Macro-level of Institutional Quality and Market Liquidity for Non-US Stocks

Pankaj K. Jain
Fogelman College of Business and Economics
University of Memphis
Memphis, TN 38152-3120
Phone: 901-678-3810
E-mail: pjain@memphis.edu

Jang-Chul Kim
Haile/US Bank College of Business
Northern Kentucky University
Highland Heights, KY 41099
Phone: 859-572-1486
E-mail: kimj1@nku.edu

Young Sang Kim
Haile/US Bank College of Business
Northern Kentucky University
Highland Heights, KY 41099
Phone: 859-572-5160
Email: kimy1@nku.edu

JEL Classification: F30, G14, G34

Keywords: Country Rating, Spreads, Market Quality Index, Adverse Selection Costs.

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Abstract

In this paper, we investigate the empirical relation between macro-level of institutional quality and market liquidity for non-US stocks. We find that non-US stocks from countries with better macro-level of institutional quality such as financial, political, economic, and exchange rate stability, and better country rating exhibit better liquidity in form of narrower quoted and effective spreads, higher market quality indexes, and lower adverse selection costs. In addition, we find that non-US stocks from countries with a better macro-level of institutional quality and greater number of overlapping trading hours tend to be significantly more liquid compared to stocks from countries with lower ratings or greater number of non-overlapping trading hours. Therefore, improving a country's image (macro-level of institutional quality) helps to improve market liquidity for non-US stocks.

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I. Introduction

In this study, we investigate the liquidity effects of the macro and micro-level institutional environments. Non-US stocks listed in the U.S. provide an ideal setting for such analyses. A total of 3,585 non-US stocks listed on major U.S. exchanges such as the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), and NASDAQ. International cross-listings have increased significantly in recent years and are receiving special attention from the exchanges as a major area for growth. According to the NYSE 2006 factbook, total market capitalization of non-US stocks is about $7 trillion which constitutes one-third the total market capitalization of approximately $21 trillion for all firms listed on NYSE in 2005.

Why do so many foreign firms list on the US exchanges? Mittoo (1992), Fanto and Karmel (1997), and Doidge, Karolyi, and Stulz (2004) show that the cross-listed firms enjoy many benefits such as lower cost of capital, better access to foreign capital markets, larger shareholder base, better visibility, and higher valuations. Coffee (1999, 2002), Stulz (1999), and Reese and Weisbach (2002) argue that a U.S. listing enhances the protection of the firm's investors and consequently, reduces the agency costs of controlling shareholders. Based on this argument, Doidge, Karolyi, and Stulz (2004) suggest that cross-listing firms have higher growth opportunity through controlling shareholders. These positive effects of being listed on major US exchanges are a good motivation for non-US firms to cross list.

Related to trading activity, Amihud and Mendelson (1986) and Jacoby, Fowler, and Gottesman (2000) show a direct link between corporate costs of capital and liquidity. Market microstructure studies (Tinic, 1972; Tinic and West, 1972; Branch and Freed, 1977; Stoll, 1978; Benston and Hagerman, 1974; Copeland and Galai, 1983; and McInish and Wood, 1992) find that firm level or trading activity variables such as price, return volatility, number of trades,

trading volume, and market capitalization are major determinants of trading costs or liquidity. However, non-US stocks are listed on both their home markets and U.S. markets. Therefore, besides such trading activity variables, the determinants of trading cost or liquidity for non-US stocks could be different from those of domestic stocks. This implies that there are other significant variables that affect trading costs or liquidity for non-US stocks.

We conjecture that both macro-level of institutional quality and micro-structure of exchange affect stock market liquidity. The former affects fundamentals, growth opportunities, cash flows, and valuations for firms. A favorable environment can attract a bigger pool of international investors. Also a good micro-structure is necessary for smooth inflow and outflow of capital and would be a pre-condition for many foreign investors to participate in a country's stock markets. Improved liquidity results in improved valuations. Amihud and Mendelson (1986) and Jacoby, Fowler, and Gottesman (2000) show a direct link between corporate costs of capital, valuations and liquidity. International evidence of these relationships is provided by Jain (2005, 2006) who highlight significant differences in liquidity and valuations among countries. Many of those differences are driven by financial market design of the stock exchanges. Other studies (Stulz, 1981; Uppal, 1993; Bacidore and Sofianos, 2002); highlight the importance of home-bias for liquidity. The interactions of market design and home-bias have implications for liquidity that have not been tested before.

In addition there can be important interaction between macro-environment and micro-structure. Developed countries typically enjoy stronger institutional and regulatory framework. In contrast, emerging countries have cleaner microstructure arrangements because their late start resulted in adoption of the latest available technology. Developed countries had to switch from less efficient microstructures to the latest technology and faced significant resistance from the

entrenched market participants who had vested interests in maintaining the old ways of trading. Thus, there is potential for negative relation between macro- and micro-structure designs.

In the JP Morgan (2003) survey, more than half (nearly 56%) of respondents said foreign exchange considerations impact their investment decisions. We conjecture that the vibrancy of foreign exchange rates, their intra-daily volatility, and variations in currency market micro-structure creates interesting variation in liquidity of non-US stocks denominated in different home currencies in their home markets. Erb, Harvey, and Viskanta (1996) investigate whether country risk rating indexes including political, financial, and economic risks can explain future expected rates of return. They find that country risk measures are highly correlated with future equity returns. Therefore, non-US stocks give a unique opportunity to investigate microeconomic variables and their trading costs because the characteristics of macroeconomic environments such as political, financial, economic, exchange rate, and country risk for non-US stocks are different country by country.

Microstructure issues of cross-listed stocks has been analyzed by Bacidore and Sofianos (2002) and Jiang and Kim (2005) who investigate the differences in market quality for a paired sample of U.S. and non-US stocks. Although specialist participation rates in non-U.S. stocks and U.S. stocks are similar, the former have wider spreads, lower depth, and larger intraday volatility than the latter, driven largely by the higher information asymmetry for non-US stocks. Brockman and Chung (2003) show that, among firms listed on the Hong Kong Stock Exchange, shares of firms based in Hong Kong have narrower spreads and greater depths than shares of firms based in mainland China. They interpret this finding as evidence that poor investor protection results in poor liquidity.

Beside the comparison of liquidity between U.S. and non-US stocks, there are several recent studies investigating the determinants of liquidity for non-US stocks. With a paired matched sample of U.S. and non-US stocks, Bacidore, Battalio, Galpin, and Jennings (2005) find that non-US stocks have less displayed liquidity than comparable U.S. stocks but similar non displayed liquidity as comparable U.S. stocks.[1] Moulton and Wei (2008) find that liquidity for European cross-listed stocks is significantly higher during overlapping trading hours than during non-overlapping trading hours for higher competition among liquidity providers during overlapping trading hours. Chung (2006) shows that American Depository Receipts (ADRs) of firms operating in countries with strong investor protection mechanisms exhibit narrower spreads than those of firms operating in poor investor protection environments. Using shareholder rights, accounting standards, and the rule of law for 49 countries developed by La Porta, Lopez-De-Silanes, Shleifer and Vishny (1997, 1998), Eleswarapu and Venkataraman (2007) suggest that macro-level institutional quality affects trading costs through its impact on information risk and investor participation.[2]

We extend these studies in a couple of important ways. First, we investigate how the joint effect of macro-level of institutional quality and micro-structure affect the degree of market integration by relating such issues as home bias and overlapping of trading hours. Pulatkonak and Sofianos (1999), Moulton and Wei (2005) highlight the importance of time zone for liquidity suppliers whereas a majority of JP Morgan (2003) investors' survey respondents said time zone differences do not impact their investment decision or demand for non-US stocks. Thus, liquidity

[1] Displayed liquidity refers to the quoted spread and depth, and non-displayed liquidity present when traders execute orders for more than the quoted depth at the quoted price or better. Also, they find that non-US stocks from transparent home markets have higher liquidity when the home market is open, but non-US stocks from opaque home markets have lower liquidity when the home market is closed.

[2] They find that trading costs are significantly lower for stocks from countries with better ratings for judicial efficiency and accounting standards. In addition, they find that the trading costs are significantly higher for stocks from French civil law than from common law countries.

effect of overlapping trading is an open empirical question. In this paper we investigate the interaction between the macro-level of institutional quality and the number of overlapping trading hours.

Our results show that non-US stocks from countries with a better macro-level of institutional quality such as financial, political, economic, exchange stability, and country rating exhibit narrower quoted and effective spreads, higher market quality indices, and lower adverse selection costs. In addition, we find that non-US stocks from countries with a better macro-level of institutional quality and a greater number of overlapping trading hours tend to be significantly more liquid, with narrower spreads, higher market quality indices, and lower adverse selection costs than non-US stocks from countries with a lower macro-level of institutional quality and a greater number of trading hours.

The rest of the paper is organized as follows. In Section II, we discuss Variable Measurement, Data Sources, and Sample Selection. Empirical results are in Section III. Section IV concludes our study.

II. Variable Measurement, Data Sources, and Sample Selection

In this section we discuss our variable measurement procedures, data sources, and descriptive statistics of the key variables used in the study.

A. Country Rating Data

We obtain a proxy for macro-level of institutional quality such as financial, political, economic, composite risk ratings, and exchange rate stability data from the International Country Risk Guide (ICRG). The ICRG System rates financial, political, and economic risks, breaking each down into its key components, as well as compiling the composite ratings and forecasts.

Erb, Harvey, and Viskanta (1996) find that the ICRG risk measures such as economic and financial risk can predict expected returns strongly for developed markets. Each risk measure is described in detail below.

A-1. Financial Risk (FR)

This rating assesses financial stability by assigning risk points to a pre-determined group of factors, the financial risk components. The minimum number of points that can be assigned to each component is zero and the maximum is defined in the list of components below. In every case, the lower the point total, the higher the risk. To calculate the Financial Risk Rating, points are assigned to the following components: Total Foreign Debt as % GDP, Debt Service as % Exports of Goods & Services, Current Account as % Exports of Goods & Services, International Liquidity as months of Import Cover, and Exchange Rate Stability as % of Change. Financial risk ratings range from a high of 50 (least risk) to a low of 0 (highest risk).

A-2. Political Risk (PR)

This rating assesses political stability by assigning risk points to a pre-set group of factors, the political risk components. The minimum number of points that can be assigned to each component is zero and the maximum is defined in the list of components below. Again, the lower the risk point total, the higher the risk. To calculate the Political Risk Rating, points are assigned to the following components: Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religious Tensions, Law and Order, Ethnic Tensions, Democratic Accountability, and Bureaucracy Quality. Political risk ratings range from a high of 100 (least risk) to a low of 0 (highest risk).

A-3. Economic Risk (ER)

This rating assesses economic stability by assigning risk points to a pre-set group of factors, the Economic risk components. The minimum number of points that can be assigned to each component is zero and the maximum is defined in the list of components below. In every case the lower the risk point total, the higher the risk and vice versa. To calculate the Economic Risk Rating, points are assigned to the following components: GDP per Head of Population, Real Annual GDP Growth, Annual Inflation Rate, Budget Balance as % GDP, and Current Account as % GDP. Economic risk ratings range from a high of 50 (least risk) to a low of 0 (highest risk).

A-4. Risk Points for Exchange Rate Stability

This ratings range from high % change of either 0.0 - 9.9 appreciation or depreciation of 0.1-4.9 with risk points at 10.0, to a midpoint of either appreciation at 50.0+ or depreciation of 30.0 - 34.9 with risk points at 5.0 to a low depreciation of 100.0+ with 0.0 points. The higher the points, the lower the risk.

A-5. Composite Risk Rating

To produce these composite risk ratings, the ICRG system combines the component points for political, financial, and economic risk according to the following formula, which calculates the aggregate political, financial, and economic risk.

$$CR \text{ (country X)} = 0.5 (FR + PR + ER)$$

The highest overall rating (theoretically 100) indicates the lowest risk, and the lowest rating (theoretically zero) indicates the highest risk. The details of the ICRG data description of financial, political, economic, and composite risk ratings are in Appendix 1.

A-6. Country Rating

In addition to the ICRG risk data, we obtain country rating data from Coface North America. The country rating assigned by Coface North America reflects the average level of

short-term non-payment risk associated with companies in a particular country. It reflects the extent to which a country's economic, financial, and political outlook influence financial commitments of local companies. Country ratings are calculated using several indicators. Coface groups the indicators in seven areas and rates each one individually. The seven risk areas are: Growth vulnerability, foreign currency liquidity crisis, external over indebtedness, sovereign financial vulnerability, banking sector's fragilities, political and institutional instability, and companies' payment behavior. Appendix 2 shows the risk level and descriptions for country ratings provided by Coface.

B. Sample Selection and Liquidity Measures

We identify non-US stocks listed on the NYSE from the NYSE's non-US companies' database as of December 2002. Initially, we have 473 non-US stocks from 51 different countries. We obtain data for liquidity variables for all non-US stocks from July to September 2002 from the Trade and Quote database (TAQ) provided by the NYSE. First, we delete non-US stocks if they are not matched with the TAQ database, if they are not common stocks, and if they are in countries described as "flags of convenience."[3] After filtering out those stocks, the final sample size is 412 non-US stocks from 43 countries.

We then apply the following data filters to trades and quotes, which are standard in the microstructure literature to clean the data of errors and outliers (see, e.g., Huang and Stoll (1996)): a) delete quotes if either the bid or ask price is negative; b) delete quotes if either the bid or ask size is negative; c) delete quotes if the bid-ask spread is greater than $4 or negative; d) delete trades and quotes if they are out of time sequence or involve an error; e) delete before-the-

[3] Following Pulatkonak and Sofianos (1999) and Bacidore and Sofianos (2002), we classify stocks incorporated in Bahamas, Bermudas, Cayman Islands, Guernsey, Jersey, Liberia, Puerto Rico and Netherland Antilles as "flag of convenience."

open and after-the-close trades and quotes; f) delete trades if the price or volume is negative; and g) delete trades and quotes if they changed by more than 10% compared to the last transaction price and quote.

The percentage quoted spreads of stock *i* at time τ are calculated as follows:

$$\text{Quoted Spread}_{i,\tau} = (\text{Ask}_{i,\tau} - \text{Bid}_{i,\tau})/\text{M}_{i,\tau};$$

where $\text{Ask}_{i,\tau}$ is the ask price for stock *i* at time τ, $\text{Bid}_{i,\tau}$ is the bid price for stock *i* at time τ, and $\text{M}_{i,\tau}$ is the mean of $\text{Ask}_{i,\tau}$ and $\text{Bid}_{i,\tau}$.

To measure the cost of trading when it occurs at prices inside the posted bid and ask quotes, we also calculate the effective percentage spread of stock *i* at time τ as

$$\text{Effective Spread}_{i,\tau} = 2\text{D}_{i,\tau}\,(\text{P}_{i,\tau} - \text{M}_{i,\tau})/\text{M}_{i,\tau};$$

where $\text{P}_{i,\tau}$ is the transaction price for stock *i* at time τ, $\text{M}_{i,\tau}$ is the midpoint of the most recently posted bid and ask quotes for stock *i*, and $\text{D}_{i,\tau}$ is a binary variable which equals one for customer buy orders and negative one for customer sell orders. We estimate $\text{D}_{i,\tau}$ using the algorithm in Ellis, Michaely, and O'Hara (2000).

The quoted depth of stock *i* at time τ is calculated as follows:

$$\text{Quoted Depth}_{i,\tau} = (\text{Ask Depth}_{i,\tau} + \text{Bid Depth}_{i,\tau});$$

where $\text{Ask Depth}_{i,\tau}$ is the ask depth for stock *i* at time τ, $\text{Bid depth}_{i,\tau}$ is the bid price for stock *i* at time τ.

We also calculate the following market quality index (MQI) suggested by Bollen and Whaley (1998) and Zhao and Chung (2006) to measure the net effect of the ratings on overall market liquidity. This measure captures the tradeoff between quoted spread and market depth

and is a direct measure of liquidity. This is defined as the ratio of the quoted depth to quoted spread.[4]

To measure adverse selection cost we follow the Lin, Sanger and Booth (1995) model because Van Ness, Van Ness, and Warr (2001) show that this model seems to yield relatively more accurate estimates of adverse-selection cost than other common spread decomposition models. In the model, λ reflects the quote revision as a fraction of the effective spread z_t, and θ reflects the pattern of order persistence.

$$Q_{t+1} - Q_t = \lambda Z_t + e_{t+1},$$

$$Z_{t+1} = \theta Z_t + \eta_{t+1},$$

where $\Delta Q_{t+1} = Q_{t+1} - Q_t$, Q_t is the logarithm of the quoted midpoint at time t, $Z_t = P_t - Q_t$, P_t is the logarithm of the trade price at time t, λ is the adverse-selection component of the effective spread, and the disturbance terms e_{t+1} and η_{t+1} are assumed to be uncorrelated. The parameters are estimated through the following regression equation: $\Delta Q_{t+1} = \lambda Z_t + e_{t+1}$. We obtain the adverse-selection component, λ, for each stock, and report the cross-sectional averages for our samples of non-US stocks. The adverse selection component of spread is again an inverse measure of liquidity.

[4] This measure assumes a linear liquidity supply schedule (i.e., a linear tradeoff between the spread and depth), which may not correctly capture actual preferences of liquidity providers.

III. Empirical Results

In this section, we examine how our liquidity measures are related to the macro-level of institutional quality for non-US stocks after controlling for other possible determinants of market liquidity.

A. Descriptive Statistics

We report descriptive statistics of our sample in Table 1. The table shows that Canada, the UK, and Brazil have the most NYSE listings among non-US stocks, with 74, 47, and 33, respectively. On average non-US stocks from Korea have the lowest quoted and effective spreads while those from Argentina have the highest quoted and effective spreads. In terms of spreads and market quality index, stocks from Korea and South Africa are the most liquid among the sample of non-US stocks listed on the NYSE. It seems that non-US stocks from South America have higher spreads and lower market quality indices with lower political, financial, and economic ratings and with higher exchange rate risk ratings. In addition, this table shows that Switzerland has the highest composite country rating while Argentina has the lowest composite country rating.

B. Correlation Matrix

Table 2 shows the correlation matrix of the variables used in the study. As expected, here we see the first pass evidence that better country ratings are associated with improved liquidity (i.e., narrower spreads, greater market quality index, smaller adverse selection costs). Higher financial, political, economic, and country risk ratings are positively correlated with market quality index, but inversely correlated with trading costs measured by quoted spreads and effective spreads. Adverse selection costs are negatively correlated with all rating variables and market quality index. This indicates that the higher the country ratings, the lower the information

asymmetry, and the lower the adverse selection costs, the higher the market quality index. Not surprisingly, all ratings variables are highly positively correlated with each other. Especially, composite ratings combining the component points for political, financial, and economic risk ratings from ICRG and country ratings from Coface North America are highly positively correlated (Pearson correlation coefficient = 0.9474).

C. Ratings, Liquidity, and Adverse Selection Costs

To further examine what drives the differences in the liquidity of our sample of non-US stocks, we first regress both quoted and effective spreads on the macro-level of institutional quality and several control variables. Prior studies show that a significant portion of cross-sectional variation in spreads can be explained by select stock attributes such as share price, return volatility, trading volume, and market capitalization.[5] We use 1/price, return volatility, dollar trading volume (in log), and market capitalization (in log) in the regression model as control variables. We use the inverse share price (instead of share price) because such specification captures more accurately the effect of the tick-size induced binding constraint on spreads when spreads are measured in relative terms (see Harris (1994)).[6] In addition to four control variables, we include an overlapping trading hour dummy between the NYSE and non-US stocks home markets in the regression equation because Pulatkonak and Sofianos (1999) find that time zone is an important variable in explaining fractions of trading volume, and Moulton and Wei (2005) find that specialist activity and spreads are lower for European cross-listed stocks when their home markets are open. However, in the JP Morgan (2003) investors' survey, more than 80% of respondents said time zone differences do not impact their investment decisions for non-US stocks.

[5] See, e.g., McInish and Wood (1992), Chung, Van Ness, and Van Ness (1999), and Stoll (2000).

[6] We obtain qualitatively similar results when we use log(price) instead of 1/price. The results are available from the authors upon request.

Table 3 shows the regression results. The results show that the coefficients on all macro-level of institutional quality variables (i.e., financial, political, economic, composite, and country ratings) are negative and significant in the regressions, indicating that non-US stocks with better macro-level of institutional quality exhibit narrower spreads. Consistent with the findings of prior research, the quoted and effective spreads are significantly and positively related to 1/price and return volatility, and negatively to trading volume. Counter intuitively and inconsistent with Moulton and Wei (2005), all coefficients on overlapping trading hours are positive, even though they are not consistently significant. The positive coefficient could be driven by non-US stocks mainly from South America with wider spreads. As noticed in Table 1, non-US stocks from South America have wider spreads than those from other areas such as Europe and Asia. We explore more overlapping trading hour issues in a later section of the paper. Again, the results are surprisingly robust across all of our macro-level of institutional quality variables except exchange rate stability. Our regression models explain a large fraction of the variation in quoted and effective spreads, with the adjusted R^2 in excess of 0.89 for each regression.

To examine the relation between liquidity and the macro-level of institutional quality for non-US stocks more completely, we regress the depth and market quality index on macro-level of institutional quality variables and the five control variables (Overlapping trading hours, Log(Price), Return volatility, Log(Dollar trading volume), and Log(Market capitalization). Because the dependent variable is no longer the spread, we use Log(Price) instead of 1/Price in the regression model. We report the regression results in Table 4. The results show that the coefficients on all macro-level of institutional quality variables (i.e., financial, political, economic, composite, country ratings, and exchange rate stability) are positive and significant, indicating that non-US stocks with better macro-level of institutional quality tend to exhibit

higher market quality. The results also show that market quality is higher for non-US stocks with lower return volatility and greater trading volume. In addition, the coefficients on overlapping trading hours are negative and significant, indicating that non-US stocks with overlapping trading hours between the NYSE and their home markets tend to have lower market quality. Again, this result is inconsistent with Moulton and Wei (2005). Our regression models explain a large fraction of the variation in depth and market quality, with the adjusted R^2 for each regression in excess of 0.80.

Our hypothesis linking macro-level of institutional quality to stock market liquidity for non-US stocks is that lower macro-level of institutional quality gives rise to greater information asymmetry between liquidity providers and liquidity demanders, which adversely affects liquidity. Our results show that non-US stocks from countries with a better macro-level of institutional quality tend to be significantly more liquid, with narrower spreads, more depth, and higher market quality indices, than non-US stocks from countries with a lower macro-level of institutional quality.

To examine whether a better macro-level of institutional quality results in a lower adverse selection cost after controlling for other determinants of adverse selection cost, we regress adverse selection cost on our macro-level of institutional quality variables and the five control variables (i.e., Overlapping trading hours, Log(Price), Return volatility, Log(Dollar trading volume), and Log(Market capitalization)). Table 5 shows the regression results. In each case, the coefficients on all macro-level of institutional quality variables (i.e., financial, political, economic, composite, country ratings, and exchange rate stability) are negative and significant, indicating that non-US stocks with a better macro-level of institutional quality exhibit a lower adverse selection cost.

D. Interactions Between Ratings and Number of Overlapping Trading Hours

Inconsistent with Moulton and Wei (2005) who find that spreads are lower for European cross-listed stocks when their home markets are open, we find that all coefficients on overlapping trading dummy are positive with spreads and negative and significant with depth and market quality index, indicating that liquidity for non-US stocks from countries with overlapping trading hours between their home markets and the US market exhibit lower liquidity. In this section, we explore the interaction between number of overlapping trading hours and country ratings.

To examine whether non-US stocks with a better macro-level of institutional quality and a greater number of overlapping trading hours have lower spreads, higher market quality, and lower adverse selection costs, we regress spreads, market quality index, or adverse selection cost on the interaction between country rating (macro-level of institutional quality) and the number of overlapping trading hours and the five control variables. Table 6 shows that the coefficients on interaction variables (Hours x High Composite) are negative and significant, indicating that non-US stocks with a better macro-level of institutional quality and a greater number of overlapping trading hours between their home markets and the US market exhibit lower spreads. Our regression models explain a large fraction of the variation in spreads, with the adjusted R^2 for each regression in excess of 0.90. In addition, the regression results on market quality index and adverse selection costs show that non-US stocks from countries with a better macro-level of institutional quality and a greater number of overlapping trading hours exhibit higher market quality and lower adverse selection costs.

Overall, our results show non-US stocks from countries with a better macro-level of institutional quality and a greater number of overlapping trading hours tend to be significantly

more liquid, with narrower spreads, higher market quality indices, and lower adverse selection costs than non-US stocks from countries with lower macro-level of institutional quality and more overlapping trading hours. These results are consistent with Bacidore, Battalio, Galpin, and Jennings (2005) who find that non-US stocks from transparent markets exhibit better liquidity when the home market is open than when it is closed, but non-US stocks from less transparent markets have lower liquidity when the market is open than when it is closed.

IV. Summary and concluding remarks

Non-US stocks are listed on both their home markets and the US market. International cross-listings have increased significantly in recent years because the cross-listed firms have many benefits over those of firms not cross listed in the US exchanges such as lower cost of capital, better access to foreign capital markets, easier raising of equity, larger shareholder base, better liquidity, better visibility, and higher valuations.

Many studies find that firm level or trading activity variables such as price, return volatility, number of trades, trading volume, and market capitalization are major determinants of liquidity. Non-US stocks are listed on both their home markets and the US markets. Therefore, besides such trading activity variables, the determinants of liquidity for non-US stocks could be different from those of domestic firms. This implies that there are other variables that affect liquidity for non-US stocks.

Using 412 non-US stocks from 43 countries listed on the NYSE, we investigate the liquidity effects of the macro-level of institutional quality and stock market liquidity for non-US stocks. The interactions of market design and home-bias have implications for liquidity that have not been tested before. Our empirical results show that companies with a better macro-level of

institutional quality (i.e., financial, political, economic, exchange rate stability, and composite) and better country rating generally have greater stock market liquidity as measured by narrower quoted and effective spreads, higher market quality indices, and lower adverse selection costs. We also find that non-US stocks from countries with a better macro-level of institutional quality and more overlapping trading hours between their home markets and the U.S. market tend to be significantly more liquid, with narrower spreads, higher market quality indices, and lower adverse selection costs than non-US stocks from countries with a lower macro-level of institutional quality and more overlapping trading hours. These results suggest that market participants are aware of foreign countries' institutional environments and eventually these risks influence their quote behavior and stock market liquidity. Therefore, we conclude that improving a country's image (macro-level of institutional quality) helps to improve market liquidity for non-US stocks.

Appendix 1:

ICRG Data Description

Budget Balance as % GDP
Central government budget balance for a given year, expressed as a percentage of GDP for that year.

Bureaucracy Quality
(maximum 4 points) Institutional strength and quality of the bureaucracy is a shock absorber that tends to minimize revisions of policy when governments change. In low-risk countries, the bureaucracy is somewhat autonomous from political pressure.

Composite Risk Rating
Composite Political, Financial, Economic Risk Rating for a country (CPFER) = 0.5 (Political Risk + Financial Risk + Economic Risk) Ranging from Very High Risk (00.0 - 49.5) to Very Low Risk (80.0 - 100). The higher the points, the lower the risk.

Corruption
(maximum 6 points) A measure of corruption within the political system that is a threat to foreign investment by distorting the economic and financial environment, reducing the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introducing inherent instability into the political process.

Current Account as % of GDP
Estimated balance on the current account of the balance of payments, converted into US dollars at the average exchange rate for that year, expressed as a percentage of GDP, converted into US dollars at the average rate of exchange for the period covered.

Current Account as % of XGS
Estimated balance on the current account of the balance of payments, converted to US$ at average rate, expressed as % of total exports of goods & services (XGS), converted into US$ at exchange rate for period covered.

Debt Service Ratio
Estimated foreign debt service converted into US dollars at the average exchange rate for that year, expressed as a percentage of the sum of estimated total exports of goods and services, converted into US dollars at the average exchange rate.

Democratic Accountability
(maximum 6 points) A measure of, not just whether there are free and fair elections, but how responsive government is to its people. The less responsive it is, the more likely it will fall. Even democratically elected governments can delude themselves into thinking they know what is best for the people, regardless of clear indications to the contrary from the people.

Economic Risk Rating
A means of assessing a country's current economic strengths and weaknesses. In general, where strengths outweigh weaknesses, a country will show low risk and where weaknesses outweigh strengths, the economic risk will be high. To ensure comparability between countries, risk components are based on accepted ratios between the measured data within the national economic/financial structure, and then the ratios are compared, not the data. Risk points are assessed for each of the component factors of GDP per head of population, real annual GDP growth, annual inflation rate, budget balance as a percentage of GDP, and current account balance as a percentage of GDP. Risk ratings range from a high of 50 (least risk) to a low of 0 (highest risk), though lowest de facto ratings are generally near 15.

Ethnic Tensions
(maximum 6 points) A measure of the degree of tension attributable to racial, national, or language divisions. Lower ratings (higher risk) are given to countries where tensions are high because opposing groups are intolerant and unwilling to compromise.

Exchange Rate Stability
Annual percentage change in the exchange rate of the national currency against the US dollar (against the euro in the case of the USA).

External Conflict
(maximum 12 points) A measure of the risk to the incumbent government and to inward investment, ranging from trade restrictions and embargoes through geopolitical disputes, armed threats, border incursions, foreign-supported insurgency and full-scale warfare.

Financial Risk Rating
A means of assessing a country's ability to pay its way by financing its official, commercial and trade debt obligations. To ensure comparability between countries, risk components are based on accepted ratios between the measured data within the national economic/financial structure, and then the ratios are compared, not the data. Risk points are assessed for each of the component factors of foreign debt as a percentage of GDP, foreign debt service as a percentage of exports of goods and services (XGS), current account as a percentage of XGS, net liquidity as months of import cover, and exchange rate stability. Risk ratings range from a high of 50 (least risk) to a low of 0 (highest risk), though lowest de facto ratings are generally near 20.

GDP per Head of Population
Gross domestic product per head of population, converted into US dollars at the average exchange rate for that year.

Government Stability
(maximum 12 points) A measure of the government's ability to stay in office and carry out its declared program(s), depending upon such factors as the type of governance, cohesion of the government and governing parties, approach of an election, and command of the legislature.

Inflation
Estimated annual inflation rate, expressed as the unweighted average of the Consumer Price Index and calculated as a percentage change.

Internal Conflict
(maximum 12 points) A measure of political violence and its actual or potential impact on governance, taking into consideration such factors as whether threats exist, whether they have political objectives, the size and strength of support, and the geographic nature of the conflict.

International Liquidity
Estimated annual net liquidity expressed as months of cover and calculated as the official reserves of the individual countries, including their official gold reserves calculated at current free market prices, but excluding the use of IMF credits and the foreign liabilities of the monetary authorities.

Investment Profile
(maximum 12 points) A measure of the government's attitude toward inward investment as determined by four components: the risk to operations, taxation, repatriation, and labor costs.

Law & Order
(maximum 6 points) Two measures comprising one risk component. Each sub-component equals half of the total. The "law" sub-component assesses the strength and impartiality of the legal system, and the "order" sub-component assesses popular observance of the law.

Military in Politics
(maximum 6 points) A measure of the military's involvement in politics. Since the military is not elected, involvement, even at a peripheral level, diminishes democratic accountability. Military involvement might stem from an external or internal threat, be symptomatic of underlying difficulties, or be a full-scale military takeover. Over the long term, a system of military government will almost certainly diminish effective governmental functioning, become corrupt, and create an uneasy environment for foreign businesses.

Political Risk Rating
A means of assessing the political stability of a country on a comparable basis with other countries by assessing risk points for each of the component factors of government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality. Risk ratings range from a high of 100 (least risk) to a low of 0 (highest risk), though lowest de facto ratings generally range in the 30s and 40s.

Real GDP Growth
Annual change in estimated Gross Domestic Product, at constant 1990 prices (for data in the 1990s), of a given country is expressed as a percentage increase or decrease.

Religious Tensions
(maximum 6 points) A measure of religious tensions arising from the domination of society and/or governance by a single religious group -- or a desire to dominate -- in a way that replaces civil law by religious law, excludes other religions from the political/social processes, suppresses religious freedom or expressions of religious identity. The risks involved range from inexperienced people imposing inappropriate policies to civil dissent or civil war.

Risk Points for Budget Balance
(maximum 10 points) Ranging from high % of 4.0+ with risk points at 10.0, to a low of -30.0 with 0.0 points. The higher the points, the lower the risk.

Risk Points for Current Account as % of GDP
(maximum 15 points) Ranging from high % of 10.0+ with risk points at 15.0, to a low of -40.0 or below with 0.0 points. The higher the points, the lower the risk.

Risk Points for Current Account as % of XGS
(maximum 15 points) Ranging from high % of 25.0+ with risk points at 15.0, to a low of less than -120.0 with 0.0 points. The higher the points, the lower the risk.

Risk Points for Debt Service
(maximum 10 points) Ranging from high % of >85.0 with risk points at 0.0, to a low of 0.0 with 10.0 points. The higher the points, the lower the risk.

Risk Points for Exchange Rate Stability
(maximum 10 points) Ranging from high % change of either 0.0 - 9.9 appreciation or depreciation of 0.1-4.9 with risk points at 10.0, to a midpoint of either appreciation at 50.0+ or depreciation of 30.0 - 34.9 with risk points at 5.0 to a low depreciation of 100.0+ with 0.0 points. The higher the points, the lower the risk.

Risk Points for Foreign Debt
(maximum 10 points) Ranging from high % of >200.0 with risk points at 0.0, to a low of 0.0 with 10.0 points. The higher the points, the lower the risk.

Risk Points for GDP Growth
(maximum 10 points) Risk points determined by expressing this number as a percentage of the average of the estimated total GDP of all the countries covered by ICRG, then assigning risk points, ranging from high % of 6+ with risk at 10.0, to a low of <0.4 with 5.0 points. The higher the points, the lower the risk.

Risk Points for GDP per Head of Population
(maximum 5 points) Risk points determined by expressing this number as a percentage of the average of the estimated total GDP of all the countries covered by ICRG, then assigned risk points ranging from the high % of 250+ with risk at 5.0 points, to the low of <10 with 0.0 points. The higher the points, the lower the risk.

Risk Points for Inflation
(maximum 10 points) Ranging from high % of 130+ with risk points at 0.0, to a low of 0.0 with 10.0 points. The higher the points, the lower the risk.

Risk Points for International Liquidity
(maximum 5 points) Ranging from high % of 15.0+ with risk points at 5.0, to a low of 0.0 with 0.0 points. The higher the points, the lower the risk.

Socioeconomic Conditions
(maximum 12 points) An estimate of the general public's satisfaction or dissatisfaction with the government's economic policies, covering a broad spectrum of factors ranging from infant mortality and medical provision to housing and interest rates. Different weights are applied in different societies, depending upon the relative political impact.

Total Foreign Debt as % GDP
Estimated gross foreign debt converted into US dollars at the average exchange rate for that year, expressed as a percentage of GDP converted into US dollars at the average exchange rate for that year.

Appendix 2:

Coface determines an overall rating for each of the 150 countries monitored. Like rating agencies, Coface ranks country ratings on seven risk levels:

Levels	Descriptions	Point-scale conversion
A1	The steady political and economic environment has positive effects on an already good payment record of companies. Very weak default probability	7
A2	Default probability is still weak even in the case when one country's political and economic environment or the payment record of companies is not as good as in A1-rated countries	6
A3	Adverse political or economic circumstances may lead to a worsening payment record that is already lower than the previous categories, although the probability of a payment default is still low.	5
A4	An already patchy payment record could be further worsened by a deteriorating political and economic environment. Nevertheless, the probability of a default is still acceptable	4
B	An unsteady political and economic environment is likely to affect further an already poor payment record	3
C	An very unsteady political and economic environment could deteriorate an already bad payment record	2
D	The high risk profile of a country's economic and political environment will further worsen a generally very bad payment record	1

References

Admati, Anat R., and Paul Pfeiderer, 1988, A theory of intraday patterns: Volume and price variability. *Review of Financial Studies* 1, 3-40.

Bacidore, Jeffrey M. and George Sofianos, 2002, Liquidity provision and specialist trading in NYSE-listed non-U.S. stocks. *Journal of Financial Economics* 63, 133-158.

Bacidore, Jeffrey. M., Robert. Battalio, Neal. Galpin, and Robert. Jennings, 2005, Sources of liquidity for NYSE-listed non-U.S. stocks. *Journal of Banking and Finance* 29, 3075-3098.

Benston, George J. and Robert L. Hagerman, 1974, Determinants of bid-asked spreads in the over-the-counter market. *Journal of Financial Economics* 1, 353-364.

Branch, Ben and Walter Freed, 1977, Bid-asked spreads on the AMEX and the big board. *Journal of Finance* 32, 159-163.

Brockman, Paul and Chung, Dennis.Y., 2003. Investor protection and firm liquidity. *Journal of Finance* 58, 921-937.

Chordia, Tarun, Roll, Richard W. and Subrahmanyam, Avanidhar, 2001, Market liquidity and trading activity. *Journal of Finance* 56, 501-530.

Chung, Huimin., 2006. Investor protection and the liquidity of cross-listed securities: Evidence from the ADR market. *Journal of Banking and Finance* 30, 1485-1505.

Chung, Kee. H., Bonnie. Van Ness, and Robert. Van Ness, 1999, Limit orders and the bid-ask spread. *Journal of Financial Economics* 53, 255-87.

Coffee, John C, 1999. The future as history: the prospects for global convergence in corporate governance and its implications. Northwestern University Law Review 93, 641–708.

Coffee, John C, 2002. Racing towards the top? The impact of cross-listings and stock market competition on international corporate governance. *Columbia Law Review* 102, 1757–1831.

Copeland, Thomas E. and Dan Galai, 1983, Information effects on the bid-ask spread. *Journal of Finance* 38, 1457-1469.

Doidge, Craig, Andrew. G Karolyi, and Rene.M. Stulz, 2004, Why are foreign firms listed in the U.S. worth more? *Journal of Financial Economics* 71, 205-238.

Eleswarapu, Venkat. R, and Kumar. Venkataraman, 2006, The impact of legal and political institutions on equity trading costs: A cross-country analysis. *Review of Financial Studies* 19, 1081-1111.

Ellis, Katrina, Roni Michaely, and Maureen O'Hara, 2000, The Accuracy of Trade Classification Rules: Evidence from NASDAQ. *Journal of Financial and Quantitative Analysis*, 35, 529–552.

Erb, Claude B, Campbell R. Harvey, and Tadas E. Viskanta, 1996, Political risk, economic risk and financial risk. *Financial Analysts Journal* 52, 29-46.

Fanto, James. A,and Roberta S. Karmel, 1997, A report on the attitudes of foreign companies regarding a U.S. listing. *Stanford Journal of Law, Business and Finance* 3, 143–162.

Harris, Lawrence, 1994, Minimum price variations, discrete bid-ask spreads, and quotation sizes. *Review of Financial Studies* 7, 149-178.

Huang, Roger. D. and Han. R Stoll, 1996, Dealer versus auction markets: A paired comparison of execution costs on NASDAQ and the NYSE. *Journal of Financial Economics* 4, 313-57.

Jacoby, Grady, David J. Fowler, and Aron A. Gottesman, 2000, The capital asset pricing model and the liquidity effect: A theoretical approach. *Journal of Financial Markets* 3, 69-81.

Jiang, Christine. X. and Jang-Chul Kim, 2005, Trading costs of non-U.S. stocks on the New York Stock Exchange: The effect of institutional ownership, analyst following, and market regulation. *The Journal of Financial Research* 28, 439-459.

JP Morgan, Buy side Survey: ADR investing, October 2003.

La Porta, R., Lopez-de-Silanes F., Shleifer A., and R.W. Vishny, 1997, Legal determinants of external finance. *Journal of Finance* 52, 1131-1150.

La Porta R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, 1998, Law and finance. *Journal of Political Economy* 106, 1113-1155.

Lee, Charles. M. C. and Mark J. Ready, 1991, Inferring trade direction from intraday data. *Journal of Finance* 4,733-746.

Lin Ji-Chai, Gary C. Sanger, and G. Geoffrey Booth, 1995, Trade size and components of the bid-ask spread. *Review of Financial Studies* 8, 1153-1183.

McInish, T. Thomas., and Robert A. Wood, 1992, An analysis of intraday patterns in bid/ask spreads for NYSE stocks. *Journal of Finance* 47, 345-374.

Mittoo, Usha. 1992. Managerial perceptions of the net benefits of foreign listing: Canadian evidence. *Journal of International Financial Management and Accounting* 4, 40–62.

Petersen, Mitchell. A. and David. Fialkowski, 1994, Posted versus effective spreads. *Journal of Financial Economics* 35, 269-292

Pulatkonak, Melek., and George. Sofianos, 1999, The distribution of global trading in NYSE-

listed non-U.S. stocks. NYSE working paper 99-03.

Reese, William., and Michael Weisbach, 2002, Protection of minority shareholder interests, cross-listings in the United States, and subsequent equity offerings. *Journal of Financial Economics* 66, 65–104.

Stoll, Hans R., 1978, The pricing of security dealer services: A empirical study of NASDAQ stocks. *Journal of Finance* 33, 1153-1172.

Stoll, Hans R, 2000, Friction, *Journal of Finance* 55, 1479-1514.

Stulz Rene M, 1981. On the effects of barriers to international investment. *Journal of Finance*36, 923-934.

Stulz, Rene M. 1999. Globalization, corporate finance, and the cost of capital. *Journal of Applied Corporate Finance* 12, 8–25.

Tinic, Seha M., 1972, The economics of liquidity services. *Quarterly Journal of Economics* 86, 79-93.

Tinic, Seha M. and Richard R. West, Competition and the pricing of dealer services in the over-the-counter market. *Journal of Financial and Quantitative Analysis* 8, 1707-1727.

Uppal, Raman, 1993, A General equilibrium model of international portfolio choice. *Journal of Finance* 48, 529-553.

Van Ness, Bonnie. F., Robert. A. Van Ness, and Richard. S. Warr, 2001, How well do adverse selection components measure adverse selection? *Financial Management* 30 (3), 77-98.

Zhao. Xin and Kee H. Chung. Information disclosure and market quality: The effect of SEC rule 11Ac1-5 on trading costs. *Journal of Financial and Quantitative Analysis* 42, 657-682.

Table 1. Descriptive Statistics for non-US stocks by Country

This table shows the Pearson correlation coefficients between the variables used in the study. Quoted spread is the mean quoted percentage spread, Effective spread is the trade-weighted mean effective percentage spread, Market quality index is measured by the log ratio of the mean quoted depth to the mean quoted percentage spread, and Adverse selection cost is the mean adverse selection cost based on Lin, Sanger and Booth (1995) method. We obtain the financial, political, economic, and composite ratings from International Country Risk Guide ((ICRG), and Country rating from Coface North America.

Country	Number of ADRs	Quoted Spread	Effective Spreads	Market Quality Index	Adverse Selection	Financial Rating	Political Rating	Economic Rating	Composite Rating	Country Rating	Overlap Trading Hours
Argentina	10	4.60	3.21	6.79	0.51	17.50	57.50	24.00	49.50	1	6.50
Australia	10	1.04	0.82	7.83	0.51	36.50	88.00	41.00	82.80	7	0.00
Austria	1	1.65	1.10	6.53	0.63	43.50	89.50	40.00	86.50	7	2.25
Belgium	1	0.47	0.35	7.55	0.56	39.50	86.50	42.50	84.30	7	1.50
Brazil	33	1.62	1.13	7.78	0.50	31.00	61.00	34.50	63.30	2	6.00
Canada	74	0.62	0.42	8.76	0.39	40.00	86.50	43.50	85.00	7	6.50
Chile	17	2.39	1.78	7.39	0.48	38.00	77.00	38.50	76.80	5	6.50
China	13	1.24	0.86	7.63	0.56	45.00	66.00	38.50	74.80	5	0.00
Colombia	1	4.50	3.17	6.57	0.54	39.00	53.00	33.00	62.50	3	2.00
Denmark	2	0.93	0.61	7.28	0.31	42.00	90.50	42.50	87.50	7	1.50
Dominican Republic	1	4.09	2.91	6.44	0.45	37.00	67.00	36.50	70.30	4	6.50
Finland	4	0.79	0.51	8.36	0.48	38.50	94.50	45.00	89.00	7	1.50
France	21	1.17	0.79	7.87	0.53	40.00	80.50	42.00	81.30	7	1.75
Germany	17	0.82	0.56	8.25	0.46	40.00	86.50	39.00	82.80	6	4.50
Ghana	1	1.26	0.74	8.48	0.31	31.00	62.50	29.50	61.50	2	0.00
Greece	4	1.32	0.86	8.13	0.33	34.00	77.00	39.50	75.30	6	0.00
Hong Kong	8	2.99	2.01	7.53	0.48	44.50	80.00	46.00	85.30	6	0.00
Hungary	1	0.51	0.30	7.86	0.59	38.00	81.00	35.50	77.30	6	1.00
India	8	1.52	0.92	8.06	0.39	41.00	56.00	34.50	65.80	4	0.00
Indonesia	2	0.82	0.50	8.30	0.25	32.50	48.50	34.50	57.80	2	0.00
Ireland	3	0.66	0.47	8.68	0.36	42.00	92.50	44.00	89.30	7	2.75
Israel	4	2.77	1.65	6.67	0.50	35.50	61.50	38.00	67.50	4	0.50
Italy	12	2.01	1.40	6.88	0.50	40.50	80.00	39.50	80.00	6	2.00
Japan	16	0.71	0.47	8.10	0.39	47.50	85.50	35.50	84.30	6	0.00
Korea	5	0.19	0.13	10.46	0.29	40.50	76.00	43.50	80.00	6	0.00
Luxembourg	1	0.82	0.52	7.36	0.39	43.50	94.50	45.00	91.50	7	0.50
Mexico	23	2.18	1.48	7.59	0.45	36.50	68.50	36.00	70.50	4	4.50
Netherlands	21	1.48	0.97	8.37	0.36	38.00	91.00	42.00	85.50	7	2.00
New Zealand	2	2.12	1.90	8.10	0.32	29.00	88.50	39.00	78.30	7	0.00
Norway	3	1.50	1.10	8.53	0.36	46.00	89.50	47.50	91.50	7	0.50
Panama	3	1.11	0.82	7.48	0.40	34.50	72.50	35.50	71.30	4	5.00
Peru	3	2.51	1.87	7.16	0.39	37.50	63.50	36.50	68.80	3	4.50
Philippines	1	0.71	0.42	9.06	0.22	38.00	67.50	37.00	71.30	4	0.00
Portugal	3	1.44	0.98	7.20	0.28	35.00	88.50	36.00	79.80	6	2.00
Russia	5	0.60	0.39	8.31	0.34	38.00	64.00	37.50	69.80	3	0.50

Singapore	1	3.49	2.01	7.47	0.44	45.50	89.00	46.00	90.30	6	0.00
South Africa	4	0.39	0.26	8.98	0.37	35.50	64.00	36.00	67.80	4	0.00
Spain	6	0.71	0.47	8.87	0.39	39.50	83.00	39.50	81.00	7	2.00
Switzerland	13	0.62	0.43	8.46	0.44	46.00	92.50	44.50	91.50	7	1.50
Taiwan	4	0.90	0.55	10.00	0.30	45.50	78.50	41.00	82.50	6	0.00
Turkey	1	0.73	0.46	8.03	0.58	31.00	56.50	25.50	56.50	2	0.00
UK	47	1.07	0.67	7.91	0.49	37.00	88.00	40.50	82.80	7	2.00
Venezuela	2	4.07	3.52	6.37	0.48	34.50	49.00	28.50	56.00	2	4.50
Grand Mean	**9.58**	**1.34**	**0.91**	**8.05**	**0.44**	**38.26**	**76.12**	**38.47**	**76.45**	**5.66**	**1.92**
Std. Deviation	**13.90**	**1.73**	**1.27**	**0.88**	**0.15**	**5.56**	**13.69**	**5.28**	**10.91**	**1.79**	**2.20**

Table 2. Correlation Matrix

This table shows the Pearson correlation coefficients between the variables used in the study. Quoted spread is the mean quoted percentage spread, Effective spread is the trade-weighted mean effective percentage spread, Market quality index is measured by the log ratio of the mean quoted depth to the mean quoted percentage spread, Adverse selection cost is the mean adverse selection cost based on Lin, Sanger and Booth (1995) method. We obtain the financial, political, economic, and composite ratings from International Country Risk Guide (ICRG), and Country rating from Coface North America. Figures in parentheses are p-values.

	Quoted Spread	Effective Spread	Market Quality Index	Adverse Selection	Financial Rating	Political Rating	Economic Rating	Composite Rating
Effective Spread	0.9830 (0.0001)							
Market Quality Index	-0.1179 (0.0166)	-0.0840 (0.0885)						
Adverse Selection	0.1380 (0.0052)	0.1189 (0.0161)	-0.4961 (0.0001)					
Financial Rating	-0.2724 (0.0001)	-0.2679 (0.0001)	0.1879 (0.0001)	-0.0942 (0.0571)				
Political Rating	-0.2685 (0.0001)	-0.2624 (0.0001)	0.2093 (0.0001)	-0.1059 (0.0322)	0.5094 (0.0001)			
Economic Rating	-0.2928 (0.0001)	-0.2884 (0.0001)	0.2739 (0.0001)	-0.1117 (0.0239)	0.6585 (0.0001)	0.7688 (0.0001)		
Composite Rating	-0.3109 (0.0001)	-0.3047 (0.0001)	0.2458 (0.0001)	-0.1176 (0.0173)	0.7495 (0.0001)	0.9403 (0.0001)	0.8933 (0.0001)	
Country Rating	-0.2946 (0.0001)	-0.2894 (0.0001)	0.2311 (0.0001)	-0.0947 (0.0555)	0.6337 (0.0001)	0.9249 (0.0001)	0.8482 (0.0001)	0.9474 (0.0001)

Table 3. Regression analysis for quoted spread and effective spread and institutional quality

This table shows the OLS results of the following regression model: Quoted Spread$_{i,t}$, or Effective Spread$_{i,t}$, = β_0 + β_1 Risk Rating$_{i,t}$ + β_2 Overlap$_{i,t}$ + β_3 (1/Price$_{i,t}$) + β_4 Return Volatility$_{i,t}$ + β_5 Log(Volume$_{i,t}$) + β_6 Log(Market Cap$_{i,t}$) + $\varepsilon_{i,t}$; where Quoted Spread$_{i,t}$ is the mean quoted percentage spread of stock *i* during the three-month study period *t*, Effective Spread$_{i,t}$ is the trade-weighted mean effective percentage spread, Risk Rating$_{i,t}$ is the financial, political, economic, composite ratings, and exchange rate stability are from International Country Risk Guide (ICRG) and Coface North America, Overlap$_{i,t}$ is the overlap in trading hours between US markets and non-US stock's home markets. Price$_{i,t}$ is the mean stock price, Return Volatility$_{i,t}$ is the standard deviation of daily closing quote-midpoint returns, Volume$_{i,t}$ is the mean daily dollar trading volume, Market Cap$_{i,t}$ is the market value of equity, and $\varepsilon_{i,t}$ is the error term. We calculate *t*-statistics using White's (1980) standard errors and report them in parentheses.

	Quoted spread						Effective spread					
	1	2	3	4	5	6	7	8	9	10	11	12
Intercept	0.4653 (1.00)	2.1459*** (4.34)	1.9109*** (3.16)	2.6636*** (4.27)	-0.5665*** (-4.41)	-0.7334*** (-4.30)	-0.1693 (-0.38)	1.2631** (2.57)	1.0712* (1.80)	1.7158*** (2.82)	-1.0512*** (-8.41)	-1.2113*** (6.96)
Financial Rating	-0.3601*** (-2.95)						-0.3096*** (-2.67)					
Political Rating		-0.7160*** (-6.16)						-0.6127*** (-5.47)				
Economic Rating			-0.7735*** (-4.66)						-0.6644*** (-4.13)			
Composite Rating				-0.8261*** (-5.71)						-0.7092*** (-5.10)		
Country Rating					-0.0680*** (-6.84)						-0.0598*** (-6.38)	
Exchange Rate Stability						-0.0125 (-1.12)						-0.0096 (-0.80)
Overlap	0.0122 (0.25)	0.1081** (2.23)	0.0721 (1.51)	0.0672 (1.43)	0.0792* (1.71)	0.0424 (0.90)	0.0031 (0.07)	0.0853** (2.03)	0.0546 (1.32)	0.0504 (1.24)	0.0614 (1.53)	0.0292 (0.73)
1/Price	0.7457*** (4.46)	0.7455*** (4.81)	0.7351*** (4.46)	0.7162*** (4.53)	0.7198*** (4.65)	0.7907*** (4.65)	0.8219*** (5.16)	0.8221*** (5.38)	0.8129*** (5.07)	0.7967*** (5.13)	0.7978*** (5.22)	0.8631*** (5.36)
Return Volatility	14.6882*** (7.07)	14.2192*** (7.49)	14.3874*** (7.25)	14.2726*** (7.40)	14.0606*** (7.54)	14.8107*** (7.00)	15.6153*** (9.08)	15.2147*** (9.69)	15.3571*** (9.36)	15.2588*** (9.58)	15.0608*** (9.82)	15.7237*** (8.91)
Log(Volume)	-0.3475*** (-34.13)	-0.3395*** (-32.82)	-0.3435*** (-34.17)	-0.3401*** (-32.91)	-0.3373*** (-31.59)	-0.3515*** (-35.50)	-0.3474*** (-35.25)	-0.3405*** (-35.00)	-0.3440*** (-35.73)	-0.3411*** (-34.81)	-0.3384*** (-33.71)	-0.3509*** (-36.63)
Log(Market Cap)	-0.0049 (-0.62)	-0.0106 (-1.37)	-0.0059 (-0.79)	-0.0102 (-1.30)	-0.0141* (-1.72)	-0.0006 (-0.07)	-0.0019 (-0.25)	-0.0068 (-0.89)	-0.0028 (-0.38)	-0.0065 (-0.84)	-0.0101 (-1.26)	0.0018 (0.24)
Adj R^2	0.89	0.90	0.89	0.90	0.90	0.89	0.91	0.91	0.91	0.91	0.91	0.90
N	412	412	412	412	412	412	412	412	412	412	412	412

***Significant at the 1% level
**Significant at the 5% level.
*Significant at the 10% level.

Table 4. Regression analysis for depth and institutional quality

This table shows the OLS results of the following regression model: $\text{Depth}_{i,t}$, or Market Quality Index $_{i,t} = \beta_0 + \beta_1 \text{ Risk Rating}_{i,t} + \beta_2 \text{ Overlap}_{i,t} + \beta_3 \text{ Log}(\text{Price}_{i,t}) + \beta_4 \text{ Return Volatility}_{i,t} + \beta_5 \text{ Log}(\text{Volume}_{i,t}) + \beta_6 \text{ Log}(\text{Market Cap}_{i,t}) + \varepsilon_{i,t}$; where $\text{Depth}_{i,t}$ is the mean quoted depth of stock *i* in the three-month study period *t*, Market Quality $\text{Index}_{i,t}$ is the ratio of the mean quoted depth to the mean quoted percentage spread, Risk $\text{Rating}_{i,t}$ is the financial, political, economic, composite ratings, and exchange rate stability are from International Country Risk Guide ((ICRG) and Coface North America, $\text{Overlap}_{i,t}$ is the overlap in trading hours between US markets and non-US stock's home markets. $\text{Price}_{i,t}$ is the mean stock price, Return $\text{Volatility}_{i,t}$ is the standard deviation of daily closing quote-midpoint returns, $\text{Volume}_{i,t}$ is the mean daily dollar trading volume, Market $\text{Cap}_{i,t}$ is the market value of equity, and $\varepsilon_{i,t}$ is the error term. We calculate *t*-statistics using White's (1980) standard errors and report them in parentheses.

	Depth						Market quality index					
	1	2	3	4	5	6	7	8	9	10	11	12
Intercept	0.1985 (0.41)	-0.9626 (-1.63)	-1.2465* (-2.00)	-1.6269** (-2.31)	1.3434*** (9.02)	1.3093*** (7.95)	-0.4610 (-0.78)	-2.6851*** (-3.67)	-3.4606*** (-3.95)	-3.9158*** (-4.37)	1.4821*** (8.35)	1.5268*** (7.29)
Financial Rating	0.3756*** (3.02)						0.6485*** (4.19)					
Political Rating		0.6057*** (4.44)						1.0989*** (6.43)				
Economic Rating			0.7908*** (4.66)						1.5089*** (6.23)			
Composite Rating				0.7555*** (4.68)						1.3768*** (6.59)		
Country Rating					0.0574*** (4.59)						0.1092*** (7.12)	
Exchange Rate Stability						0.0264*** (2.80)						0.0373*** (3.20)
Overlap	-0.1246** (-2.44)	-0.2080*** (-4.05)	-0.1863*** (-3.72)	-0.1761*** (-3.54)	-0.1838*** (-3.69)	-0.1554*** (-3.16)	-0.1807*** (-2.81)	-0.3292*** (-5.26)	-0.2924*** (-4.93)	-0.2714*** (-4.50)	-0.2875*** (-4.86)	-0.2350*** (-3.93)
Log(Price)	0.2304*** (5.28)	0.2153*** (4.90)	0.2279*** (5.38)	0.2139*** (4.87)	0.2125*** (4.83)	0.2380*** (5.55)	-0.4373*** (-8.18)	-0.4665*** (-8.98)	-0.4456*** (-8.79)	-0.4693*** (-9.01)	-0.4749*** (-9.29)	-0.4206*** (-7.91)
Return Volatility	-2.2417 (-1.58)	-2.3805* (-1.74)	-1.9476 (-1.46)	-2.2270* (-1.65)	-2.1920 (-1.62)	-2.2394 (-1.53)	-11.5058*** (-4.11)	-11.7492*** (-4.48)	-10.9270*** (-4.34)	-11.4696*** (-4.46)	-11.3939*** (-4.52)	-11.5330*** (-4.01)
Log(Volume)	0.2855*** (20.27)	0.2835*** (20.68)	0.2816*** (20.59)	0.2823*** (20.79)	0.2815*** (20.92)	0.2882*** (19.96)	0.5883*** (29.61)	0.5843*** (30.40)	0.5804*** (30.40)	0.5822*** (30.19)	0.5802*** (29.88)	0.5931*** (30.15)
Log(Market Cap)	0.0006 (0.08)	0.0043 (0.57)	0.0016 (0.21)	0.0047 (0.62)	0.0073 (0.95)	-0.0041 (-0.54)	0.0064 (0.55)	0.0136 (1.22)	0.0090 (0.82)	0.0143 (1.26)	0.0200* (1.67)	-0.0016 (-0.14)
Adj R^2	0.81	0.81	0.81	0.81	0.81	0.81	0.85	0.86	0.86	0.86	0.86	0.85
# of Observations	412	412	412	412	412	412	412	412	412	412	412	412

***Significant at the 1% level
**Significant at the 5% level.
*Significant at the 10% level.

Table 5. Regression analysis for adverse selection and institutional quality

This table shows the OLS results of the following regression model: Adverse Selection $_{i,t} = \beta_0 + \beta_1$ Risk rating$_{i,t} + \beta_2$ Overlap$_{i,t} + \beta_3$ Log(Price$_{i,t}$) + β_4 Return Volatility$_{i,t} + \beta_5$ Log(Volume$_{i,t}$) + β_6 Log(Market Cap$_{i,t}$) + $\varepsilon_{i,t}$; where Adverse Selection Cost$_{i,t}$ is the mean adverse selection cost based on Lin, Sanger and Booth (1995) method, Risk Rating$_{i,t}$ is the financial, political, economic, composite ratings, and exchange rate stability are from International Country Risk Guide (ICRG) and Coface North America, Overlap$_{i,t}$ is the overlap in trading hours between US markets and non-US stock's home markets. Price$_{i,t}$ is the mean stock price, Return Volatility$_{i,t}$ is the standard deviation of daily closing quote-midpoint returns, Volume$_{i,t}$ is the mean daily dollar trading volume, Market Cap$_{i,t}$ is the market value of equity, and $\varepsilon_{i,t}$ is the error term. We calculate *t*-statistics using White's (1980) standard errors and report them in parentheses.

	Adverse Selection Cost					
	1	2	3	4	5	6
Intercept	0.9414*** (3.56)	1.4650*** (3.49)	1.1230*** (3.21)	1.8863*** (4.32)	-0.0949 (-1.00)	-0.0609 (-0.67)
Financial Rating	-0.3249*** (-4.52)					
Political Rating		-0.4066*** (-4.16)				
Economic Rating			-0.3796*** (-3.94)			
Composite Rating				-0.5014*** (-4.95)		
Country Rating					-0.0348*** (-4.55)	
Exchange Rate Stability						-0.0180*** (-3.48)
Overlap	0.0370 (1.06)	0.0998*** (2.87)	0.0799** (2.26)	0.0782** (2.25)	0.0819** (2.37)	0.0642* (1.87)
Log(Price)	0.2273*** (10.70)	0.2334*** (11.26)	0.2208*** (10.57)	0.2342*** (11.25)	0.2330*** (11.10)	0.2184*** (10.39)
Return Volatility	2.7957*** (3.21)	2.9012*** (3.51)	2.6827*** (3.15)	2.8016*** (3.39)	2.7850*** (3.36)	2.8044*** (3.15)
Log(Volume)	-0.1000*** (-11.82)	-0.0993*** (-11.96)	-0.0993*** (-11.68)	-0.0986*** (-11.86)	-0.0985*** (-11.90)	-0.1022*** (-11.90)
Log(Market Cap)	-0.0027 (-0.54)	-0.0043 (-0.87)	-0.0015 (-0.31)	-0.0045 (-0.93)	-0.0055 (-1.12)	0.0013 (0.25)
Adj R^2	0.38	0.39	0.38	0.39	0.39	0.37
N	409	409	409	409	409	409

***Significant at the 1% level
**Significant at the 5% level.
*Significant at the 10% level.

Table 6. Interaction between country rating and number of overlapping hours

This table shows the OLS results of the following regression model: Quoted Spread, Effective Spread, Market Quality Index $_{i,t}$ or Adverse Selection Cost = β_0 + β_1 Hours * High Composite$_{i,t}$ + β_2 High Composite$_{i,t}$ + β_3 (1/Price$_{i,t}$) or Log(Price$_{i,t}$) + β_4 Return Volatility$_{i,t}$ + β_5 Log(Volume$_{i,t}$) + β_6 Log(Market Cap$_{i,t}$) + $\varepsilon_{i,t}$; where Hours * High Composite$_{i,t}$ is the interaction variable of Hours and High Composite rating. Hours is the overlap in trading hours between US markets and non-US stock's home markets. High Composite is a dummy variable which equals to 1 if Composite rating for a country is higher than median value in our sample. Otherwise equals to zero. Price$_{i,t}$ is the mean stock price, Return Volatility$_{i,t}$ is the standard deviation of daily closing quote-midpoint returns, Volume$_{i,t}$ is the mean daily dollar trading volume, Market Cap$_{i,t}$ is the market value of equity, and $\varepsilon_{i,t}$ is the error term. We calculate *t*-statistics using White's (1980) standard errors and report them in parentheses.

	Quoted Spread	Effective Spread	Market Quality Index	Adverse Selection Cost
Intercept	-0.8007*** (-6.89)	-1.2618*** (-11.15)	1.7240*** (9.63)	-0.1769** (-1.99)
Hours x High Composite	-0.0311*** (-3.83)	-0.0285*** (-3.81)	0.0537*** (3.84)	-0.0077 (-1.18)
High Composite	-0.0876* (-1.87)	-0.0832** (-2.02)	0.1084* (1.73)	-0.0635* (-1.84)
1/Price or Log(price)	0.7517*** (4.71)	0.8246*** (5.33)	-0.4558*** (-8.86)	0.2278*** (10.86)
Return Volatility	14.8099*** (7.63)	15.6658*** (9.86)	-13.0452*** (-4.66)	3.3596*** (3.78)
Log(Volume)	-0.3459*** (-36.46)	-0.3454*** (-38.24)	0.5942*** (32.50)	-0.1030*** (-12.10)
Log(Market Cap)	0.0021 (0.31)	0.0040 (0.59)	-0.0107 (-1.10)	0.0030 (0.63)
Adj R^2	0.90	0.91	0.86	0.37
N	412	412	412	409

***Significant at the 1% level
**Significant at the 5% level.
*Significant at the 10% level.