Foreign Ownership, Legal System, and Stock Market Liquidity*

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Bank of Korea WP 2015-15

* The authors thank Kwangwoo Park, Kumar Venkataraman, seminar participants at the Bank of Korea and the Korea Advanced Institute of Science and Technology (KAIST), session participants at the Asian Finance Association, and colleagues at the State University of New York at Buffalo for their useful comments and suggestions. This project is partially funded by a research grant provided by the Bank of Korea and supported by the National Research Foundation of Korea Grant funded by the Korean government (NRF-2014S1A3A2036037). The usual disclaimer applies.

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Abstract

In this study we analyze how the price impact of trades and the bid-ask spread are related to foreign stock ownership using data from 21 emerging markets. We show that while the price impact of trades increases with the percentage of shares held by foreign investors, the bid-ask spread decreases with foreign ownership. We interpret these results as evidence that although foreign investors increase adverse selection risks for liquidity providers, they bring net benefit to the market in terms of lower trading costs by increasing competition in the price discovery process. Both the price impact of trades and the bid-ask spread are smaller for companies in the common law countries. The general increase in foreign ownership in emerging markets after the global financial crisis resulted in higher price impacts and lower spreads. The two-stage least squares regression analysis suggests that our results are unlikely to be driven by reverse causality.

Keywords: Foreign investors, Information asymmetry, Price impact, Spread, Adverse selection component, Non-information cost of trading, Illiquidity

JEL Classification: G15, G18, G34, G38

1. Introduction

In this paper we analyze the effect of stock ownership by foreign investors on the bid-ask spread and the price impact of trades. The bid-ask spread is the difference between the price at which liquidity providers are willing to sell and the price at which liquidity providers are willing to buy. As such, the bid-ask spread represents the cost of trading incurred by liquidity demanders when they trade at prices quoted by liquidity suppliers. Prior research shows that the bid-ask spread contains the adverse selection cost, the inventory and order processing cost, and economic rent. The price impact of trades measures the information content of a trade and is conceptually equivalent to the adverse selection component of the bid-ask spread. Although the bid-ask spread and the price impact of trades tend to move together in the same direction, the bid-ask spread is a more inclusive measure of liquidity because it includes both the information and non-information costs of trading. The joint analysis of the spread and the price impact of trades should prove useful because it helps to better explain the role of foreign investors in the price discovery process and the determination of market liquidity.

Casual observation suggests that market participants (e.g., investors and regulators) in emerging markets believe that foreign investors, who are mainly institutional investors from North America and Europe, have better information and investment tools than domestic investors. If foreign investors were to trade frequently on superior information as liquidity demanders, they could exacerbate the adverse selection problem in the securities market, reducing market liquidity and increasing trading costs. Alternatively, foreign investors may bring net benefits to traders as liquidity providers if they add competition to the price discovery process that is large enough to offset any adverse effect associated with their information based trading, and thereby increase market liquidity and reduce trading costs.

Prior research has taken several different approaches to examine whether foreign investors have superior information and investment tools. Numerous studies compare the relative performance of foreign and domestic investors as a means to assess whether foreign investors have information advantages over domestic investors. Grinblatt and Keloharju (2000) show that foreign investors earn higher returns than domestic individual investors. Seasholes (2000) shows that foreign investors trade more profitably than domestic investors ahead of earnings announcements in Taiwan. Similarly, Froot, O'Connell, and Seasholes (2001) and Froot and Ramadorai (2001) find superior performance by foreign investors in different markets. The results of these studies suggest that foreign investors are better-informed traders than their domestic counterparts.

In contrast, other studies report that the performance of foreign investors is no better than that of domestic investors. Kang and Stulz (1997) find that foreign investors do not outperform domestic investors in Japan. Choe, Kho, and Stulz (2005) show that in Korea, the performance of foreign money managers is poorer than that of their domestic counterparts for medium and large trades. Dvorak (2005) finds that domestic investors make larger profits than foreign investors in Indonesia. Because prior studies have offered contradictory results, it is difficult to draw a conclusion as to whether domestic or foreign investors have information advantages based on their investment performance.

Park and Chung (2007) conduct an alternative test of whether foreign or domestic investors have superior information by analyzing whether the speed of price adjustment is related to foreign stock ownership. The authors find that returns of stocks with high foreign ownerships lead the returns of stocks with low foreign ownerships (especially after foreign ownership restriction is lifted) and conclude that foreign investors in Korea have faster access to, or processing power of, new information than local investors. Park, Chung, and Kim

(2015) take another approach to test the information superiority of foreign investors in the Korean stock market. The authors estimate the probability of informed trading (PIN) from only those trades that are initiated by each of the three types of investors (i.e., foreign investors, domestic institutional investors, and domestic individual investors) using the framework of Easley, Kiefer, O'Hara, and Paperman (1996). The authors find that the mean value of PIN for foreign investors is significantly higher than that for domestic individual investors. However, Park, Chung, and Kim (2015) do not examine whether trades initiated by foreign investors increase or decrease market liquidity.

Jiang and Kim (2004) examine the relation between foreign ownership and information asymmetry for a sample of Japanese firms using the timing and magnitude of inter-temporal return-earnings associations as a measure of information asymmetry. They show that foreign ownership is inversely related to information asymmetry and interpret the result as evidence that foreign investors are attracted to firms with low information asymmetry. Rhee and Wang (2009) show that an increase in foreign ownership leads to (i.e., Granger causes) an increase in the bid-ask spread, a decrease in depth, and an increase in the price impact of trades in the Indonesian stock market and interpret the results as evidence that foreign investors exacerbate the adverse selection problem. Choi et al. (2013) find a significant and positive relation between foreign ownership and the bid-ask spread in China and interpret the result as evidence that foreign investors increase the adverse selection risk in local markets.

Our study sheds additional light on continuing debates on the role of foreign investors in the price discovery process in emerging markets by analyzing the effect of foreign ownership on the bid-ask spread and the price impact of trades using data from 21 countries. In particular, the present study contributes to the literature by analyzing how countries' legal

and regulatory environments affect the bid-ask spread, the price impact of trades, and the relation between these variables and foreign ownership. Foreign ownership in emerging markets, especially in the common law countries, increased dramatically after the 2007-2008 global financial crisis. Our study also contributes to the literature by analyzing how the global financial crisis and the subsequent increase in foreign ownership affect the bid-ask spread, the price impact of trades, and the relation between these variables and foreign ownership.

We show that the price impact of trades increases with foreign ownership, measured by the percentage of shares that are owned by foreign investors, after controlling for various firm/stock attributes that are likely to determine the adverse selection cost. This result is consistent with the finding of previous studies (e.g., Rhee and Wang, 2009) that foreign investors have information advantages over domestic investors. We find however that the bid-ask spread is significantly and negatively related to foreign ownership after controlling for various firm/stock attributes that are known to affect the bid-ask spread, such as trading volume, return volatility, and share price. We interpret these results as evidence that although foreign traders increase the adverse selection cost in the securities market, they actually decrease trading costs by increasing competition in the price discovery process.

Prior research (e.g., La Porta et al., 1998) shows that the common law countries have better legal and regulatory environments for protecting shareholders as well as better corporate governance structures. The stronger investor protection in the common law system may reduce information asymmetry among investors and thus decrease the extent of information-based trading. We find that both the price impact of trades and the bid-ask spread are smaller for companies in the common law countries than for those in the civil law countries, suggesting that superior investor protection generally reduces both the adverse selection cost and the bid-ask spread. This result is consistent with the finding of Eleswarapu

and Venkataraman (2006) and Chung et al., (2012) that trading costs are significantly higher for stocks traded in the civil law countries than those traded in the common law countries.[2] More importantly, we show that although foreign investors exacerbate the adverse selection risk to liquidity providers, the effect of foreign ownership on the price impact of trades is smaller for firms in the common law countries, again because of their better legal and regulatory environments for protecting shareholders and better corporate governance structures.

We show that the general increase in foreign ownership in emerging markets after the global financial crisis resulted in higher price impacts and lower spreads, which is consistent with our cross-sectional regression result that higher foreign ownership is generally associated with higher price impacts and lower spreads. The effect of foreign ownership on price impacts and spreads in the post-crisis period is smaller than that in the pre-crisis period. The effect of foreign ownership on price impacts is smaller for firms in the common law countries during both the pre- and post-crisis periods and especially so in the post-crisis period. The spread-reducing effect of foreign ownership is stronger for firms in the common law countries in the post-crisis period, suggesting that in the wake of the global financial crisis, foreign investors' role as liquidity providers became stronger, especially in countries with better legal environments for shareholder rights protection.

Although our empirical results are consistent with the conjecture that foreign ownership affects both the adverse selection cost and the bid-ask spread, it is possible that our results could be driven by reverse causality. For instance, foreign investors may be attracted to stocks with greater information asymmetry problems to exploit profit opportunities using

[2] Eleswarapu and Venkataraman (2006) obtain this result using a sample of 412 NYSE-listed American Depository Receipts (ADRs) from 44 countries.

their superior information and investment tools. Alternatively, foreign investors may prefer stocks with lower spreads to minimize trading costs. To address these issues, we employ the two-stage least squares (2SLS) regression method using instrumental variables that are likely to affect the price impact of trades and the bid-ask spread only through their effects on foreign ownership. We show that our main inferences do not change after controlling for the potential endogeneity problem.

The paper is organized as follows. Section 2 describes the data and empirical methodology. Sections 3 and 4 present our empirical findings. Section 5 concludes.

2. Data sources and variable measurement

2.1. Study sample and data sources

Our study sample includes firms in 21 emerging markets (i.e., Argentina, Brazil, Czech Republic, Chile, China, Columbia, Hungary, India, Indonesia, Israel, Malaysia, Mexico, Peru, Pakistan, Philippines, Poland, Portugal, South Korea, Taiwan, Thailand, and Turkey). Following Reynolds and Flores (1989) and La Porta et al. (1998), we categorize the legal origin of each country into the common law system or civil law system (French Commercial Code and German Commercial Code).

We obtain daily return index, daily trading volume in number of shares, daily adjusted price, daily high price, daily low price, daily bid price, daily ask price, monthly foreign ownership, and monthly market capitalization from Thomson Reuters Datastream. In addition, we collect information from Worldscope on firm characteristics for all listed firms in each market. These firm characteristics include total assets and research and development (R&D) expenditure. We convert all local currencies into US dollars.

As in Karolyi et al. (2012), Lee (2011), and Ince and Porter (2006), we restrict our

study sample to stocks that are listed on major exchanges in each country. If 90% or more of the stocks listed on an exchange have a zero return in a given day, we consider it a non-trading day and exclude it from the study sample. We also exclude a stock if the number of zero-return days is more than 80% in a given month. Our final sample includes 9,701 stocks from 21 countries for the period from July 2005 through December 2013.

2.2. Variable measurement

The price impact of a trade is a widely-used empirical metric of the adverse selection cost faced by liquidity providers [see, e.g., Eleswarapu and Venkataraman (2006) and Hasbrouck (2009)]. Hasbrouck (2009) shows that Amihud's (2002) illiquidity measure is a robust metric of the price impact of trades in Kyle (1985). Similarly, Goyenko, Holden, and Trzcinka (2009) calculate monthly and yearly liquidity measures using the Center for Research in Security Prices (CRSP) daily stock data and compare them with monthly and yearly liquidity measures calculated from the TAQ data. They show that Amihud's (2002) illiquidity measure calculated from the CRSP daily data is more strongly correlated with the price impact of trades calculated from the TAQ data than any other low frequency liquidity measures. Based on these results, we use the Amihud measure as our empirical proxy for the price impact of trades (or the adverse selection component of the spread).[3] We calculate the Amihud measure using the following formula:

$$\text{AMIHUD}_{i,t} = \frac{|\text{Return}_{i,t}|}{\text{DVOL}_{i,t}} \text{ x}10^9; \tag{1}$$

[3] Prior studies analyze liquidity risk and the role of liquidity risk in asset pricing using the Amihud measure. See, for example, Acharya and Pedersen (2005), Spiegel and Wang (2005), Watanabe and Watanabe (2008), Avramov, Chordia, and Goyal (2006), Avramov, Chordia, and Goyal (2006), and Kamara, Lou and Sadka (2008).

where $Return_{i,t}$ is stock i's return on day t and $DVOL_{i,t}$ is stock i's dollar trading volume on day t. To remove outliers, we winsorize the data at 99.8% and require that the number of trading days within a month is at least 12 days. For each stock, we calculate monthly values of the Amihud measure during the study period.

Following Brennan, Huh, and Subrahmanyam (2013) and Lou and Shu (2014), we also calculate the turnover-based Amihud measure:

$$AMIHUD\_TO_{i,t} = \frac{|Return_{i,t}|}{Turnover_{i,t}} \times 10^9; \quad (2)$$

where $Turnover_{i,t}$ is stock i's turnover ratio (i.e., the number of shares traded divided by the number of shares outstanding) on day t. We use this alternative measure of price impact to address the concern that the original Amihud measure ($AMIHUD_{i,t}$) may largely capture the size effect (i.e., bigger firms generally have greater trading volumes, resulting in smaller $AMIHUD_{i,t}$).

Chung and Zhang (2014) propose a simple bid-ask spread measure that can be calculated from the two new fields (i.e., Ask and Bid) added to the CRSP database in December 2005. They show that the CRSP-based spread is highly correlated with the TAQ-based spread. For instance, the annual average of monthly cross-sectional correlation coefficients between the CRSP spread and the TAQ spread ranges from 0.9193 to 0.9729 for NASDAQ stocks. They also provide evidence that the simple CRSP-based spread provides a better approximation of the TAQ spread than other low-frequency liquidity measures.

Fong, Holden, and Trzcinka (2014) compare daily and monthly liquidity measures calculated from the Datastream daily stock data with daily and monthly liquidity measures calculated from the Thomson Reuters Tick History (TRTH) intraday stock data for 43 exchanges around the world. They show that for both monthly and daily frequencies, the

simple bid-ask spread measure suggested by Chung and Zhang (2014) has much higher correlations with intraday effective, quoted, and realized spreads than any other low frequency measures. For example, the simple bid-ask spread measure has an average cross-sectional correlation of 0.691 with daily percent effective spread calculated from intraday data and a portfolio time-series of 0.809.

Based on these results, we calculate the bid-ask spread of each stock in our study sample using Chung and Zhang's simple spread measure:

$$CZ\_SPREAD_{i,t} = (ASK_{i,t} - BID_{i,t})/M_{i,t}; \quad (3)$$

where $ASK_{i,t}$ is the ask price of stock i on day t from the Datastream daily data, $BID_{i,t}$ is the bid price of stock i on day t, and $M_{i,t}$ is the mean of $ASK_{i,t}$ and $BID_{i,t.}$ Following Lesmond (2005) and Chung and Zhang (2014), we exclude $CZ\_SPREAD_{i,t}$ if the spread is greater than 50% of the quote midpoint and/or if the daily bid price exceeds the daily ask price. For each stock, we then calculate monthly values of CZ_SPREAD if the number of trading days is greater than 12.

Although the simple bid-ask spread measure provides an excellent approximation of the intraday spread, it is not without limitation: many stocks in the Datastream database do not have the bid and/or ask prices. To fully utilize our data, we estimate the bid-ask spread using the method developed by Corwin and Schultz (2012) for these stocks. Corwin and Schultz (2012) derive and test a new way to estimate the bid-ask spread from high and low prices. The expected value of the log of the high-low price ratio is proportional to the standard deviation of the true value of the security.[4] However, in the presence of bid-ask spreads, the highest transaction price over a trading day would be the ask price hit by a buyer-initiated

[4] See Parkinson (1980) and Beckers (1983).

trade and the lowest transaction price over a trading day would be the bid price hit by a seller-initiated trade. As a result, the expected value of the high-low price ratio is a function of the standard deviation and the bid-ask spread.

To disentangle the spread and variance portions of the high-low price range, Corwin and Schultz (2012) calculate the sum of the squared log price ranges over two consecutive days,

$$\beta = \sum_{j=0}^{1} \left[\ln \left(\frac{H_{t+j}^{O}}{L_{t+j}^{O}} \right) \right]^2 \tag{4}$$

$$\gamma = \sum_{j=0}^{1} \left[\ln \left(\frac{H_{t,t+j}^{O}}{L_{t,t+j}^{O}} \right) \right]^2 \tag{5}$$

where H_j^O is the observed high price on day j and L_j^O is the observed low price on day j. The sum of the log price ratios over two days contains twice the daily variance and twice the bid-ask spread. The log price ratio for the two-day period contains twice the daily variance, but only one bid-ask spread. Making use of previous work on high-low price ratios, Corwin and Schultz (2012) obtain the following closed-form solution for the bid-ask spread (CS_SPREAD):

$$\text{CS\_SPREAD} = \frac{2(e^{\alpha}-1)}{1+e^{\alpha}}; \tag{6}$$

where $$\alpha = \frac{\sqrt{2\beta} - \sqrt{\beta}}{3 - 2\sqrt{2}} - \sqrt{\frac{\gamma}{3 - 2\sqrt{2}}}.$$

We calculate the high-low spread estimate for each two-day interval using equation (6) from the daily high and low prices provided in Datastream. We then compute monthly spreads for each sample stock by averaging spreads across all overlapping two-day intervals within each month. Following Corwin and Schultz (2012), we use only those stocks-months

with at least 12 daily spread observations and we set all negative estimates to zero before taking the monthly average. We also adjust for overnight returns as in Corwin and Shultz (2012) by comparing daily high and low prices to the previous day's close.[5]

Using the above two spread measures (i.e., CZ_SPREAD and CS_SPREAD), we define a new variable, SPREAD, which is equal to CZ_SPREAD for those stocks with bid and ask prices in Datastream and CS_SPREAD for those stocks without bid and ask prices in Datastream. We use this new variable SPREAD in our empirical analysis.

Datastream provides information on strategic holdings, which refer to any disclosed holdings exceeding 5% of the total number of outstanding shares. Specifically, Datastream provides strategic holdings of corporations, pension or endowment funds, investment banks or institutions, employees/families, and foreign investors. We use data item "NOSHFR" in Datastream as our measure of foreign ownership (FOWN), which is the percentage of total shares in issue held by institutions domiciled in countries other than that of the firm. We limit our study period to July 2005-December 2013 because the definition of strategic holders changed on April 1, 2005.[6]

We incorporate in our empirical analysis a number of firm/stock attributes that are likely related to the price impact of trades and the bid-ask spread, including return volatility, trading volume, share price, firm size, market-to-book ratio, and R&D intensity, among others. For instance, we conjecture that the price impact of trades would be greater for firms with a higher market-to-book ratio and R&D intensity because the extent of information

[5] The pairwise correlation coefficient between the high-low spread of Corwin and Schultz (2012) and the simple spread of Chung and Zhang (2014) is 0.675.

[6] Before April 1, 2005, institutions identified as strategic holders were considered strategic for every company in which they owned share, regardless of percentage of shares held. After this date, institutions are considered strategic holders of a firm only if they hold more than 5% of the firm's shares.

asymmetry in a firm is likely to increase with the size of its intangible assets. In addition, prior research shows that the bid-ask spread is significantly related to trading volume, return volatility, and share price. We measure return volatility by the standard deviation of daily stock returns (VOLATILITY), trading volume by the average daily dollar trading volume (DVOL), firm size by the market value of equity (MVE), market-to-book ratio by the market value of equity divided by the book value of equity (MTB), and R&D intensity by the ratio of R&D expenditures to total assets. All variables are winsorized at 99.9%.

2.3. Descriptive statistics

Table 1 shows the breakdown of our sample firms by legal origins, regions, and countries. Five countries have the English common law origin, ten countries have the French civil law origin, and six countries have the German civil law origin. The results show a large variation in foreign ownership across countries. The mean foreign ownership is highest (7.77%) in the Czeck Republic and lowest (1.91%) in India.

Table 2 shows the descriptive statistics of the variables used in the study. The Amihud illiquidity measure (AMIHUD) ranges from 0 to 789.27 with the mean value of 26.54, the turnover-based Amihud (AMIHUD_TO) ranges from 0 to 421.55 with the mean value of 8.69, the market value of equity (MVE) ranges from 0.01 to 359,696 (in $ million) with the mean value of 875, and dollar trading volume (DVOL) ranges from 0.0004 to 7,863,210 (in $ thousand) with the mean value of 4,013. To account for the high level of skewness in the distribution, we use the logarithms of AMIHUD, AMIHUD_TO, MVE, and DVOL in our empirical analysis.

Table 3 shows the pairwise correlation matrix of the variables. The results show that the turnover-based Amihud measure (AMIHUD_TO) is highly correlated (0.957) with the

original Amihud measure (AMIHUD). The correlation coefficient between the Corwin-Schultz spread (CS_SPREAD) and the Chung-Zhang spread (CZ_SPREAD) is 0.475. Our combined spread measure (SPREAD) is highly correlated with both CS_SPREAD and CZ_SPREAD, with the correlation coefficient of 0.766 and 1, respectively. As expected, both versions of the Amihud measure are positively related to the bid-ask spread (SPREAD) with a correlation coefficient of 0.186 and 0.266, respectively. Foreign ownership (FOWN) is positively related to both Amihud measures, but negatively related to the three measures of the bid-ask spread (i.e., SPREAD, CS_SPREAD, CZ_SPREAD). Both Amihud measures are negatively related to trading volume (Log(DVOL)) and firm size (Log(MVE)), and positively related to return volatility (VOLATILITY) and R&D. All three measures of the bid-ask spread are negatively related to trading volume, market-to-book ratio (MTB), and MVE, and positively related to return volatility and the inverse of share price. Not surprisingly, we find a positive and high correlation (0.789) between trading volume and firm size.

3. Empirical results

In this section we conduct regression analyses to investigate how the price impact of trades and the bid-ask spread are related to foreign ownership, legal origin, and various firm/stock attributes. In the first set of regressions, we analyze how the price impact of trades is related to these variables using a variety of estimation methods. The main research question here is whether higher foreign ownership is associated with greater adverse selection costs of trading and whether the legal origin of countries plays any role in this association. In the second set of regressions, we analyze the effect of foreign ownership on the cost of trading (the bid-ask spread) to assess the net effect of foreign ownership on liquidity. The net effect could be positive or negative because although the trading of foreign investors as

liquidity demanders may increase the adverse selection component of the spread, foreign investors as liquidity providers may bring net benefits to traders if they add competition in the price discovery process that is large enough to offset any adverse effect associated with their information based trading, increasing market liquidity and reducing trading costs.[7]

3.1. Regression results for the price impact of trades

To examine how the extent of informed trading is related to foreign ownership, legal origin, and other firm characteristics, we estimate the following regression model:

$$\begin{aligned} \text{Log}(\text{AMIHUD}_{i,t}) \text{ or } \text{Log}(\text{AMIHUD\_TO}_{i,t}) = \beta_0 + \beta_1 \text{FOWN}_{i,t-1} + \beta_2 \text{COMMOM}_{i,t} \\ + \beta_3 \text{FOWN}_{i,t-1}*\text{COMMON}_{i,t} + \beta_4 \text{VOLATILITY}_{i,t} + \beta_5 \text{Log}(\text{DVOL}_{i,t}) \\ + \beta_6 \text{Log}(\text{MVE}_{i,t}) + \beta_7 \text{R\&D}_{i,t} + \beta_8 \text{MTB}_{i,t} + \varepsilon_{i,t}; \end{aligned} \tag{7}$$

where $\text{AMIHUD}_{i.t}$ is the Amihud measure of firm i in month t, AMIHUD_TO is the turnover-based Amihud measure of firm i in month t, $\text{FOWN}_{i,t-1}$ is the percentage of shares that are held by foreign investors for firm i in month t-1, $\text{COMMON}_{i,t}$ is equal to 1 for firms in the common law countries and zero otherwise, $\text{VOLATILITY}_{i,t}$ is the standard deviation of daily stock returns for firm i in month t, $\text{DVOL}_{i,t}$ is the average daily dollar trading volume of firm i in month t, $\text{MVE}_{i,t}$ is the market value of equity for firm i in month t, $\text{R\&D}_{i,t}$ is the ratio of R&D expenditures to total assets for firm i in month t, and $\text{MTB}_{i,t}$ is the ratio of the market value of equity to the book value of equity for firm i in month t.

[7] Foreign traders, like other traders, play the role of liquidity demanders and liquidity providers in the price discovery process. They are liquidity demanders when they submit market orders or marketable limit orders and liquidity providers when they submit non-marketable limit orders.

Table 4 shows the pooled ordinary least squares (OLS) regression results with clustered standard errors at the firm level that are estimated from 328,459 firm-month observations.[8] To assess the sensitivity of our results with respect to different estimation methods, we also estimate the model using the Fama-MacBeth method. Columns (1) through (6) show the results when we use AMIHUD as the dependent variable and columns (7) through (12) show the results when we use AMIHUD_TO as the dependent variable. Columns (1), (2), (7) and (8) show the results when we include only foreign ownership and other firm attributes in the regression. Columns (3), (4), (9), and (10) show the results when we include the dummy variable for the common law countries in the regression. Columns (5), (6), (11), and (12) show the results when we include both the common law dummy variable and its interaction with foreign ownership in the regression.

The results show that the regression coefficients on foreign ownership (FOWN) are positive and significant across all model specifications and estimation methods. This finding is consistent with the conjecture that foreign investors are generally more informed than domestic investors and their trading poses greater adverse selection risks to liquidity providers. Prior studies show that institutional trading is more likely information-driven (e.g., Ali et al., 2004; Pinnuck, 2004; Bushee and Goodman, 2007), and higher institutional ownership is associated with a greater information asymmetry (e.g., Dennis and Weston, 2001; Agrawal 2007; Rubin, 2007). The finding of the present study suggests that, in emerging markets, this information asymmetry may be amplified because foreign investors are more experienced, better trained, or even better informed. Consequently, their trading

[8] The clustered standard errors correctly account for the dependence in the data, common in a panel data set, and produce unbiased estimates. See Petersen (2009) for a detailed explanation of this method.

may pose even greater adverse selections risks to domestic liquidity providers, resulting in larger price impacts.

We find that the price impact of trades is higher for stocks with greater return volatility regardless of estimation methods or model specifications. This result is consistent with the notion that liquidity providers generally face greater adverse selection risks in riskier stocks. The price impact of trades is smaller for stocks with larger trading volumes, perhaps indicating that the price of these stocks is more informative. The price impact of trades is positively and significantly related to both R&D expenditures and the market-to-book ratio across all model specifications and estimation methods. This result is consistent with our conjecture that the extent of information asymmetry in a firm is likely to increase with the size of its intangible assets. The turnover-based Amihud measure is negatively and significantly related to MVE (firm size) across all model specifications and estimation methods. This result is consistent with the finding of prior research (e.g., Chung and Charoenwong, 1998) that larger firms generally disclose more inside information and thus the extent of insider trading is lower. The relation between the original Amihud measure and firm size is generally positive and much weaker than the relation between the turnover-based Amihud measure and firm size. This result may be driven by the fact that the original Amihud measure includes the effect of firm size.

Consistent with the findings of Eleswarapu and Venkataraman (2006) and Chung et al., (2012), the results in columns (3), (4), (9) and (10) show that the regression coefficients on the dummy variable for the common law countries are all negative and significant, indicating that liquidity providers generally face lower adverse selection risks in the common law countries. This result is in line with the finding of prior research that the common law countries have, on average, better legal and regulatory environments for protecting

shareholders as well as better corporate governance structures. The stronger investor protection in the common law system may reduce information asymmetry among investors and thus may decrease the extent of information-based trading.

When we include both the common law dummy variable and its interaction with foreign ownership in the regression, we find that the coefficients on the interaction variable are negative and significant according to both the pooled OLS and Fama-MacBeth regressions [see columns (5), (6), (11) and (12)]. Hence, although foreign investors exacerbate the adverse selection risk to liquidity providers, the effect of foreign ownership on price impact is smaller for firms in the common law countries, perhaps because of their better legal and regulatory environments for protecting shareholders and better corporate governance structures.

3.2. Regression results for the bid-ask spread

In the previous section, we show that higher foreign ownership is associated with higher price impacts of trades and interpret the result as evidence that foreign investors pose greater adverse selection risks to liquidity providers. As we noted earlier, the positive relation between the price impact of trades and foreign ownership does not necessarily imply a positive relation between foreign ownership and the spread because higher foreign ownership implies not only a higher adverse selection component of the spread but also a *lower* non-information component (e.g., economic rent) to the extent that foreign ownership results in higher competition in the price discovery process.

In this section, we analyze the relation between foreign ownership and the bid-ask spread after controlling for various firm/stock attributes that are related to the bid-ask spread. Specifically, we estimate the following regression model:

$$SPREAD_{i,t} = \beta_0 + \beta_1 FOWN_{i,t-1} + \beta_2 COMMOM_{i,t} + \beta_3 FOWN_{i,t-1} * COMMON_{i,t}$$
$$+ \beta_4 VOLATILITY_{i,t} + \beta_5 Log(DVOL_{i,t}) + \beta_6 1/PRICE_{i,t} + \beta_7 Log(MVE_{i,t})$$
$$+ \beta_8 \ R\&D_{i,t} + \beta_9 MTB_{i,t} + \varepsilon_{i,t}; \quad (8)$$

where $SPREAD_{i,t}$ is the bid-ask spread of stock i in month t, $PRICE_{i,t}$ is mean price of stock i in month t, and all other variables are the same as defined in regression model (7). We also estimate regression model (8) using only those stocks for which the bid and ask prices are available in Datastream [i.e., using only those stocks for which the Chung and Zhang (2014) method (SPREAD_CZ) is applicable].[9] We include return volatility and dollar trading volume in the regression model because prior research shows that the spread increases with return volatility and decreases with trading volume.[10] We include the reciprocal of share price in the model because prior research shows that it provides the best fit for the spread model.[11] We include R&D and MTB to control for the effect of intangible assets on the spread. Table 5 shows the regression results.

As in Table 4, columns (1) through (6) show the results when we use SPREAD as the dependent variable and columns (7) through (12) show the results when we use SPREAD_CZ as the dependent variable. Columns (1), (2), (7) and (8) show the results when we include only foreign ownership and other firm attributes in the regression. Columns (3), (4), (9), and (10) show the results when we include the dummy variable for the common law countries in the regression. Columns (5), (6), (11), and (12) show the results when we include both the common law dummy variable and its interaction with foreign ownership in the regression.

[9] We also estimate the model using only the Corwin and Schultz (2012) spreads. We find that the results are qualitatively similar to those reported in the paper. The results are available from the authors upon request.
[10] See Harris (1994), Barclay and Smith (1988), Benston and Hagerman (1974), and Choi and Subramanyam (1993).
[11] See Harris (1994).

The results show that the regression coefficients on foreign ownership (FOWN) are negative and significant across all model specifications and estimation methods, indicating that a larger foreign ownership is associated with a lower spread despite the fact that foreign investors are generally more informed than domestic investors. We interpret this result as evidence that foreign investors add competition to the price discovery process as liquidity providers, reducing the non-information component of the bid-ask spread. Overall, our results are consistent with the trading hypothesis (Rubin, 2007) that foreign investors provide liquidity through their frequent trading. However, our results differ from the findings of Rhee and Wang (2009) and Choi et al. (2014) that the spread is positively related to foreign ownership in the Indonesian and Chinese stock markets, respectively. Possible reasons for the different results may be different study samples, study periods, and/or control variables.

The results in columns (3), (4), (9), and (10) show that the regression coefficients on the dummy variable for the common law countries are all negative and significant, which is consistent with the finding of prior research (e.g., Lesmond, 2005) that firms in the common law countries have, on average, lower spreads than firms in the civil law countries. When we include both the common law dummy variable and its interaction with foreign ownership in the regression, we find that the coefficients on the interaction variable are not significantly different from zero according to both the pooled OLS and Fama-MacBeth regressions [see columns (5), (6), (11) and (12)]. Hence, the effect of foreign ownership on the bid-ask spread is similar between firms in the common law countries and firms in the civil law countries.

Consistent with the findings of prior research, the bid-ask spread is positively related to return volatility and the reciprocal of share price, and negatively related to dollar trading volume regardless of estimation methods or model specifications. However, the relation between the spread and other firm attributes (i.e., MVE, R&D, and MTB) is sensitive to

whether we use SPREAD or SPREAD_CZ as the dependent variable. One possible explanation for the latter result is the difference in regression samples: the number of observations used in the SPREAD regressions is 361,670, while the number of observations used in the SPREAD_CZ regressions is only 195,639. There may be systematic differences in firm characteristics between the two samples, which led to the different regression results.

3.3. Subsample results: Pre- and post-crisis period

Figure 1 shows that foreign ownership in the emerging markets has increased since 2005. In particular, foreign ownership in the common law countries has increased more than foreign ownership in the civil law countries since the global financial crisis (2007-2008). The increase in foreign ownership in the emerging markets may be attributed to (1) improved fundamentals in the emerging market economies and (2) low interest rates in the developed market economies that encouraged investors to increase their investments in the emerging markets.

To determine whether the effect of foreign ownership on the price impact of trades and the bid-ask spread differs between the 2005-2008 period and the 2009-2013 period (i.e., the post financial crisis period), we estimate regression models (7) and (8) using data for each subperiod separately. Panel A of Table 6 shows the results for the price impact of trades measured by AMIHUD_TO and Panel B of Table 6 shows the results for the bid-ask spread measured by SPREAD.[12] The left half of each panel shows the results for the 2005-2008 period and the right half shows the results for 2009-2013 period.

[12] The results are similar when we use AMIHUD instead of AMIHUD_TO.

Similar to the results in Table 4 and Table 5, the price impact of trades increases with foreign ownership (see Panel A) while the bid-ask spread decreases with foreign ownership (see Panel B) during both sub-periods. In the price impact regressions, the coefficients on FOWN during the 2009-2013 period are smaller than the corresponding figures during the 2005-2008 period, indicating a smaller effect of foreign ownership on price impact in the post-crisis period. Similarly, the coefficients on FOWN during the 2009-2013 period are smaller than (in absolute value) the corresponding figures during the 2005-2008 period in the spread regressions with all control variables, indicating a smaller effect of foreign ownership on spreads in the post-crisis period.

Panel A shows that the coefficients on COMMON in the price impact regressions are negative during both sub-periods and larger in absolute values and more significant during the post-crisis period, indicating that the price impact of trades is smaller in the common law countries during both sub-periods and the difference in price impacts between the common and civil law countries is larger during the post-crisis period. Similarly, Panel B shows that the bid-ask spread is also smaller in the common law countries during both sub-periods.

Panel A shows that the coefficients on the interaction term between foreign ownership and the dummy variable for the common law countries in the price impact regressions are negative during both sub-periods and more significant in the post-crisis period, indicating that the effect of foreign ownership on price impact is smaller for firms in the common law countries during both sub-periods, and especially so during the post-crisis period. In contrast, Panel B shows that the coefficients on the interaction term in the spread regressions have opposite signs between the two sub-periods. The coefficients on the interaction term are positive and significant in the 2005-2008 period, indicating that although the spread decreases with foreign ownership, the relation is weaker for firms in the common law

countries. In the post-crisis period, however, the coefficients on the interaction term are negative and significant, indicating that the spread-reducing effect of foreign ownership is stronger for firms in the common law countries. Hence in the wake of the global financial crisis, foreign investors' role as liquidity providers became stronger, especially in countries with better legal environments for shareholder rights protection. The results for other explanatory variables are qualitatively identical to those reported in Table 4 and Table 5.

3.4. Regression results for the whole period with a dummy variable for the post-crisis period

To shed further light on the effect of the global financial crisis, we add a dummy variable for the post-crisis period (POST), interaction terms between POST and FOWN, COMMON, and FOWN*COMMON to regression models (7) and (8) and show the results in Panel C of Table 6.[13] The first three columns show the results for the price impact regressions and the next three columns show the results for the spread regressions. The results show that the estimated coefficients on POST in the price impact regressions are positive and significant, while the estimated coefficients on POST in the spread regressions are negative and significant. Hence, the general increase in foreign ownership in emerging markets after the global financial crisis resulted in higher price impacts and lower spreads, which is consistent with our cross-sectional regression result (in Table 4 and Table 5) that higher foreign ownership is generally associated with both higher price impacts and lower spreads.

The coefficients on FOWN are positive and significant in the price impact regressions, but negative and significant in the spread regressions, indicating that stocks with

[13] We report only the results of the pooled OLS regressions because the Fama-MacBeth regression is not applicable to this case.

higher foreign ownerships exhibit higher price impacts and lower spreads during the 2005-2008 period. The coefficients on POST*FOWN are negative in the price impact regressions, indicating a smaller (positive) effect of foreign ownership on price impact in the post-crisis period. The coefficients on POST*FOWN are positive and significant in the spread regressions with all variables, indicating a smaller (negative) effect of foreign ownership on spreads in the post-crisis period. These results are qualitatively identical to those in Panel A and Panel B. Figure 2 and Figure 3 summarize these results. The lower sensitivity of the price impact of trades and the bid-ask spread to foreign ownership in the post-crisis period may reflect the diminishing marginal effect of foreign ownership on these variables given their larger values in the post-crisis period.

The coefficients on COMMON are all negative and mostly significant in the price impact and spread regressions, indicating that the price impact and spread are smaller in the common law countries during the 2005-2008 period. The coefficients on POST*COMMON are negative and significant in the price impact regressions, indicating that the difference in price impacts between the common law and civil law countries is even larger during the post-crisis period. In contrast, the coefficients on POST*COMMON in the spread regressions are not significantly different from zero, indicating that the difference in spreads between the common law and civil law countries is similar between the two sub-periods. These results are qualitatively identical to those in Panel A and Panel B.

The coefficients on both FOWN*COMMON and POST*FOWN*COMMON in the price impact regressions are negative, indicating that the effect of foreign ownership on price impact is smaller for firms in the common law countries during both sub-periods and especially so in the post-crisis period. In contrast, the coefficients on FOWN*COMMON are positive and significant and the coefficients on POST*FOWN*COMMON are negative and

significant in the spread regressions. This result is consistent with the results in Panel B that although the spread decreases with foreign ownership, the relation is weaker for firms in the common law countries in the 2005-2008 period and the spread-reducing effect of foreign ownership is stronger for firms in the common law countries in the post-crisis period. The results for other explanatory variables are qualitatively similar to those reported in Table 4 and Table 5.

4. Analysis of possible reverse causality

Although our empirical results are consistent with the conjecture that foreign ownership affects both the adverse selection cost and the bid-ask spread, it is possible that our results could be driven by reverse causality. For instance, foreign investors may be attracted to stocks with greater information asymmetries to exploit profit opportunities using their superior information and investment tools. Alternatively, foreign investors may prefer stocks with lower spreads to minimize trading costs. To address these issues, we employ the two-stage least squares (2SLS) method using instrumental variables that are likely to affect the price impact of trades and the bid-ask spread only through their effects on foreign ownership (or that are related to foreign ownership, but unlikely to be correlated with residuals in the second-stage regression).

Prior research (see, e.g., Kang and Stulz, 1997; Dahlquist and Robertsson, 2001; Covrig et al., 2006; Ferreira and Matos, 2009) suggests that foreign investors prefer to hold firms with large market capitalizations, low return volatility, low financial leverage, large foreign sales, and more closely held shares. Among these variables, we use financial leverage (LEVERAGE), foreign sales (FOREIGN_SALES), and closely held shares (CLOSELY_HELD) as our instrumental variables in the 2SLS regression because they are

unlikely to directly influence the price impact of trades or the bid-ask spread. We obtain data on foreign sales (foreign sales/the market value of equity), leverage (total debt/total assets), and closely held shares from Datastream.[14]

In the first stage, we regress foreign ownership on the three instrumental variables discussed above and all other exogenous variables in the second-stage regression. In the second stage, we regress both the Amihud measure and the bid-ask spread on the predicted values of foreign ownership (from the first stage regression) and all other explanatory variables in the regression models.

Consistent with the finding of prior research, the first-stage regression results (see Table 7) show that the estimated coefficients on our instrumental variables have the expected signs: foreign ownership is positively related to foreign sales and closely owned shares, and negatively related to financial leverage in both regressions. More importantly, we find that our main results remain intact after controlling for the potential endogeneity problem. In the 2SLS model for the Amihud price impact (Log(AMIHUD_TO)), we find that the coefficient on the instrumented foreign ownership is significant and positive in the second stage regression. Likewise, in the 2SLS model for the bid-ask spread (SPREAD), we find that the coefficient on the instrumented foreign ownership is negative and significant in the second stage regression.[15]

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[14] CLOSELY_HELD is defined as the ratio of the number of closely held shares to the total number of common shares outstanding. For companies with more than one class of common stock, closely held shares for each class is added together. It includes but is not restricted to: shares held by officers, directors and their immediate families; shares held in trust; shares of the company held by any other corporation (except shares held in a fiduciary capacity by banks or other financial institutions); shares held by pension/benefit plans; shares held by individuals who hold 5% or more of the outstanding shares. For Japanese companies closely held represents the holdings of the ten largest shareholders.

[15] To examine a potential endogeneity problem, we also conduct the Durbin-Wu-Hausman test as suggested by Davidson and MacKinnon (1995). The test results indicate that we cannot reject the null hypothesis.

5. Summary and concluding remarks

There have been ongoing debates regarding the role of foreign investors in the domestic securities market for emerging economies. In particular, both regulators and researchers have analyzed the possible benefits and negative consequences of foreign traders in the domestic securities market because foreign investors are generally believed to have better information and analytical tools than domestic investors. If foreign investors as liquidity demanders have sufficient information advantages over domestic liquidity providers, the presence of the former can lead to lower market liquidity because of the latter's reluctance to trade with better informed traders. If, on the other hand, the information advantage of foreign investors is not large enough to offset the additional competition and liquidity they provide, the presence of foreign investors could actually benefit domestic investors through lower overall trading costs.

In our study, we shed additional light on these issues by analyzing the impact of foreign ownership on the adverse selection cost and the bid-ask spread using data from 21 countries. Our study also investigates the effect of legal systems on the adverse selection cost and the spread and whether the manner through which foreign ownership affects these variables depends on countries' legal systems.

Our results show that stocks with higher foreign investment exhibit a larger price impact of trades than those with lower foreign investment. We interpret this result as evidence that foreign investors' trades have greater information content than do domestic investors' trades. Consequently, the adverse selection component of the spread increases with foreign ownership. We find however that the bid-ask spread is negatively and significantly related to foreign ownership after controlling for other determinants of the spread. We obtain qualitatively similar results after addressing the potential endogeneity problem using a set of

instrumental variables that are likely to affect the price impact of trades and the bid-ask spread only through foreign ownership. Hence our results are unlikely to be driven by reverse causality. Overall, our results indicate that although foreign investors increase adverse selection risks in the securities market as liquidity demanders, they bring net benefits to the market in the form of lower trading costs through their role as liquidity providers by increasing competition in the price discovery process.

Prior research suggests that legal and regulatory environments for the protection of shareholder right have important consequences on stock market liquidity. In a similar spirit, we find that both the price impact of trades and the bid-ask spread are lower for firms in the common law countries than for those in the civil law countries. More importantly, we find that although foreign investors increase the adverse selection risk to liquidity providers, the effect of foreign ownership on price impact is smaller for firms in the common law countries, perhaps because of their better legal and regulatory environments that protect shareholder rights as well as better corporate governance structures. Finally, we show that the spread-reducing effect of foreign ownership is stronger for firms in the common law countries in the post financial-crisis period (2009-2013), suggesting that foreign investors' role as liquidity providers became stronger in countries with a better legal environment for shareholder rights protection.

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Table 1
Breakdown of study sample by legal origins, regions, and countries

This table shows the breakdown of our sample firms by country and type of legal origin during the sample period (July 2005-Dec 2013). Foreign ownership (FOWN) is the percentage of shares that are held by foreign investors.

Legal origin	Region	Country	Number of firms	Number of observations	FOWN (%)
Common (English)	Asia	India	998	76,119	1.91
	Asia	Malaysia	1,058	81,678	3.80
	Asia	Pakistan	206	15,185	4.13
	Asia	Thailand	645	47,848	4.25
	EMEA	Israel	495	39,758	3.95
Civil (French)	Asia	Indonesia	498	18,433	4.75
	Asia	Philippines	274	18,454	4.42
	EMEA	Russia	319	17,038	6.04
	EMEA	Turkey	389	32,814	4.53
	Latin	Argentina	86	6,368	4.71
	Latin	Brazil	464	29,274	5.63
	Latin	Colombia	53	1,783	7.48
	Latin	Chile	195	9,040	6.54
	Latin	Mexico	156	7,905	7.08
	Latin	Peru	98	4,159	5.30
Civil (German)	Asia	China	1,226	85,973	6.16
	Asia	Korea	925	56,771	5.17
	Asia	Taiwan	1,002	78,361	5.28
	EMEA	Czech Republic	16	625	7.77
	EMEA	Hungary	60	3,179	4.34
	EMEA	Poland	538	35,355	3.90

Table 2
Descriptive statistics

This table shows the descriptive statistics of the variables used in the study. AMIHUD is the price impact measure calculated using the method in Amihud (2002), AMIHUD_TO is the turnover-based Amihud measure, SPREAD_CS is the bid-ask spread calculated using the method in Corwin and Schultz (2012), SPREAD_CZ is the bid-ask spread calculated using the method in Chung and Zhang (2014), SPREAD is the bid-ask spread constructed from SPREAD_CS and SPREAD_CZ (i.e., SPREAD is equal to CZ_SPREAD for those stocks with bid and ask prices in Datastream and CS_SPREAD for those stocks without bid and ask prices in Datastream). FOWN is the percentage of shares that are held by foreign investors, VOLATILITY is the standard deviation of daily stock returns, DVOL is the average daily dollar trading volume, PRICE is the mean share price, MVE is the market value of equity, R&D is the ratio of R&D expenditures to total assets, and MTB is the ratio of the market value of equity to the book value of equity. Subscript i denotes firm i and subscript t denotes month t.

Variables	Number of observations	Mean	Standard deviation	Minimum	Maximum
$AMIHUD_{i,t}$	589,766	26.54	105.83	0.00	789.27
$AMIHUD\_TO_{i,t}$	589,766	8.69	49.87	0.00	421.55
$SPREAD_{i,t}$	661,487	0.045	0.05	0.00	0.71
$SPREAD\_CS_{i,t}$	616,969	0.050	0.04	0.00	0.71
$SPREAD\_CZ_{i,t}$	355,381	0.041	0.06	0.00	0.50
$FOWN_{i,t}$ (%)	556,789	4.33	14.27	0.00	100.00
$VOLATILITY_{i,t}$	635,184	0.034	0.03	0.00	0.95
$MVE_{i,t}$ ($ million)	665,000	875	4,336	0.01	359,696
$R\&D_{i,t}$	665,001	0.004	0.01	0.00	0.10
$DVOL_{i,t}$ ($ thousand)	658,983	4,013	34,474	0.0004	7,863,210
$PRICE_{i,t}$ ($)	659,041	5.34	16.85	0.01	133.03

Table 3
Correlation matrix

This table shows the pair-wise correlation coefficient between the variables. AMIHUD is the price impact measure calculated using the method in Amihud (2002), AMIHUD_TO is the turnover-based Amihud measure, SPREAD_CS is the bid-ask spread calculated using the method in Corwin and Schultz (2012), SPREAD_CZ is the bid-ask spread calculated using the method in Chung and Zhang (2014), SPREAD is the bid-ask spread constructed from SPREAD_CS and SPREAD_CZ (i.e., SPREAD is equal to CZ_SPREAD for those stocks with bid and ask prices in Datastream and CS_SPREAD for those stocks without bid and ask prices in Datastream). FOWN is the percentage of shares that are held by foreign investors, VOLATILITY is the standard deviation of daily stock returns, DVOL is the average daily dollar trading volume, PRICE is the mean share price, MVE is the market value of equity, R&D is the ratio of R&D expenditures to total assets, and MTB is the ratio of the market value of equity to the book value of equity. Subscript i denotes firm i and subscript t denotes month t. *** denotes statistical significance at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Log($AMIHUD_{i,t}$)	1											
(2) Log($AMIHUD\_TO_{i,t}$)	0.957***	1										
(3) $SPREAD_{i,t}$	0.186***	0.266***	1									
(4) $SPREAD\_CZ_{i,t}$	0.348***	0.449***	1	1								
(5) $SPREAD\_CS_{i,t}$	0.238***	0.305***	0.766***	0.475***	1							
(6) $FOWN_{i,t-1}$	0.065***	0.016***	-0.015***	-0.010***	-0.028***	1						
(7) $VOLATILITY_{i,t}$	0.270***	0.308***	0.525***	0.544***	0.621***	-0.011***	1					
(8) Log($DVOL_{i,t}$)	-0.737***	-0.834***	-0.342***	-0.560***	-0.164***	-0.069***	-0.201***	1				
(9) $1/PRICE_{i,t}$	0.114***	0.189***	0.195***	0.391***	0.111***	0.020***	0.212***	-0.249***	1			
(10) $MTB_{i,t}$	-0.174***	-0.220***	-0.063***	-0.111***	-0.010***	0.033***	-0.030***	0.228***	-0.090***	1		
(11) Log($MVE_{i,t}$)	-0.609***	-0.812***	-0.337***	-0.402***	-0.329***	0.082***	-0.294***	0.789***	-0.270***	0.250***	1	
(12) $R\&D_{i,t}$	0.009***	0.009***	-0.004***	-0.003	0.003	0.001	0.008***	0.003	-0.004***	0.019***	-0.006***	1

Table 4
Regression results for the price impact of trades

This table shows the results of the following regression model:

$$\text{Log}(\text{AMIHUD}_{i,t}) \text{ or } \text{Log}(\text{AMIHUD\_TO}_{i,t}) = \beta_0 + \beta_1\text{FOWN}_{i,t-1} + \beta_2\text{COMMOM}_{i,t} + \beta_3\ \text{FOWN}_{i,t-1}*\text{COMMON}_{i,t} + \beta_4\text{VOLATILITY}_{i,t} + \beta_5\text{Log}(\text{DVOL}_{i,t}) + \beta_6\text{Log}(\text{MVE}_{i,t}) + \beta_7\ \text{R\&D}_{i,t} + \beta_8\ \text{MTB}_{i,t} + \varepsilon_{i,t};$$

where $\text{AMIHUD}_{i.t}$ is the Amihud price impact measure of firm i in month t, AMIHUD_TO is the turnover-based Amihud measure of firm i in month t, $\text{FOWN}_{i,t-1}$ is the percentage of shares that are held by foreign investors for firm i in month t-1, $\text{COMMON}_{i,t}$ is equal to 1 for firms in the common law countries and zero otherwise, $\text{VOLATILITY}_{i,t}$ is the standard deviation of daily stock returns for firm i in month t, $\text{DVOL}_{i,t}$ is the average daily dollar trading volume of firm i in month t, $\text{MVE}_{i,t}$ is the market value of equity for firm i in month t, $\text{R\&D}_{i,t}$ is the ratio of R&D expenditures to total assets for firm i in month t, and $\text{MTB}_{i,t}$ is the ratio of the market value of equity to the book value of equity for firm i in month t. Figures in parenthesis are t-statistics. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent variables	Log($AMIHUD_{i,t}$)						Log($AMIHUD\_TO_{i,t}$)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Explanatory variables	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth
$FOWN_{i,t-1}$	0.011***	0.013***	0.011***	0.012***	0.015***	0.016***	0.011***	0.012***	0.011***	0.012***	0.015***	0.015***
	(4.93)	(20.24)	(4.87)	(20.15)	(4.99)	(22.11)	(4.90)	(20.23)	(4.85)	(20.15)	(4.97)	(22.20)
$COMMON_{i,t}$			-0.256***	-0.241***	-0.193**	-0.192***			-0.236***	-0.221***	-0.174**	-0.173***
			(-3.37)	(-12.13)	(-2.48)	(-10.91)			(-3.09)	(-11.31)	(-2.22)	(-9.93)
$FOWN_{i,t-1}$* $COMMON_{i,t}$					-0.014***	-0.011***					-0.013***	-0.011***
					(-3.53)	(-12.19)					(-3.50)	(-12.30)
$VOLATILITY_{i,t}$	0.266***	0.269***	0.264***	0.266***	0.262***	0.265***	0.272***	0.275***	0.270***	0.273***	0.268***	0.271***
	(25.75)	(30.46)	(25.51)	(30.31)	(25.42)	(30.52)	(26.07)	(30.64)	(25.85)	(30.52)	(25.77)	(30.71)
$Log(DVOL)_{i,t}$	-1.129***	-1.128***	-1.142***	-1.139***	-1.138***	-1.136***	-1.134***	-1.134***	-1.147***	-1.144***	-1.142***	-1.141***
	(-55.85)	(-240.97)	(-56.00)	(-217.41)	(-55.65)	(-219.59)	(-55.08)	(-235.45)	(-55.33)	(-212.87)	(-55.01)	(-214.71)
$1/PRICE_{i,t}$	-0.026***	-0.025***	-0.025***	-0.024***	-0.025***	-0.024***	-0.026***	-0.025***	-0.025***	-0.024***	-0.026***	-0.025***
	(-13.45)	(-38.48)	(-13.43)	(-38.57)	(-13.60)	(-38.43)	(-13.45)	(-37.65)	(-13.48)	(-37.67)	(-13.65)	(-37.57)
$Log(MVE)_{i,t}$	0.038	0.046***	0.029	0.037***	0.023	0.033***	-0.941***	-0.933***	-0.948***	-0.941***	-0.955***	-0.946***
	(1.07)	(7.07)	(0.83)	(5.78)	(0.65)	(5.01)	(-26.74)	(-136.35)	(-26.72)	(-141.24)	(-26.86)	(-139.89)
$R\&D_{i,t}$	0.105***	3.339***	0.107***	3.353***	0.108***	3.369***	0.106***	3.413***	0.108***	3.424***	0.109***	3.440***
	(7.96)	(8.52)	(7.83)	(8.69)	(7.75)	(8.67)	(7.55)	(8.60)	(7.44)	(8.75)	(7.36)	(8.73)
$MTB_{i,t}$	0.035***	0.034***	0.036***	0.036***	0.037***	0.036***	0.034***	0.033***	0.035***	0.035***	0.036***	0.036***
	(2.65)	(11.43)	(2.76)	(12.43)	(2.81)	(12.60)	(2.60)	(11.08)	(2.70)	(12.00)	(2.75)	(12.16)
Constant	2.278***	2.293***	2.474***	2.482***	2.461***	2.473***	2.158***	2.181***	2.339***	2.355***	2.326***	2.346***
	(14.19)	(73.77)	(13.93)	(68.53)	(13.86)	(69.27)	(13.28)	(67.61)	(13.00)	(64.09)	(12.93)	(64.63)
Number of observations	328,495	328,495	328,495	328,495	328,495	328,495	328,495	328,495	328,495	328,495	328,495	328,495
R-squared	0.64	0.62	0.64	0.62	0.64	0.62	0.80	0.79	0.80	0.79	0.80	0.79
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Clustered by firm	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO

Table 5
Regression results for the bid-ask spread

This table shows the results of the following regression model:

$$SPREAD_{i,t} \text{ or } SPREAD\_CZ_{i,t} = \beta_0 + \beta_1 FOWN_{i,t-1} + \beta_2 COMMOM_{i,t} + \beta_3 FOWN_{i,t-1} * COMMON_{i,t} + \beta_4 VOLATILITY_{i,t} + \beta_5 Log(DVOL_{i,t}) + \beta_6 1/PRICE_{i,t} + \beta_7 Log(MVE_{i,t}) + \beta_8 R\&D_{i,t} + \beta_9 MTB_{i,t} + \varepsilon_{i,t};$$

where $SPREAD_{i,t}$ is the bid-ask spread of firm i in month t constructed using the methods in Corwin and Schultz (2012) and Chung and Zhang (2014) (i.e., SPREAD is equal to CZ_SPREAD for those stocks with bid and ask prices in Datastream and CS_SPREAD for those stocks without bid and ask prices in Datastream), SPREAD_CZ is the bid-ask spread of firm i in month t calculated using the method in Chung and Zhang (2014), $FOWN_{i,t-1}$ is the percentage of shares that are held by foreign investors for firm i in month t-1, $COMMON_{i,t}$ is equal to 1 for firms in the common law countries and zero otherwise, $VOLATILITY_{i,t}$ is the standard deviation of daily stock returns for firm i in month t, $DVOL_{i,t}$ is the average daily dollar trading volume of firm i in month t, $PRICE_{i,t}$ is mean price of stock i in month t, $MVE_{i,t}$ is the market value of equity for firm i in month t, $R\&D_{i,t}$ is the ratio of R&D expenditures to total assets for firm i in month t, and $MTB_{i,t}$ is the ratio of the market value of equity to the book value of equity for firm i in month t. Figures in parenthesis are t-statistics. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent variables	$SPREAD_{i,t}$						$SPREAD\_CZ_{i,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Explanatory variables	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth	Pooled OLS	Fama MacBeth
$FOWN_{i,t-1}$	-0.010***	-0.010***	-0.010***	-0.010***	-0.009***	-0.010***	-0.008***	-0.006***	-0.009***	-0.006***	-0.008***	-0.006***
	(-6.36)	(-20.02)	(-6.55)	(-21.07)	(-4.76)	(-16.02)	(-4.90)	(-9.11)	(-5.09)	(-9.82)	(-3.57)	(-9.31)
$COMMON_{i,t}$			-0.296***	-0.279***	-0.280***	-0.268***			-0.243***	-0.299***	-0.224**	-0.286***
			(-4.29)	(-6.52)	(-3.89)	(-6.29)			(-2.84)	(-4.69)	(-2.46)	(-4.45)
$FOWN_{i,t-1}*COMMON_{i,t}$					-0.004	0.002					-0.004	0.003
					(-1.15)	(1.20)					(-1.06)	(1.56)
$VOLATILITY_{i,t}$	0.827***	0.837***	0.824***	0.832***	0.824***	0.832***	0.774***	0.792***	0.771***	0.785***	0.771***	0.784***
	(74.16)	(90.48)	(74.11)	(89.23)	(74.08)	(89.20)	(59.00)	(82.20)	(59.36)	(81.24)	(59.30)	(81.29)
$Log(DVOL)_{i,t}$	-0.301***	-0.303***	-0.315***	-0.315***	-0.314***	-0.315***	-0.971***	-0.984***	-0.978***	-0.995***	-0.976***	-0.994***
	(-17.74)	(-26.67)	(-17.97)	(-31.07)	(-17.86)	(-30.89)	(-44.66)	(-49.80)	(-44.31)	(-54.36)	(-44.22)	(-54.00)
$1/PRICE_{i,t}$	0.020***	0.020***	0.020***	0.020***	0.020***	0.020***	0.083***	0.078***	0.083***	0.078***	0.083***	0.078***
	(7.03)	(17.99)	(7.07)	(17.76)	(7.05)	(17.79)	(15.45)	(38.64)	(15.46)	(38.02)	(15.46)	(38.28)
$Log(MVE)_{i,t}$	-0.137***	-0.147***	-0.150***	-0.162***	-0.151***	-0.162***	0.335***	0.314***	0.322***	0.298***	0.320***	0.299***
	(-5.55)	(-14.98)	(-6.01)	(-17.48)	(-6.06)	(-17.74)	(10.54)	(24.77)	(9.97)	(24.96)	(9.94)	(24.93)
$R\&D_{i,t}$	-0.070**	-0.957***	-0.068**	-0.967***	-0.067**	-0.976***	0.015**	1.228*	0.017**	0.883	0.017**	0.894
	(-2.03)	(-2.66)	(-2.00)	(-2.76)	(-2.00)	(-2.80)	(2.02)	(1.74)	(2.44)	(1.34)	(2.48)	(1.35)
$MTB_{i,t}$	0.029**	0.031***	0.030***	0.032***	0.030***	0.032***	-0.022	-0.019***	-0.022	-0.023***	-0.022	-0.022***
	(2.50)	(5.48)	(2.60)	(5.61)	(2.60)	(5.62)	(-1.55)	(-3.37)	(-1.55)	(-3.91)	(-1.55)	(-3.89)
Constant	4.019***	3.982***	4.253***	4.238***	4.248***	4.230***	3.904***	3.919***	4.093***	4.187***	4.085***	4.175***
	(27.77)	(42.60)	(27.09)	(56.10)	(27.05)	(55.98)	(16.46)	(30.10)	(16.44)	(36.44)	(16.36)	(36.15)
Number of observations	361,670	361,670	361,670	361,670	361,670	361,670	195,639	195,639	195,639	195,639	195,639	195,639
R-squared	0.36	0.35	0.36	0.36	0.36	0.36	0.53	0.53	0.53	0.53	0.53	0.53
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Clustered by firm	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO

Table 6
Regression results for the sub-periods

To determine whether the effect of foreign ownership on the price impact of trades and the bid-ask spread differs between the 2005-2008 period and the 2009-2013 period, we estimate the following regression models using data for each sub-period separately. Panel A shows the results for the price impact of trades and Panel B shows the results for the bid-ask spread. The left half of each panel shows the results for the 2005-2008 and the right half shows the results for the 2009-2013 (i.e., post financial crisis) period.

$$\text{Log}(\text{AMIHUD\_TO}_{i,t}) = \beta_0 + \beta_1\text{FOWN}_{i,t-1} + \beta_2\text{COMMOM}_{i,t} + \beta_3\ \text{FOWN}_{i,t-1}*\text{COMMON}_{i,t} + \beta_4\text{VOLATILITY}_{i,t} + \beta_5\text{Log}(\text{DVOL}_{i,t}) + \beta_6\text{Log}(\text{MVE}_{i,t}) + \beta_7\ \text{R\&D}_{i,t} + \beta_8\ \text{MTB}_{i,t} + \varepsilon_{i,t}$$

$$\text{SPREAD}_{i,t} = \beta_0 + \beta_1\text{FOWN}_{i,t-1} + \beta_2\text{COMMOM}_{i,t} + \beta_3\text{FOWN}*\text{COMMON}_{i,t} + \beta_4\text{VOLATILITY}_{i,t} + \beta_5\text{Log}(\text{DVOL}_{i,t}) + \beta_6\ 1/\text{PRICE}_{i,t} + \beta_7\ \text{Log}(\text{MVE}_{i,t}) + \beta_8\ \text{R\&D}_{i,t} + \beta_9\ \text{MTB}_{i,t} + \varepsilon_{i,t}$$

where $\text{AMIHUD\_TO}_{i,t}$ is the turnover-based Amihud price impact measure of firm i in month t, $\text{SPREAD}_{i,t}$ is the bid-ask spread of stock i in month t, $\text{FOWN}_{i,t-1}$ is the percentage of shares that are held by foreign investors for firm i in month t-1, $\text{COMMON}_{i,t}$ is equal to 1 for firms in the common law countries and zero otherwise, $\text{VOLATILITY}_{i,t}$ is the standard deviation of daily stock returns for firm i in month t, $\text{DVOL}_{i,t}$ is the average daily dollar trading volume of firm i in month t, $\text{PRICE}_{i,t}$ is mean price of stock i in month t, $\text{MVE}_{i,t}$ is the market value of equity for firm i in month t, $\text{R\&D}_{i,t}$ is the ratio of R&D expenditures to total assets for firm i in month t, and $\text{MTB}_{i,t}$ is the ratio of the market value of equity to the book value of equity for firm i in month t. Figures in parenthesis are t-statistics. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A. Dependent variable: Log(AMIHUD_TO$_{i,t}$)

	Results for the 2005-2008 period						Results for the 2009-2013 period					
Explanatory variables	(1) Pooled OLS	(2) Fama-MacBeth	(3) Pooled OLS	(4) Fama-MacBeth	(5) Pooled OLS	(6) Fama-MacBeth	(7) Pooled OLS	(8) Fama-MacBeth	(9) Pooled OLS	(10) Fama-MacBeth	(11) Pooled OLS	(12) Fama-MacBeth
FOWN$_{i,t-1}$	0.017***	0.018***	0.017***	0.018***	0.018***	0.020***	0.009***	0.009***	0.009***	0.008***	0.012***	0.012***
	(5.10)	(21.94)	(5.07)	(22.38)	(4.62)	(18.38)	(3.74)	(21.85)	(3.72)	(21.07)	(4.01)	(20.38)
COMMON$_{i,t}$			-0.042	-0.052**	-0.025	-0.031			-0.332***	-0.340***	-0.259***	-0.272***
			(-0.47)	(-2.18)	(-0.27)	(-1.34)			(-4.43)	(-21.06)	(-3.35)	(-18.39)
FOWN*COMMON$_{i,t}$					-0.008	-0.010***					-0.013***	-0.011***
					(-1.32)	(-6.92)					(-3.04)	(-10.42)
VOLATILITY$_{i,t}$	0.193***	0.207***	0.193***	0.206***	0.192***	0.206***	0.320***	0.323***	0.317***	0.319***	0.314***	0.317***
	(17.12)	(17.51)	(17.16)	(17.30)	(17.14)	(17.35)	(26.50)	(37.85)	(26.10)	(37.07)	(26.00)	(37.16)
Log(DVOL$_{i,t}$)	-1.093***	-1.103***	-1.096***	-1.107***	-1.095***	-1.106***	-1.153***	-1.155***	-1.168***	-1.170***	-1.162***	-1.165***
	(-43.52)	(-154.90)	(-42.40)	(-138.95)	(-42.26)	(-140.34)	(-56.23)	(-235.12)	(-56.82)	(-231.26)	(-56.41)	(-222.94)
1/PRICE$_{i,t}$	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***	-0.029***	-0.029***	-0.028***	-0.028***	-0.028***	-0.028***
	(-7.38)	(-30.09)	(-7.52)	(-29.23)	(-7.58)	(-29.00)	(-15.16)	(-37.63)	(-15.03)	(-35.92)	(-15.18)	(-35.59)
Log(MVE$_{i,t}$)	-0.984***	-0.974***	-0.985***	-0.974***	-0.987***	-0.976***	-0.914***	-0.904***	-0.928***	-0.919***	-0.935***	-0.924***
	(-23.37)	(-130.48)	(-23.36)	(-128.42)	(-23.34)	(-126.88)	(-26.40)	(-103.96)	(-26.45)	(-102.66)	(-26.59)	(-100.18)
R&D$_{i,t}$	1.331*	6.075***	1.336*	6.028***	1.348*	6.060***	0.098***	1.549***	0.101***	1.601***	0.102***	1.607***
	(1.77)	(8.06)	(1.77)	(8.14)	(1.77)	(8.09)	(10.10)	(7.85)	(9.97)	(7.80)	(9.95)	(7.91)
MTB$_{i,t}$	0.063***	0.055***	0.063***	0.056***	0.064***	0.056***	0.020	0.018***	0.022	0.021***	0.023*	0.021***
	(3.85)	(10.89)	(3.85)	(11.03)	(3.86)	(11.08)	(1.45)	(8.54)	(1.64)	(10.65)	(1.69)	(10.95)
Constant	2.109***	2.189***	2.140***	2.224***	2.141***	2.224***	2.320***	2.176***	2.559***	2.446***	2.542***	2.432***
	(10.55)	(40.25)	(9.92)	(36.04)	(9.92)	(36.14)	(14.47)	(54.58)	(14.47)	(58.79)	(14.38)	(59.11)
Number of observations	112,493	112,493	112,493	112,493	112,493	112,493	216,002	216,002	216,002	216,002	216,002	216,002
R-squared	0.76	0.75	0.76	0.75	0.76	0.75	0.82	0.81	0.82	0.82	0.82	0.82
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Clustered by firm	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO

Panel B. Dependent variable: $SPREAD_{i,t}$

Explanatory Variables	Results for the 2005-2008 period						Results for the 2009-2013 period					
	(1) Pooled OLS	(2) Fama-MacBeth	(3) Pooled OLS	(4) Fama-MacBeth	(5) Pooled OLS	(6) Fama-MacBeth	(7) Pooled OLS	(8) Fama-MacBeth	(9) Pooled OLS	(10) Fama-MacBeth	(11) Pooled OLS	(12) Fama-MacBeth
$FOWN_{i,t-1}$	-0.009***	-0.009***	-0.010***	-0.009***	-0.013***	-0.012***	-0.010***	-0.010***	-0.010***	-0.010***	-0.008***	-0.008***
	(-3.90)	(-10.82)	(-4.18)	(-11.77)	(-4.64)	(-12.24)	(-6.02)	(-16.91)	(-6.16)	(-17.42)	(-3.87)	(-12.09)
$COMMON_{i,t}$			-0.363***	-0.328***	-0.394***	-0.357***			-0.307***	-0.288***	-0.268***	-0.256***
			(-4.27)	(-3.94)	(-4.52)	(-4.24)			(-4.19)	(-6.35)	(-3.45)	(-5.94)
$FOWN*COMMON_{i,t}$					0.013**	0.013***					-0.007**	-0.005***
					(2.40)	(5.43)					(-2.13)	(-4.47)
$VOLATILITY_{i,t}$	0.827***	0.835***	0.823***	0.828***	0.824***	0.829***	0.829***	0.836***	0.826***	0.831***	0.825***	0.831***
	(58.57)	(54.40)	(58.35)	(53.38)	(58.41)	(53.53)	(58.99)	(69.52)	(59.01)	(68.68)	(58.93)	(68.53)
$Log(DVOL_{i,t})$	-0.317***	-0.306***	-0.340***	-0.325***	-0.342***	-0.327***	-0.295***	-0.298***	-0.307***	-0.308***	-0.304***	-0.305***
	(-13.85)	(-14.05)	(-14.20)	(-17.59)	(-14.27)	(-17.78)	(-16.60)	(-23.72)	(-16.81)	(-26.06)	(-16.61)	(-25.67)
$1/PRICE_{i,t}$	0.029***	0.028***	0.030***	0.029***	0.030***	0.029***	0.030***	0.030***	0.031***	0.031***	0.030***	0.031***
	(5.63)	(11.92)	(5.79)	(12.00)	(5.84)	(12.12)	(7.48)	(17.25)	(7.63)	(17.17)	(7.60)	(17.18)
$Log(MVE_{i,t})$	-0.166***	-0.164***	-0.175***	-0.179***	-0.170***	-0.175***	-0.117***	-0.125***	-0.132***	-0.143***	-0.135***	-0.145***
	(-5.26)	(-11.36)	(-5.49)	(-12.95)	(-5.34)	(-12.90)	(-4.41)	(-9.78)	(-4.98)	(-11.86)	(-5.09)	(-12.10)
$R\&D_{i,t}$	-0.724*	-0.654	-0.691*	-0.630	-0.707*	-0.649	-0.064**	-1.248***	-0.061**	-1.263***	-0.061**	-1.268***
	(-1.85)	(-0.81)	(-1.86)	(-0.81)	(-1.85)	(-0.84)	(-2.08)	(-4.78)	(-2.05)	(-4.79)	(-2.05)	(-4.76)
$MTB_{i,t}$	0.038**	0.026***	0.038**	0.024***	0.038**	0.025***	0.027**	0.035***	0.029**	0.038***	0.029**	0.038***
	(2.31)	(2.80)	(2.29)	(2.70)	(2.28)	(2.71)	(2.10)	(5.11)	(2.26)	(5.56)	(2.27)	(5.56)
Constant	4.168***	4.048***	4.442***	4.356***	4.438***	4.352***	4.737***	3.820***	4.966***	4.072***	4.954***	4.061***
	(22.18)	(23.99)	(21.89)	(31.93)	(21.89)	(31.96)	(29.00)	(37.84)	(29.05)	(51.26)	(28.96)	(51.11)
Number of observations	121,533	121,533	121,533	121,533	121,533	121,533	237,840	237,840	237,840	237,840	237,840	237,840
R-squared	0.38	0.36	0.38	0.36	0.38	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Clustered by firm	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO

Panel C. Regression results for the whole period with a dummy variable for the post-crisis period (POST)

Dependent Variables	Log(AMIHUD_TO$_{i,t}$)			SPREAD$_{i,t}$		
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)
POST	0.060	0.131**	0.114*	-0.214**	-0.180**	-0.200**
	(0.91)	(1.99)	(1.74)	(-2.44)	(-2.05)	(-2.28)
FOWN$_{i,t-1}$	0.016***	0.016***	0.018***	-0.010***	-0.010***	-0.013***
	(23.39)	(23.31)	(21.17)	(-11.16)	(-11.58)	(-13.02)
POST*FOWN$_{i,t-1}$	-0.007***	-0.007***	-0.004***	0.000	0.000	0.005***
	(-9.00)	(-9.07)	(-4.52)	(0.18)	(0.30)	(4.07)
COMMON		-0.109***	-0.089***		-0.272***	-0.300***
		(-7.40)	(-5.86)		(-10.96)	(-11.75)
POST*COMMON		-0.192***	-0.136***		-0.081***	-0.017
		(-11.27)	(-7.67)		(-2.73)	(-0.55)
FOWN$_{i,t-1}$*COMMON			-0.007***			0.013***
			(-5.85)			(5.61)
POST*FOWN*COMMON			-0.007***			-0.019***
			(-4.79)			(-7.71)
VOLATILITY$_{i,t}$	0.272***	0.270***	0.269***	0.828***	0.824***	0.824***
	(84.23)	(83.39)	(83.09)	(117.88)	(117.52)	(117.43)
Log(DVOL$_{i,t}$)	-1.135***	-1.147***	-1.142***	-0.301***	-0.316***	-0.315***
	(-401.69)	(-397.09)	(-392.98)	(-67.64)	(-68.18)	(-67.56)
Log(MVE$_{i,t}$)	-0.026***	-0.025***	-0.026***	0.029***	0.030***	0.030***
	(-71.77)	(-69.90)	(-70.55)	(22.77)	(23.36)	(23.36)
R&D$_{i,t}$	-0.940***	-0.949***	-0.955***	-0.131***	-0.145***	-0.145***
	(-206.48)	(-207.71)	(-207.64)	(-19.65)	(-22.00)	(-21.97)
MTB$_{i,t}$	0.106***	0.108***	0.109***	-0.070***	-0.067***	-0.066***
	(17.79)	(17.88)	(18.18)	(-4.46)	(-4.31)	(-4.30)
1/PRICE$_{i,t}$	0.034***	0.036***	0.036***	0.030***	0.031***	0.031***
	(17.16)	(18.02)	(18.28)	(9.25)	(9.75)	(9.75)
Constant	2.148***	2.290***	2.290***	3.946***	4.182***	4.187***
	(37.21)	(39.11)	(39.11)	(49.73)	(52.00)	(52.07)
Number of observations	328,495	328,495	328,495	359,373	359,373	359,373
R-squared	0.80	0.80	0.80	0.37	0.37	0.37
Industry dummies	YES	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES	YES
Clustered by firm	YES	YES	YES	YES	YES	YES

Table 7
Two-stage least squares (2SLS) regression results

This table shows the two-stage least squares regression results for the turnover-based Amihud price impact measure (AMIHUD_TO) and the bid-ask spread (SPREAD). In the first stage, we regress foreign ownership on three instrumental variables [i.e., financial leverage (LEVERAGE), foreign sales (FOREIGN-SALES), and closely held shares (CLOSELY-HELD)] and all other exogenous variables in the second-stage regression. In the second stage, we regress both the Amihud measure and the bid-ask spread on the predicted values of foreign ownership (from the first stage regression) and all other explanatory variables in the regression models. $AMIHUD_{i,t}$ is the Amihud price impact measure of firm i in month t, $SPREAD_{i,t}$ is the bid-ask spread of stock i in month t, $FOWN_{i,t-1}$ is the percentage of shares that are held by foreign investors for firm i in month t-1, $LEVERAGE_{i,t}$ is the ratio of total debt to total assets for firm i in month t, $FOREIGN\text{-}SALES_{i,t}$ is the ratio of foreign sales to the market value of equity for firm i in month t, and CLOSELY-HELD is the ratio of the number of closely held shares to the total number of common shares outstanding. $COMMON_{i,t}$ is equal to 1 for firms in the common law countries and zero otherwise, $VOLATILITY_{i,t}$ is the standard deviation of daily stock returns for firm i in month t, $DVOL_{i,t}$ is the average daily dollar trading volume of firm i in month t, $PRICE_{i,t}$ is mean price of stock i in month t, $MVE_{i,t}$ is the market value of equity for firm i in month t, $R\&D_{i,t}$ is the ratio of R&D expenditures to total assets for firm i in month t, and $MTB_{i,t}$ is the ratio of the market value of equity to the book value of equity for firm i in month t. The p-value of the Durbin-Wu-Hausman statistics is reported for testing whether variables are exogenous. Regression results are based on clustered standard errors at the firm level. Figures in parenthesis are t-statistics. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent variables	Log(AMIHUD_TO$_{i,t}$)		SPREAD$_{i,t}$	
	(1)	(2)	(3)	(4)
Explanatory variables	FOWN$_{i,t}$ 2SLS (1st Stage)	Log(AMIHUD_TO$_{i,t}$) 2SLS (2nd Stage)	FOWN$_{i,t}$ 2SLS (1st Stage)	SPREAD$_{i,t}$ 2SLS (2nd Stage)
FOWN$_{i,t-1}$		0.0047*		-0.0002***
		(1.68)		(-3.05)
CLOSELY_HELD$_{i,t}$	0.004***		0.004***	
	(40.90)		(42.63)	
LEVERAGE$_{i,t}$	-0.018***		-0.017***	
	(-10.89)		(-10.34)	
FOREIGN_SALES$_{i,t}$	0.001		0.002	
	(0.77)		(1.33)	
VOLATILITY$_{i,t}$	0.182***	0.294***	0.224***	0.0081***
	(9.41)	(124.52)	(15.52)	(237.61)
Log(DVOL$_{i,t}$)	-0.771	-0.984***	-1.518***	-0.0031***
	(-33.17)	(-253.91)	(-82.17)	(-32.65)
Log(MVE$_{i,t}$)	1.997***	-1.152***	2.540***	-0.0009***
	(60.8)	(-159.66)	(89.1)	(-6.15)
R&D$_{i,t}$	0.859	0.754***	-0.082	-0.0015
	(1.55)	(11.36)	(-0.17)	(-1.35)
MTB$_{i,t}$	0.199	0.016***	0.266***	-0.0001***
	(11.99)	(7.92)	(15.87)	(-3.33)
1/PRICE$_{i,t}$	-0.003	-0.037***	-0.042***	0.0004***
	(-0.95)	(-99.16)	(-14.27)	(57.48)
Constant	5.986***	-0.663***	-0.458	0.0356***
	(14.55)	(-12.27)	(-1.43)	(51.70)
Number of observations	218,001	218,001	234,409	234,409
Industry dummies	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
R-squared	0.15	0.90	0.08	0.38
F-test (P-value)	609.64(0.00)		542.67(0.00)	
Durbin-Wu-Hausman		0.11		2.05
(P-value)		(0.74)		(0.15)

Figure 1. Legal origin and foreign ownership

This figure shows time-series variation in foreign ownership (FOWN) for our study sample of 21 emerging markets. We show the results for firms in the common law countries and firms in the civil law countries separately.

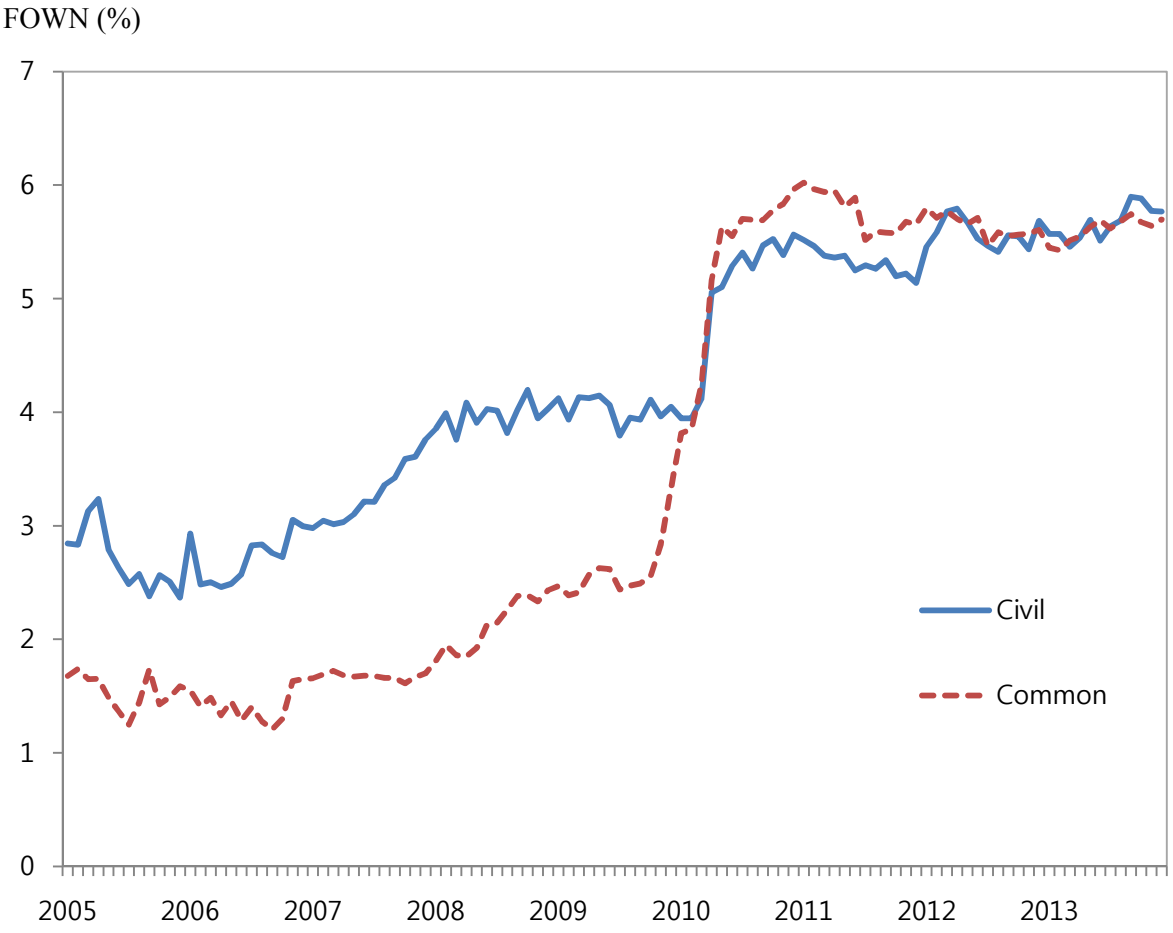

Figure 2. Relation between foreign ownership (FOWN) and the price impact of trades measured by Log(AMIHUD_TO)

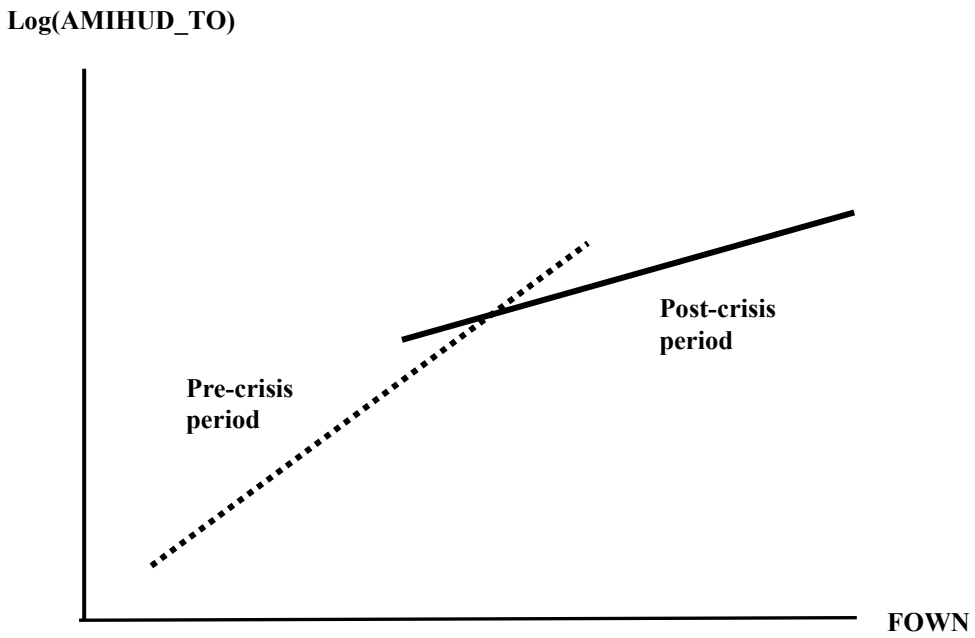

Figure 3. Relation between foreign ownership (FOWN) and liquidity measured by the bid-ask spread (SPREAD)