxin Wang, 2009, Foreign institutional ownership and stock market liquidity: Evidience from Indonesia, *Journal of Banking and Finance* 33, 1312-1324.

Rubin, Amir, 2007, Ownership level, ownership concentration, and liquidity, *Journal of Financial Markets* 10, 219-248.

Stulz, Rene M., 2005, Limits of financial globalization, *Journal of Finance* 60, 1595-1638.

Tesar, Linda L., and Ingrid M. Werner, 1995, Home bias and high turnover, *Journal of International Money and Finance* 14, 467-492.

Vagias, Dimitrios, and Mathijs A. van Dijk, 2010, International capital flows and liquidity, Working paper.

Vayanos, Dimitri, 2004, Flight to quality, flight to liquidity and the pricing of risk, NBER Working Paper No. 10327.

Warnock, Francis, and Chad Cleaver, 2001, Financial centers and the geography of capital flows, Board of Governors of the Federal Reserve System, International finance discussion papers #722.

Wei, Chishen, 2010, Have foreign institutions improved liquidity worldwide?, Working Paper, University of Texas at Austin.

Appendix: Variable definitions

Variable	Acronym	Definition	Data source
Stock market liquidity measures			
Amihud's (2002) illiquidity ratio	$Illiq$	Log of the average of daily Amihud's (2002) measure (calculated as the absolute value of stock return divided by dollar trading volume on a given day) in a given year	Datastream
Proportion of zero stock returns	$ZRet$	The proportion of the number of days with zero stock returns to the total number of days with non-missing stock returns in a given year	Datastream
Effective spread	$ESpread$	Average of the daily dollar-volume weighted average of effective spreads (calculated as $\frac{2\times\lvert\text{Trading price}-\text{bid-ask midpoint}\rvert}{\text{Trading price}}$) in a given year	TRTH*
Firm ownership measures			
Foreign direct ownership	FDI	Aggregate strategic holdings by investors domiciled in a foreign country as a percentage of total number of outstanding shares at previous year end, where a strategic holding refers to a disclosed holding of above 5% of a firm's total outstanding shares	Datastream
Foreign portfolio ownership	FPI	Aggregate equity portfolio holdings by financial institutions domiciled in a foreign country as a percentage of total number of outstanding shares at previous year end, where their individual holdings in the firm should be less than 5%.	FactSet
Domestic institutional ownership	$DInst$	Aggregate equity holdings by domestic institutional investors as a percentage of total number of outstanding shares at previous year end	Factset
Stock trading activity variables			
Stock trading turnover	$Turn$	Total number of shares traded in a given year, scaled by the number of shares outstanding	Datastream
Number of trades	$NTrades$	Log of average of daily number of trades in a given year	TRTH
Information environment variables			
Probability of informed trading	PIN	Probability of informed trading computed following the microstructure model by Easley, Hvidkjaer, and O'Hara (2002)	TRTH
Stock price non-synchronicity	$NSync$	Log of (1-R^2) divided by R^2, where R^2 is estimated by regressing individual stock returns on local and US market returns	Datastream
Number of analysts following	$\#Ana$	Number of financial analysts following a firm	IBES
Analyst forecast errors	$FErr$	Log of absolute value of the difference between announced earnings per share and analyst earnings forecasts average scaled by stock price	IBES

*TRTH refers to Thomson Reuters Tick History database which provides detailed intraday transactions data for international companies from all over the world.

Appendix: Variable definitions - Continued

Variable	Acronym	Definition	Data source
Firm characteristics			
Firm size	$Size$	Log of market capitalization denominated in U.S. dollars at previous year end	Worldscope
Book-to-market ratio	BM	Log of book-to-market equity ratio as of June in the previous year	Worldscope
Stock price	$Price$	Log of unadjusted stock price in U.S. dollars at previous year end	Datastream
Annual stock return	Ret	Annual stock return in the previous year	Datastream
Stock return volatility	σ_{ret}	Annualized standard deviation of monthly stock returns in the previous year	Datastream
American Depository Receipts	ADR	An ADR dummy equals one if the firm was cross-listed on a U.S. stock exchange	Multiple sources**
MSCI country index membership membership	$MSCI$	An MSCI index member dummy which equals one if the firm is included in an MSCI country index and zero otherwise	Datastream
Instrumental variables			
Big 4 auditors	$Big\ 4$	A dummy variable which equals one if the firm is audited by one of the big 4 accounting firms and zero otherwise	Worldscope/ Compustat
Adoption of international accounting standards	IAS	A dummy variable which equals one if the firm adopts the international accounting standards and zero otherwise	Worldscope
Financial leverage	$Debt$	Ratio of total debt to total assets	Worldscope
Stock dividend yield	DY	Average monthly dividend yield in the previous year	Worldscope
Foreign Sales	$FSales$	Foreign sales scaled by total assets in the previous year	Worldscope
Other variables			
World market beta	β_W	Estimated coefficient of world market return from the regression of individual stock return on world market return and local market return (excluding world market return)	Datastream
Local market beta	β_C	Estimated coefficient of local market return from the regression of individual stock return on world market return and local market return (excluding world market return)	Datastream
Financial profitability	ROA	Operating income divided by total assets	Worldscope
Tobin's Q	Tobin's Q	Market value of equity plus book value of total debt scaled by book value of equity plus debt	Worldscope
Total assets	TA	Log of total assets	Worldscope
Implied Cost of Capital	$ICOC$	A detailed description of the approach is contained in Pastor, Sinha, and Swaminathan (2008)	IBES

**The information of U.S. cross-listings is gathered from three data sources: Depository banks such as Bank of New York, U.S. stock exchanges and Datastream.

Table 1
Summary Statistics

This table gives the mean value of firm-level variables for the number of sample firms (N) from each country. The variables are the number of sample firms with non-zero foreign direct ownership N(FDI), foreign direct ownership, foreign direct ownership conditional on firms with nonzero foreign direct holdings ($c(FDI)$), foreign portfolio ownership (FPI), domestic institutional ownership ($DInst$), Amihud's illiquidity ratio ($Illiq$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), stock return volatility (σ_{ret}), American Depositary Receipts (ADR), MSCI country index membership ($MSCI$), and number of analyst forecasts ($\#Ana$). The sample period is from 2003 to 2009. All the variables are defined in the appendix.

Country	N	N (FDI)	FDI	$c(FDI)$	FPI	$DInst$	$Illiq$	$Size$	BM	$Price$	Ret	σ_{ret}	ADR	$MSCI$	$\#Ana$
Argentina	62	20	0.057	0.430	0.004	0.000	0.379	11.869	0.063	0.009	0.016	0.507	0.252	0.550	0.894
Australia	1887	736	0.040	0.197	0.013	0.006	0.942	10.429	-0.682	-1.262	-0.064	0.630	0.016	0.229	1.530
Austria	101	53	0.097	0.321	0.053	0.012	-1.398	12.614	-0.468	3.352	0.073	0.343	0.013	0.521	2.629
Belgium	166	94	0.116	0.297	0.038	0.026	-1.742	12.497	-0.384	3.604	0.056	0.318	0.010	0.477	3.589
Brazil	149	52	0.052	0.324	0.029	0.001	-0.772	12.808	-0.253	1.917	0.202	0.546	0.130	0.602	2.636
Canada	1300	798	0.067	0.181	0.034	0.107	-1.161	11.917	-0.611	1.253	-0.006	0.520	0.141	0.402	2.846
Chile	179	61	0.063	0.311	0.003	0.003	0.667	12.121	-0.318	-0.568	0.128	0.315	0.123	0.475	0.539
China	1524	97	0.007	0.217	0.002	0.014	-4.311	12.535	-0.999	-0.149	-0.013	0.464	0.006	0.822	0.485
Denmark	204	80	0.042	0.206	0.028	0.068	-1.040	11.755	-0.449	3.504	0.086	0.359	0.017	0.381	2.459
Finland	152	74	0.044	0.158	0.066	0.077	-1.213	12.119	-0.613	1.919	0.075	0.331	0.032	0.453	5.788
France	949	384	0.054	0.215	0.032	0.030	-0.768	11.829	-0.544	3.126	0.030	0.425	0.036	0.330	3.913
Germany	885	427	0.090	0.306	0.040	0.033	0.515	11.681	-0.476	2.308	0.003	0.467	0.030	0.084	4.324
Greece	307	33	0.008	0.220	0.017	0.001	-0.476	11.469	-0.291	1.218	-0.080	0.462	0.012	0.408	2.109
Hong Kong	1095	1000	0.401	0.501	0.024	0.009	0.102	11.338	-0.102	-2.365	-0.050	0.630	0.012	0.418	2.407
India	952	352	0.022	0.163	0.024	0.028	-1.095	12.048	-0.619	1.309	0.175	0.538	0.024	0.624	2.537
Indonesia	253	79	0.054	0.298	0.022	0.000	2.519	11.005	-0.062	-2.633	0.102	0.560	0.011	0.498	2.155
Ireland	57	53	0.157	0.225	0.113	0.008	-1.211	12.749	-0.699	0.961	-0.020	0.421	0.173	0.613	3.524
Israel	141	51	0.053	0.253	0.024	0.000	-1.815	12.378	-0.384	1.922	0.001	0.393	0.233	0.708	0.719
Italy	336	164	0.049	0.206	0.038	0.014	-3.044	12.942	-0.478	1.523	-0.009	0.320	0.031	0.650	4.903
Japan	3087	724	0.010	0.139	0.021	0.023	-2.693	12.333	-0.184	2.239	0.029	0.368	0.012	0.592	2.279
Malaysia	872	110	0.012	0.206	0.009	0.004	1.225	10.856	0.122	-1.182	-0.040	0.381	0.000	0.319	1.953
Mexico	127	33	0.029	0.241	0.035	0.003	0.004	13.213	-0.201	0.183	0.104	0.393	0.258	0.575	3.143
Netherlands	167	120	0.068	0.156	0.096	0.040	-2.854	12.875	-0.615	2.659	0.035	0.365	0.143	0.595	7.245
New Zealand	120	52	0.049	0.196	0.017	0.005	0.399	11.302	-0.614	-0.178	0.058	0.364	0.041	0.325	2.655
Norway	271	129	0.052	0.195	0.042	0.054	-0.974	11.850	-0.398	1.564	0.010	0.455	0.027	0.408	3.788
Philippines	179	38	0.041	0.326	0.017	0.000	2.615	10.722	0.125	-3.065	0.095	0.580	0.008	0.450	1.381
Poland	323	113	0.112	0.410	0.024	0.087	-0.312	11.355	-0.520	1.780	0.112	0.521	0.007	0.437	0.955
Portugal	68	38	0.088	0.249	0.024	0.024	-0.676	12.215	-0.330	1.303	0.060	0.385	0.058	0.703	3.624
Singapore	630	390	0.142	0.371	0.021	0.005	0.472	11.298	-0.155	-1.463	0.008	0.460	0.006	0.294	2.277
South Africa	443	110	0.022	0.200	0.019	0.039	0.962	11.336	-0.526	-0.390	0.179	0.555	0.032	0.417	1.795
South Korea	748	296	0.030	0.163	0.026	0.001	-2.457	11.419	0.320	2.024	0.048	0.559	0.013	0.479	0.762
Spain	138	64	0.067	0.243	0.041	0.031	-4.318	13.965	-0.748	2.631	0.098	0.295	0.060	0.764	9.556
Sweden	418	195	0.040	0.150	0.035	0.100	-1.201	11.613	-0.726	1.129	-0.031	0.469	0.027	0.392	3.324
Switzerland	272	174	0.084	0.211	0.061	0.045	-2.669	12.940	-0.488	4.756	0.066	0.315	0.045	0.571	4.827
Taiwan	774	154	0.011	0.138	0.022	0.000	-3.086	11.876	-0.139	-0.689	-0.007	0.474	0.010	0.602	1.225
Thailand	397	108	0.034	0.208	0.021	0.005	0.511	11.156	-0.209	-1.222	0.079	0.436	0.000	0.459	3.447
Turkey	193	35	0.015	0.244	0.036	0.001	-3.111	12.126	-0.272	1.164	0.062	0.597	0.008	0.688	2.457
United Kingdom	2380	1548	0.081	0.208	0.023	0.103	-0.783	11.379	-0.609	0.081	-0.151	0.466	0.032	0.330	2.498
United States	5670	1077	0.017	0.197	0.021	0.404	-3.974	12.898	-0.754	2.596	-0.033	0.431	0.000	0.633	5.271

Table 2
Pearson Correlation Coefficients

This table reports Pearson correlation coefficients of the variables used in this study. The variables are foreign direct ownership (FDI), foreign portfolio ownership (FPI), domestic institutional ownership ($DInst$), Amihud's illiquidity ratio ($Illiq$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), stock return volatility (σ_{ret}), American Depositary Receipts (ADR), MSCI country index membership ($MSCI$), and number of analyst forecasts ($\#Ana$). The sample period is from 2003 to 2009. All the variables are defined in the appendix.

	FDI	FPI	$DInst$	$Illiq$	$Size$	BM	$Price$	Ret	σ_{ret}	ADR	$MSCI$	$\#Ana$
FDI	1.000											
FPI	0.089	1.000										
$DInst$	-0.110	0.045	1.000									
$Illiq$	0.121	-0.361	-0.420	1.000								
$Size$	-0.035	0.425	0.353	-0.849	1.000							
BM	0.018	-0.103	-0.169	0.270	-0.309	1.000						
$Price$	-0.168	0.229	0.345	-0.534	0.560	-0.218	1.000					
Ret	-0.018	0.045	-0.008	-0.155	0.157	-0.173	0.194	1.000				
σ_{ret}	0.059	-0.099	-0.097	0.190	-0.284	-0.086	-0.275	0.117	1.000			
ADR	0.037	0.207	-0.034	-0.149	0.212	-0.047	0.063	0.001	-0.027	1.000		
$MSCI$	-0.049	0.287	0.291	-0.668	0.647	-0.153	0.282	0.093	-0.130	0.107	1.000	
$\#Ana$	-0.012	0.469	0.340	-0.605	0.682	-0.197	0.342	-0.005	-0.158	0.233	0.414	1.000

Table 3
Impacts of Foreign Investor Heterogeneity on Stock Liquidity

This table presents panel regressions of a firm's stock liquidity measure on its foreign direct ownership (FDI) and foreign portfolio ownership (FPI) and firm-level control variables (X) as well as unreported country-, year-, and industry-fixed effects on the full sample and different sub-samples. The regression model is

$$\text{Stock Liquidity}_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.$$

Stock Liquidity is a proxy for liquidity at year t (measured using Amihud's illiquidity measure ($Illiq$), the proportion of zero daily stock returns ($ZRet$), and effective spread ($ESpread$)). $X_{i,t-1}$ includes domestic institutional ownership ($DInst$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), annualized monthly stock return volatility (σ_{ret}), an ADR dummy (ADR), the MSCI country index membership variable ($MSCI$), the number of financial analyst forecasts ($\#Ana$). The construction of these variables is detailed in the appendix. DEV refers to firms from developed countries, whereas EMG refers to those from developing countries. t-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. NObs denotes the number of firm-year observations, and $\bar{R}^2$ is the adjusted R^2. The sample period is from 2003 to 2009.

	Dependent Variable: Liquidity Proxies								
	Illiq	*ZRet*	*ESpread*	*Illiq*					
		All Firms		U.S. firms	Non-U.S. firms	DEV	EMG	Year≤2006	Year≥2007
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
FDI	0.930	0.060	0.241	0.591	0.933	0.891	1.016	0.820	0.889
	(17.71)	(9.62)	(9.03)	(3.74)	(16.92)	(16.56)	(6.41)	(11.85)	(14.93)
FPI	-3.018	-0.310	-0.796	-1.662	-3.671	-2.899	-4.599	-2.388	-3.565
	(-20.63)	(-19.53)	(-9.20)	(-8.21)	(-19.28)	(-19.08)	(-10.72)	(-12.65)	(-22.79)
$DInst$	-1.109	-0.056	-0.617	-0.629	-0.829	-1.009	-1.362	-0.881	-1.444
	(-29.33)	(-15.75)	(-17.55)	(-13.89)	(-7.57)	(-26.61)	(-6.93)	(-20.45)	(-30.30)
$Size$	-0.987	-0.033	-0.293	-1.228	-0.926	-0.992	-0.951	-1.032	-0.924
	(-123.91)	(-43.35)	(-64.51)	(-83.41)	(-102.48)	(-113.05)	(-52.72)	(-109.20)	(-101.13)
BM	-0.053	-0.003	-0.048	0.048	-0.075	-0.035	-0.105	-0.048	-0.052
	(-6.23)	(-3.18)	(-10.81)	(3.03)	(-7.71)	(-3.87)	(-4.97)	(-4.63)	(-4.96)
$Price$	-0.059	-0.008	-0.039	-0.199	-0.059	-0.085	0.052	-0.040	-0.067
	(-9.23)	(-13.32)	(-10.40)	(-8.29)	(-8.82)	(-12.45)	(3.00)	(-5.20)	(-9.52)
Ret	-0.296	-0.001	-0.186	0.035	-0.343	-0.329	-0.239	-0.413	-0.124
	(-32.93)	(-0.90)	(-34.43)	(1.60)	(-34.37)	(-32.57)	(-11.29)	(-30.99)	(-10.52)
σ_{ret}	-0.298	-0.038	0.124	-0.403	-0.285	-0.261	-0.422	-0.258	-0.255
	(-14.02)	(-19.45)	(11.65)	(-7.14)	(-12.41)	(-11.01)	(-8.39)	(-8.96)	(-9.41)
ADR	-0.155	-0.020	-0.047		-0.201	-0.088	-0.298	-0.197	-0.081
	(-2.74)	(-4.03)	(-1.61)		(-3.41)	(-1.61)	(-2.07)	(-3.29)	(-1.24)
$MSCI$	-1.047	-0.068	-0.276	-1.007	-1.059	-1.175	-0.789	-0.916	-1.187
	(-49.30)	(-35.37)	(-27.35)	(-26.69)	(-43.22)	(-48.61)	(-19.26)	(-39.35)	(-46.44)
$\#Ana$	-0.076	0.002	-0.021	-0.021	-0.088	-0.068	-0.110	-0.071	-0.086
	(-33.54)	(9.33)	(-15.78)	(-7.09)	(-28.99)	(-28.44)	(-17.49)	(-28.22)	(-31.86)
NObs	139,121	132,307	69,614	28,950	110,171	100,735	38,386	74,508	64,613
$\bar{R}^2$	85.2%	51.7%	81.9%	90.8%	82.2%	87.7%	79.4%	85.5%	85.7%

Table 4
Impacts of the Size of Foreign Ownership Stakes on Stock Liquidity

This table presents panel regressions of a firm's stock liquidity measure on varying sizes and types of foreign direct ownership (FDI), foreign portfolio ownership (FPI), and firm-level control variables ($X_{i,t-1}$) as well as unreported country-, year-, and industry-fixed effects on the full sample and different sub-samples. The regression model is

$$Illiq_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.$$

$Illiq$ is Amihud's illiquidity measure at year t. $FDI < 30\%$ ($FDI \geq 30\%$) is foreign direct ownership if a firm's foreign direct ownership is less than (greater or equal to) 30% and zero otherwise. $Dummy(FDI)$ is equal one if a company has a non-zero foreign direct ownership. $FDI(Inst)$ denotes foreign institutional direct ownership, and $FDI(NInst)$ refers to foreign non-institutional direct ownership. $X_{i,t-1}$ includes domestic institutional ownership ($DInst$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), annualized monthly stock return volatility (σ_{ret}), an ADR dummy (ADR), the MSCI country index membership variable ($MSCI$), the number of financial analyst forecasts ($\#Ana$). The construction of these variables is detailed in the appendix. t-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. NObs denotes the number of firm-year observations, and $\bar{R}^2$ is the adjusted R^2. The sample period is from 2003 to 2009.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
FDI			1.133	1.313			
			(16.98)	(18.52)			
$FDI < 30\%$	0.507						
	(4.13)						
$FDI \geq 30\%$	0.959						
	(17.88)						
$Dummy(FDI)$		0.157	-0.112				
		(9.71)	(-5.58)				
$FDI(Inst)$					1.739		1.786
					(7.05)		(7.28)
$FDI(NInst)$						0.904	0.907
						(16.89)	(16.96)
FPI	-2.941	-3.086	-2.875	-2.158	-3.142	-2.849	-3.173
	(-19.96)	(-20.47)	(-19.60)	(-12.53)	(-20.23)	(-19.29)	(-20.45)
$DInst$	-1.111	-1.136	-1.111	-0.782	-1.145	-1.114	-1.106
	(-29.38)	(-29.94)	(-29.40)	(-8.30)	(-30.14)	(-29.45)	(-29.24)
$Size$	-0.987	-0.984	-0.987	-1.015	-0.981	-0.987	-0.986
	(-124.00)	(-122.77)	(-124.09)	(-68.47)	(-122.46)	(-123.89)	(-123.69)
BM	-0.053	-0.054	-0.053	-0.100	-0.056	-0.053	-0.053
	(-6.22)	(-6.37)	(-6.23)	(-6.11)	(-6.53)	(-6.18)	(-6.28)
$Price$	-0.059	-0.059	-0.059	-0.066	-0.060	-0.059	-0.060
	(-9.25)	(-9.23)	(-9.24)	(-4.85)	(-9.33)	(-9.19)	(-9.26)
Ret	-0.297	-0.297	-0.298	-0.298	-0.300	-0.297	-0.296
	(-33.08)	(-32.97)	(-33.16)	(-14.99)	(-33.35)	(-33.00)	(-32.89)
σ_{ret}	-0.296	-0.297	-0.295	-0.253	-0.293	-0.297	-0.297
	(-13.97)	(-13.95)	(-13.94)	(-7.14)	(-13.78)	(-14.00)	(-14.03)
ADR	-0.149	-0.160	-0.145	-0.221	-0.145	-0.153	-0.157
	(-2.62)	(-2.80)	(-2.56)	(-3.18)	(-2.55)	(-2.69)	(-2.77)
$MSCI$	-1.046	-1.051	-1.045	-1.095	-1.049	-1.047	-1.047
	(-49.29)	(-49.33)	(-49.26)	(-25.22)	(-49.20)	(-49.29)	(-49.30)
$\#Ana$	-0.076	-0.077	-0.076	-0.074	-0.077	-0.077	-0.076
	(-33.60)	(-33.86)	(-33.65)	(-19.20)	(-33.93)	(-33.72)	(-33.41)
NObs	139,121	139,121	139,121	27,520	139,121	139,121	139,121
$\bar{R}^2$	85.2%	85.2%	85.2%	84.3%	85.1%	85.2%	85.2%

Table 5
Robustness Checks for Endogeneity

This table addresses the endogeneity problem and presents panel regression results of stock liquidity on foreign ownership, firm-level control variables, and unreported country-, year-, and industry-fixed effects based on the variations of the following baseline regression model,

$$Illiq_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.$$

Illiq is a stock's Amihud's illiquidity ratio. The explanatory variables are foreign direct ownership (FDI), foreign portfolio ownership (FPI), domestic institutional ownership ($DInst$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), stock return volatility (σ_{ret}), American Depositary Receipts (ADR), MSCI country index membership ($MSCI$), and number of analyst forecasts ($\#Ana$). All variables are defined in the appendix. Panel A shows results of the baseline regression with firm fixed effects (Model 1), with lagged *Illiq* (Model 2), and from the two-stage least squares (2SLS) regression analysis (Models 3-4), and of the change in *Illiq* on the change in each independent variable (Model 5). In the first-stage estimation associated with Model 3 (Model 4), we regress FDI (FPI) on the following instrumental variables: Big 4 auditors ($Big\ 4$), adoption of international accounting standards dummy variable (IAS), debt to assets ratio ($Debt$), stock dividend yield (DY), and foreign sales ($FSales$). In the second-stage, we estimate the baseline specification by replacing the actual FDI (FPI) with its predicted value of FDI, $F\hat{D}I$, ($F\hat{P}I$) from the first stage. Panel B reports results from cross-border mergers and acquisitions (M&A), where the change in illiquidity ($\Delta Illiq$) is regressed on the proportion of shares acquired by a foreign bidder from an M&A and on the change in explanatory variables. Models 7-10 show the results of different proportions of shares acquired by foreign bidders (Shares Acquired), and Model 6 focuses only target firms while the remaining models use the full sample. All the variables are defined in the appendix. t-statistics shown in parentheses are based on the standard errors adjusted for firm-level clustering and robust to heteroskedasticity. $\bar{R}^2$ is the adjusted R^2. NObs denotes the number of firm-year observations. The sample period is from 2003 to 2009.

Panel A: Dependent Variable: *Illiq* in Models 1-4 and $\Delta Illiq$ in Model 5

	Firm-Fixed	Inclusion	Second-Stage Results from 2SLS		Diff. on
	Effects	of $Illiq_{t-1}$	$F\hat{D}I$ from 1^{st} Stage	$F\hat{P}I$ from 1^{st} Stage	Diff.
Variable	Model 1	Model 2	Model 3	Model 4	Model 5
FDI	0.310	0.234	0.373	0.922	0.124
	(6.08)	(10.01)	(4.88)	(16.08)	(3.47)
FPI	-1.955	-0.841	-3.206	-0.191	-1.201
	(-10.97)	(-14.96)	(-19.13)	(-2.85)	(-8.71)
$DInst$	-1.638	-0.124	-0.973	-1.054	-0.879
	(-21.90)	(-7.50)	(-18.82)	(-26.03)	(-14.73)
$Size$	-0.608	-0.209	-1.007	-1.000	-0.711
	(-43.79)	(-46.72)	(-114.65)	(-110.15)	(-61.00)
BM	-0.097	-0.031	-0.042	-0.048	-0.111
	(-8.00)	(-7.79)	(-4.72)	(-5.45)	(-11.38)
$Price$	-0.295	0.002	-0.053	-0.054	-0.481
	(-21.78)	(0.76)	(-7.90)	(-8.04)	(-38.03)
Ret	-0.242	-0.434	-0.291	-0.304	0.249
	(-24.93)	(-67.47)	(-29.29)	(-32.64)	(29.74)
σ_{ret}	-0.247	-0.274	-0.341	-0.331	0.054
	(-12.22)	(-17.62)	(-15.00)	(-14.69)	(3.53)
ADR	-0.222	-0.045	-0.153	-0.188	-0.045
	(-2.19)	(-2.37)	(-2.66)	(-3.26)	(-0.70)
$MSCI$		-0.428	-1.047	-1.051	
		(-50.22)	(-48.28)	(-44.49)	
$\#Ana$	-0.035	-0.017	-0.070	-0.081	-0.053
	(-14.91)	(-21.46)	(-27.27)	(-30.80)	(-30.58)
$Illiq_{t-1}$		0.768			
		(247.73)			
NObs	139,121	139,121	132,042	132,042	119,399
$\bar{R}^2$	93.3%	92.8%	85.3%	85.3%	48.1%

Table 5 – Continued
Robustness Checks for Endogeneity

Panel B: Dependent Variable: $\Delta Illiq$ Associated with M&A

	Target Firms	Full Sample			
Variable	Model 6	Model 7	Model 8	Model 9	Model 10
Shares Acquired	0.364	0.207			
	(3.34)	(2.70)			
Shares Acquired $< 30\%$			-0.081		-0.077
			(-0.32)		(-0.30)
Shares Acquired $\geq 30\%$				0.237	0.237
				(2.99)	(2.99)
ΔFPI	-2.187	-1.198	-1.211	-1.198	-1.199
	(-1.94)	(-8.73)	(-8.79)	(-8.73)	(-8.74)
$\Delta DInst$	-1.179	-0.880	-0.882	-0.880	-0.881
	(-1.57)	(-14.74)	(-14.77)	(-14.75)	(-14.75)
$\Delta Size$	-0.577	-0.712	-0.711	-0.711	-0.711
	(-6.74)	(-61.00)	(-60.95)	(-60.99)	(-60.96)
ΔBM	-0.026	-0.111	-0.111	-0.111	-0.111
	(-0.35)	(-11.37)	(-11.37)	(-11.36)	(-11.36)
$\Delta Price$	-0.256	-0.481	-0.481	-0.481	-0.481
	(-2.27)	(-38.02)	(-38.00)	(-38.02)	(-38.02)
ΔRet	-0.057	0.249	0.249	0.249	0.249
	(-0.68)	(29.76)	(29.75)	(29.75)	(29.75)
$\Delta\sigma_{ret}$	0.015	0.054	0.054	0.054	0.054
	(0.11)	(3.49)	(3.52)	(3.50)	(3.50)
ΔADR	-0.045	-0.043	-0.044	-0.043	-0.043
	(-0.06)	(-0.67)	(-0.68)	(-0.67)	(-0.67)
$\Delta \#Ana$	-0.084	-0.053	-0.053	-0.053	-0.053
	(-4.88)	(-30.58)	(-30.58)	(-30.59)	(-30.58)
NObs	1,212	119,399	119,399	119,399	119,399
$\bar{R}^2$	46.3%	48.1%	48.1%	48.1%	48.1%

Table 6

Foreign Investor Heterogeneity, Change in Stock Liquidity, and the 2008 Global Financial Crisis

Panel A reports the annual average of daily stock liquidity proxied by Amihud's illiquidity ratio, $Illiq$, one year before and after 30 June 2008 (the outset of global financial crisis) by country. $\Delta Illiq$ is the annual average of $Illiq$ one year after 30 June 2008 minus the annual average of $Illiq$ one year before 30 June 2008. Panel B shows the panel regression of $\Delta Illiq$ on foreign direct investment ownership FDI, foreign portfolio investment ownership FPI, and control variables, $X_{i,t-1}$.

$$\Delta Illiq_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.$$

$X_{i,t-1}$ includes lagged $Illiq$, domestic institutional ownership ($DInst$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), annualized monthly stock return volatility (σ_{ret}), an ADR dummy (ADR), the MSCI country index membership variable ($Index$), the number of financial analyst forecasts ($\#Ana$). The construction of these variables is detailed in the appendix. DEV refers to firms from developed countries, whereas EMG refers to those from developing countries. t-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. NObs denotes the number of firm-year observations, and $\bar{R}^2$ is the adjusted R^2. The sample period is from 2003 to 2009.

Panel A: Change in Stock Liquidity ($Illiq$) by Country

		$Illiq$		
Country	N	Before the Crisis	After the Crisis	$\Delta Illiq$
Argentina	37	-0.167	1.398	1.564
Australia	1268	0.373	2.320	1.947
Austria	70	-2.468	-0.695	1.773
Belgium	112	-2.382	-0.977	1.405
Brazil	85	-2.364	-0.758	1.606
Canada	856	-1.674	0.015	1.689
Chile	138	-0.056	1.025	1.081
China	1314	-5.058	-4.657	0.400
Denmark	147	-1.806	0.094	1.900
Finland	119	-2.075	-0.600	1.475
France	610	-1.502	-0.075	1.427
Germany	616	0.378	1.782	1.404
Greece	229	-0.907	1.131	2.038
Hong Kong	897	-0.914	0.964	1.879
India	712	-1.394	0.533	1.927
Indonesia	188	1.852	3.435	1.583
Ireland	35	-1.479	0.326	1.804
Israel	109	-2.334	-1.042	1.293
Italy	229	-3.690	-1.802	1.887
Japan	2592	-2.797	-1.935	0.862
Malaysia	700	1.101	2.855	1.755
Mexico	97	-0.907	0.604	1.511
Netherlands	110	-3.857	-2.319	1.538
New Zealand	87	0.159	1.422	1.263
Norway	165	-1.629	0.034	1.663
Philippines	136	1.664	2.892	1.229
Poland	215	-0.842	0.633	1.475
Portugal	44	-1.971	-0.499	1.473
Singapore	490	-0.085	1.964	2.049
South Africa	250	-0.354	1.206	1.560
South Korea	658	-3.157	-1.840	1.317
Spain	12	-6.268	-4.489	1.779
Sweden	284	-1.749	-0.098	1.651
Switzerland	214	-3.436	-2.115	1.321
Taiwan	698	-3.566	-2.187	1.379
Thailand	339	0.232	1.972	1.739
Turkey	109	-3.012	-2.070	0.942
United Kingdom	1214	-0.741	1.101	1.842
United States	3779	-4.382	-3.052	1.330

Table 6 – Continued
Foreign Investor Heterogeneity, Change in Stock Liquidity, and the 2008 Global Financial Crisis

Panel B: Change in Stock Liquidity and Foreign Ownership

	Dependent Variable: $\Delta Illiq$				
	All Firms	U.S. firms	Non-U.S. firms	DEV	EMG
Variable	Model 1	Model 2	Model 3	Model 4	Model 5
FDI	0.133	0.429	0.136	0.186	0.005
	(2.42)	(2.33)	(2.37)	(2.80)	(0.04)
FPI	-0.848	0.307	-1.468	-1.052	-2.923
	(-7.33)	(1.71)	(-9.79)	(-6.07)	(-9.56)
$Illiq$	-0.223	-0.263	-0.227	-0.238	-0.215
	(-30.88)	(-12.01)	(-29.95)	(-24.06)	(-17.97)
$DInst$	-0.461	0.055	0.054	0.048	-0.179
	(-9.37)	(0.69)	(0.48)	(0.38)	(-0.64)
$Size$	-0.194	-0.357	-0.172	-0.187	-0.137
	(-18.00)	(-10.92)	(-15.17)	(-13.12)	(-7.15)
BM	0.027	0.033	0.011	0.012	0.002
	(2.68)	(1.77)	(0.96)	(0.86)	(0.07)
$Price$	-0.071	-0.208	-0.071	-0.064	-0.109
	(-12.45)	(-8.94)	(-11.87)	(-9.80)	(-7.55)
Ret	-0.529	-0.547	-0.468	-0.524	-0.285
	(-26.49)	(-10.82)	(-21.21)	(-19.72)	(-6.97)
σ_{ret}	0.063	-0.133	0.048	0.142	-0.267
	(1.56)	(-1.43)	(1.12)	(2.57)	(-4.07)
ADR	-0.010		-0.043	-0.042	-0.062
	(-0.21)		(-0.89)	(-0.75)	(-0.70)
$MSCI$	-0.327	-0.660	-0.292	-0.332	-0.231
	(-15.03)	(-12.49)	(-12.28)	(-10.98)	(-5.95)
$\#Ana$	-0.026	-0.008	-0.028	-0.025	-0.041
	(-12.54)	(-2.33)	(-10.97)	(-8.92)	(-7.28)
NObs	19,964	3,779	16,185	10,127	6,058
$\bar{R}^2$	32.5%	39.1%	33.3%	33.9%	33.2 %

Table 7
Stock Trading Activity and Foreign Investor Holdings

This table presents coefficient estimates of two panel regressions. In the first regression, we estimate the link between trading activity and types of foreign investors, whereas in the second regression, we show the differential effects of foreign investor ownerships on liquidity. The two regressions are as follows.

$$\begin{aligned}\text{Trading Activity}_{i,t} &= \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.\\ Illiq_{i,t} &= \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \beta_3 \text{Trading Activity}_{i,t-1}\\ &\quad + \beta_4 FDI_{i,t-1} \times \text{Trading Activity}_{i,t-1} + \beta_5 FPI_{i,t-1} \times \text{Trading Activity}_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.\end{aligned}$$

The first dependent variable is trading activity measured using stock turnover ($Turn$) and number of trades ($NTrades$), and the second is stock liquidity ($Illiq$). † indicates that the variable $NTrades$ from TRTH is available from 2003 to 2007 and thus the sample is constrained by its availability. The key variables are foreign direct investors' holdings (FDI) and foreign portfolio investors' holdings (FPI). $X_{i,t-1}$ includes domestic institutional ownership ($DInst$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), annualized monthly stock return volatility (σ_{ret}), an ADR dummy (ADR), the MSCI country index membership variable ($Index$), the number of financial analyst forecasts ($\#Ana$). The construction of these variables is detailed in the appendix. t-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. NObs denotes the number of firm-year observations, and $\bar{R}^2$ is the adjusted R^2. The sample period is from 2003 to 2009.

	Dependent Variable: Trading Activity in Models 1-2 and Stock Liquidity in Models 3-8							
	$Turn$	$NTrades^{\dagger}$	$Turn$			$NTrades^{\dagger}$		
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
FDI	-0.328	-0.420	0.930	0.797	1.114	0.843	0.333	0.917
	(-11.37)	(-10.78)	(17.72)	(16.30)	(16.37)	(11.92)	(7.48)	(10.80)
FPI	1.182	1.960	-3.042	-2.564	-3.753	-2.682	-0.299	-5.357
	(7.63)	(14.46)	(-20.85)	(-18.30)	(-17.01)	(-13.17)	(-2.74)	(-13.59)
$Turn$				-0.405	-0.407			
				(-69.52)	(-72.22)			
$FDI \times Turn$					-0.685			
					(-6.18)			
$FPI \times Turn$					0.922			
					(8.57)			
$NTrades^{\dagger}$							-1.215	-1.219
							(-142.75)	(-143.86)
$FDI \times NTrades^{\dagger}$								-0.221
								(-9.86)
$FPI \times NTrades^{\dagger}$								0.962
								(14.76)
$DInst$	1.763	1.136	-1.126	-0.412	-0.462	-0.690	0.691	0.688
	(32.58)	(19.60)	(-29.86)	(-12.19)	(-13.72)	(-10.74)	(16.06)	(15.98)
$Size$	-0.062	0.448	-0.987	-1.012	-1.010	-0.994	-0.449	-0.449
	(-9.44)	(63.81)	(-123.98)	(-136.47)	(-137.47)	(-92.43)	(-56.46)	(-56.91)
BM	-0.107	-0.008	-0.054	-0.098	-0.100	-0.052	-0.062	-0.064
	(-12.80)	(-1.14)	(-6.40)	(-12.78)	(-13.14)	(-4.55)	(-8.26)	(-8.61)
$Price$	-0.061	-0.157	-0.062	-0.086	-0.087	0.006	-0.186	-0.182
	(-9.45)	(-24.82)	(-9.60)	(-14.75)	(-14.90)	(0.66)	(-25.84)	(-25.39)
Ret	-0.038	0.135	-0.300	-0.315	-0.318	-0.526	-0.363	-0.361
	(-3.44)	(14.93)	(-33.52)	(-37.77)	(-37.86)	(-37.08)	(-37.83)	(-37.86)
σ_{ret}	0.756	0.533	-0.288	0.018	0.027	-0.263	0.384	0.382
	(25.71)	(19.70)	(-13.65)	(1.04)	(1.64)	(-8.50)	(16.90)	(16.88)
ADR	-0.045	0.294	-0.156	-0.174	-0.156	-0.238	0.120	0.083
	(-1.27)	(7.13)	(-2.75)	(-3.47)	(-3.12)	(-3.76)	(3.49)	(2.41)
$MSCI$	0.428	0.704	-1.052	-0.879	-0.869	-0.965	-0.109	-0.091
	(22.41)	(41.05)	(-49.66)	(-46.44)	(-45.96)	(-36.47)	(-7.28)	(-6.05)
$\#Ana$	0.045	0.059	-0.076	-0.057	-0.058	-0.075	-0.004	-0.006
	(21.37)	(29.89)	(-33.33)	(-27.09)	(-27.48)	(-25.82)	(-2.24)	(-3.45)
NObs	138,546	69,773	138,546	138,546	138,546	69,773	69,773	69,773
$\bar{R}^2$	33.4%	82.1%	85.4%	88.2%	88.3%	85.4%	94.1%	94.2%

Table 8
Information Environment and Foreign Investor Holdings

This table presents coefficient estimates of two panel regressions. In the first regression, we estimate the link between information environment proxies ($IEnv$, measured by the probability of informed trading, PIN; stock price non-synchronicity, $NSync$; number of analysts following, $\#Ana$; and analyst forecast error, $FErr$) and foreign investor holdings, and in the second regression, we show the differential effects of foreign investor ownerships on stock liquidity, $Illiq$. The two regressions are as follows.

$$IEnv_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.$$

$$Illiq_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \beta_3 IEnv_{i,t-1} + \beta_4 FDI_{i,t-1} \times IEnv_{i,t-1} + \beta_5 FPI_{i,t-1} \times IEnv_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.$$

The key variables are foreign direct investors' holdings (FDI) and foreign portfolio investors' holdings (FPI). $X_{i,t-1}$ includes domestic institutional ownership ($DInst$), firm size ($Size$), book-to-market ratio (BM), stock price ($Price$), annual stock return (Ret), annualized monthly stock return volatility (σ_{ret}), an ADR dummy (ADR), the MSCI country index membership variable ($Index$), the number of financial analyst forecasts ($\#Ana$). The construction of these variables is detailed in the appendix. t-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. NObs denotes the number of firm-year observations, and $\bar{R}^2$ is the adjusted R^2. The sample period is from 2003 to 2009.

Dependent Variable: Information Environment Measure ($IEnv$) in Models 1-4 and Stock Liquidity ($Illiq$) in Models 5-16

	PIN	$NSync$	$\#Ana$	$FErr$	PIN			$NSync$			$\#Ana$			$FErr$		
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
FDI	0.032	0.291	-0.234	0.154	0.832	0.730	0.476	0.939	0.872	0.680	1.028	0.930	1.078	0.899	0.896	1.029
	(6.43)	(9.33)	(-7.30)	(3.01)	(12.25)	(11.27)	(3.64)	(17.62)	(17.09)	(10.20)	(18.98)	(17.71)	(18.55)	(15.29)	(15.28)	(14.73)
FPI	-0.067	-0.383	3.524	0.500	-2.840	-2.630	-0.245	-3.162	-3.074	-3.136	-4.321	-3.018	-5.237	-2.812	-2.814	-3.098
	(-5.87)	(-3.93)	(19.56)	(3.73)	(-13.89)	(-13.57)	(-0.78)	(-21.51)	(-21.44)	(-19.52)	(-26.77)	(-20.63)	(-24.29)	(-19.40)	(-19.51)	(-17.13)
$IEnv$						3.146	3.259		0.232	0.226		-0.076	-0.093		0.035	0.036
						(39.37)	(39.02)		(55.72)	(51.06)		(-33.54)	(-36.42)		(7.66)	(6.85)
$FDI \times IEnv$							0.861			0.096			-0.054			0.099
							(2.19)			(3.95)			(-5.77)			(3.22)
$FPI \times IEnv$							-13.165			0.099			0.276			-0.171
							(-8.16)			(1.33)			(14.69)			(-2.62)
$DInst$	-0.045	-1.167	0.408	0.240	-0.636	-0.493	-0.494	-1.233	-0.963	-0.975	-1.280	-1.109	-1.082	-0.753	-0.758	-0.761
	(-11.79)	(-33.59)	(12.51)	(6.38)	(-10.34)	(-8.57)	(-8.70)	(-32.53)	(-26.73)	(-26.98)	(-32.55)	(-29.33)	(-28.77)	(-19.87)	(-19.97)	(-20.06)
$Size$	-0.022	-0.326	0.153	-0.116	-0.998	-0.928	-0.927	-0.987	-0.911	-0.911	-1.119	-0.987	-0.975	-1.076	-1.073	-1.073
	(-31.17)	(-72.41)	(31.09)	(-15.16)	(-96.17)	(-92.84)	(-93.32)	(-124.35)	(-116.37)	(-116.45)	(-165.51)	(-123.91)	(-121.43)	(-122.61)	(-121.89)	(-122.01)
BM	0.001	-0.106	-0.089	0.269	-0.050	-0.052	-0.052	-0.057	-0.032	-0.032	-0.073	-0.053	-0.052	-0.061	-0.066	-0.066
	(1.12)	(-19.23)	(-16.78)	(25.50)	(-4.47)	(-4.95)	(-4.92)	(-6.60)	(-3.87)	(-3.85)	(-8.51)	(-6.23)	(-6.18)	(-5.78)	(-6.30)	(-6.27)
$Price$	0.010	0.027	-0.017	-0.195	0.004	-0.026	-0.026	-0.056	-0.062	-0.062	-0.042	-0.059	-0.056	-0.013	-0.007	-0.006
	(15.54)	(7.60)	(-5.81)	(-25.45)	(0.47)	(-3.31)	(-3.25)	(-8.64)	(-9.85)	(-9.74)	(-6.30)	(-9.23)	(-8.70)	(-1.68)	(-0.88)	(-0.82)
Ret	-0.006	-0.114	0.270	-0.514	-0.527	-0.507	-0.506	-0.309	-0.283	-0.283	-0.240	-0.296	-0.306	-0.286	-0.277	-0.277
	(-6.63)	(-16.43)	(38.99)	(-41.95)	(-37.82)	(-37.70)	(-37.60)	(-33.78)	(-31.72)	(-31.71)	(-26.39)	(-32.93)	(-34.04)	(-23.91)	(-23.35)	(-23.28)
σ_{ret}	-0.005	0.029	-0.036	1.023	-0.234	-0.219	-0.221	-0.300	-0.307	-0.307	-0.341	-0.298	-0.295	-0.537	-0.570	-0.570
	(-2.81)	(2.29)	(-3.90)	(25.16)	(-7.84)	(-7.66)	(-7.74)	(-13.99)	(-14.75)	(-14.75)	(-15.75)	(-14.02)	(-13.93)	(-13.73)	(-14.08)	(-14.09)
ADR	0.003	0.142	-0.020	0.240	-0.247	-0.258	-0.272	-0.166	-0.199	-0.193	-0.348	-0.155	-0.205	-0.251	-0.262	-0.260
	(0.78)	(5.50)	(-0.37)	(6.07)	(-3.94)	(-4.46)	(-4.72)	(-2.93)	(-3.62)	(-3.50)	(-6.24)	(-2.74)	(-3.63)	(-5.02)	(-5.21)	(-5.17)
$MSCI$	-0.028	-0.267	-0.009	-0.119	-0.973	-0.885	-0.875	-1.054	-0.992	-0.993	-1.022	-1.047	-1.010	-1.048	-1.047	-1.045
	(-18.70)	(-22.14)	(-0.86)	(-6.19)	(-37.90)	(-36.57)	(-36.13)	(-49.45)	(-48.37)	(-48.42)	(-47.70)	(-49.30)	(-48.25)	(-41.37)	(-41.36)	(-41.29)
$\#Ana$	0.000	-0.001	0.901	-0.016	-0.073	-0.072	-0.073	-0.074	-0.073	-0.073				-0.047	-0.046	-0.046
	(-2.30)	(-1.08)	(447.77)	(-9.40)	(-26.00)	(-27.02)	(-27.53)	(-32.55)	(-33.64)	(-33.74)				(-22.56)	(-22.17)	(-22.24)
NObs	74,898	132,664	139,121	74,959	74,898	74,898	74,898	132,664	132,664	132,664	139,121	139,121	139,121	75,620	75,620	75,620
$\bar{R}^2$	33.7%	39.3%	93.5%	37.9%	85.3%	86.2%	86.3%	85.6%	86.2%	86.2%	84.8%	85.2%	85.3%	86.2%	86.2%	86.2%

Table 9
Firm Performance, Cost of Equity Capital, and Foreign Investor Holdings

This table presents separate panel regressions of firm performance (measured by Tobin's Q and return on total assets, ROA) and implied cost of capital (ICOC) on foreign direct ownership (FDI) and foreign portfolio ownership (FPI), stock illiquidity ($Illiq$), and interactions between $FDI/\ FPI$ and $Illiq$, together with control variables, $X_{i,t-1}$. The regressions are as follows.

$$\text{Firm Performance}_{i,t} = \alpha+\beta_1 FDI_{i,t-1}+\beta_2 FPI_{i,t-1}+\beta_3 Illiq_{i,t-1}+\beta_4 FDI_{i,t-1}\times Illiq_{i,t-1}+\beta_5 FPI_{i,t-1}\times Illiq_{i,t-1}+\delta X_{i,t-1}+\varepsilon_{i,t}.$$

$$\text{ICOC}_{i,t} = \alpha + \beta_1 FDI_{i,t-1} + \beta_2 FPI_{i,t-1} + \beta_3 Illiq_{i,t-1} + \beta_4 FDI_{i,t-1} \times Illiq_{i,t-1} + \beta_5 FPI_{i,t-1} \times Illiq_{i,t-1} + \delta X_{i,t-1} + \varepsilon_{i,t}.$$

The control variables for the panel regressions include domestic institutional ownership ($DInst$), world market beta (β_W), local market beta (β_C), operating income scaled by total assets (ROA), foreign sales ($FSales$), log of total assets ($\log(TA)$), Tobin's Q, firm size ($Size$), book-to-market ratio (BM), annual stock return (Ret), stock return volatility (σ_{ret}), American Depositary Receipts (ADR), MSCI country index membership ($MSCI$), and number of analysts following ($\#Ana$). Regressions also include unreported country-, year-, and industry-fixed effects. All variables are defined in the appendix. t-statistics shown in parentheses are based on the standard errors adjusted for firm-level clustering and robust to heteroskedasticity. $\bar{R}^2$ is the adjusted R^2. NObs denotes the number of firm-year observations. The sample period is from 2003 to 2009.

	Dependent Variable: Tobin's Q			**Dependent Variable: ROA**			**Dependent Variable: ICOC**		
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
FDI	0.210	0.347	0.424	0.010	0.018	0.026	0.007	0.005	0.013
	(3.84)	(6.46)	(6.51)	(2.76)	(4.77)	(5.18)	(3.34)	(2.59)	(4.42)
FPI	0.704	-0.185	-0.092	0.020	-0.021	-0.063	0.003	0.008	-0.031
	(5.53)	(-1.63)	(-0.47)	(2.79)	(-2.83)	(-3.92)	(0.76)	(2.14)	(-3.79)
$Illiq$		-0.211	-0.213		-0.010	-0.010		0.002	0.002
		(-39.22)	(-38.32)		(-26.54)	(-25.33)		(8.75)	(8.94)
$FDI \times Illiq$			0.028			0.003			0.003
			(1.74)			(2.69)			(4.61)
$FPI \times Illiq$			0.012			-0.008			-0.008
			(0.37)			(-3.39)			(-6.08)
$DInst$	-0.130	-0.354	-0.359	0.003	-0.008	-0.009	0.001	0.003	0.003
	(-3.23)	(-9.17)	(-9.31)	(1.14)	(-3.12)	(-3.12)	(1.11)	(2.53)	(2.51)
ROA	2.812	2.190	2.187						
	(17.04)	(14.20)	(14.17)						
$FSales$	0.064	0.048	0.048	-0.003	-0.003	-0.003			
	(2.18)	(1.70)	(1.70)	(-1.40)	(-1.64)	(-1.64)			
log (TA)	-0.270	-0.419	-0.419	-0.005	-0.013	-0.013			
	(-35.77)	(-44.09)	(-44.08)	(-11.71)	(-24.39)	(-24.60)			
Tobin's Q				0.024	0.020	0.020			
				(24.19)	(20.64)	(20.66)			
β_W							0.001	0.001	0.001
							(2.34)	(3.13)	(3.35)
β_C							0.000	0.000	0.000
							(2.08)	(2.45)	(2.37)
$Size$							-0.006	-0.004	-0.004
							(-22.95)	(-11.61)	(-11.88)
BM							0.005	0.005	0.005
							(12.09)	(12.36)	(12.15)
Ret	0.331	0.204	0.205	0.037	0.031	0.031	-0.010	-0.009	-0.009
	(23.68)	(15.33)	(15.23)	(29.51)	(26.03)	(25.87)	(-18.20)	(-17.15)	(-17.35)
σ_{ret}	0.280	0.182	0.181	-0.063	-0.064	-0.064	0.036	0.037	0.037
	(6.76)	(5.06)	(5.03)	(-16.25)	(-16.13)	(-16.18)	(18.02)	(17.87)	(17.80)
ADR	0.184	0.098	0.102	-0.003	-0.007	-0.007	0.002	0.003	0.002
	(4.60)	(2.61)	(2.70)	(-1.22)	(-2.49)	(-2.71)	(2.12)	(2.47)	(1.95)
$MSCI$	0.448	0.148	0.147	0.012	-0.002	-0.001	-0.008	-0.006	-0.005
	(21.98)	(7.67)	(7.50)	(7.91)	(-0.98)	(-0.54)	(-10.50)	(-7.67)	(-6.72)
$\#Ana$	0.052	0.032	0.032	0.001	0.000	0.000	0.000	0.000	0.000
	(28.58)	(19.03)	(18.90)	(9.14)	(1.98)	(1.68)	(3.74)	(4.99)	(4.41)
NObs	55,749	55,749	55,749	55,749	55,749	55,749	55,749	55,749	55,749
$\bar{R}^2$	31.6%	36.8%	36.8%	23.0%	24.8%	24.8%	36.9%	37.1%	37.3%