



No.304 / November 2009

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IIIS Discussion Paper No. 304

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Evidence from emerging economies around the world

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Abstract

Prior research suggests an inverse relationship between geographic distance and financial market linkages. In this paper, we examine whether and how cultural distance between countries mitigates this finding. We find that country-pairs exhibit higher linkages if they have smaller cultural distance. The result remains significant to alternative measures of linkage. Finally, the cultural effect seems to be more pronounced for active trading country-pairs than thin-trading country-pairs.

Keywords: Emerging markets; International stock market comovement; Cultural distance

JEL Classification: D81, G15, Z12

1. Introduction

“If, as argued by the practitioners of behavioral finance, individuals have psychological biases that matter for finance, it would be surprising that individuals’ view of the world as determined by their culture does not matter for how they view and act in financial markets.”

— Stulz and Williamson (2003, p.347)

Although economic fundamentals have achieved great success in explaining international capital market linkages,¹ this is incomplete and thus searching unknown determinants is still an intriguing research objective. In this paper, we examine whether the norms and propensity of investors’ behavior is a missing piece of a puzzle. Two arguments inform this paper, one the cause of frictions in international integration and the other on the extent of natural barriers. With respect to the first argument, one could expect that international financial integration will move to a higher level after

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¹ See section 2.2 for relevant literature.

transformations such as financial liberalization. However, it may not reach to a “perfect” or full-scale degree. This point has been demonstrated by early works from both quantity- and price-based perspectives. For example, French and Poterba (1991), Cooper and Kaplanis (1994), and Tesar and Werner (1995) document the equity home bias puzzle which describes the fact that individual and institutional investors only hold modest amounts of foreign equity assets even when there are no regulation restrictions on cross-border asset holding; Bekaert and Harvey (1995) show that global integration is a time-varying process; Harvey (1995) find that standard global asset pricing models fail to explain the cross sectional returns in emerging economies; Kang and Stulz (1997) study the ownership in Japanese stocks by foreign investors and confirm the existence of equity home bias.

This evidence brings us to the second argument, which says that when artificial barriers are removed, natural barriers remain to hinder market connections. In the spirit of gravity models, some recent literature considers various geographic variables as natural determining factors. Flavin et al. (2002) test the effect of several geographical variables such as great circle distance, common land border, common language, colonial links and overlapping opening hours on cross-country stock market price correlation. The authors find that sharing a common border and the number of overlapping opening hours exert significant positive impact on correlation between markets. Portes and Rey (2005) find that the geographic information is the main determinant of the pattern of cross-border equity flows. Aggarwal et al. (2009) take cultural distance as a type of transaction cost. They find that smaller cultural distance between financial trading partners will lead to greater cross-border foreign portfolio investment (FPI) holdings of debt and equity, and these effects are greater for cross-border equity than debt holdings. These works deliver a basic idea that geographic and cultural distance acts as a proxy for transaction cost, information asymmetry and unfamiliarity effect. These effects will impact on cross-border capital flows and price comovement. Moreover, the existence of agency problems tends to shy away foreign investors from overcoming these problems such as hiring local portfolio managers.

As shown above, researchers have also started to investigate the role of cultural distance. In this paper, our main question is: does cultural distance affect the comovement of stock market returns? Intuitively, people resident in different cultural settings are likely to behave in different ways when they make decisions. Hofstede (1994) defines culture as “the collective programming of the mind which distinguishes the members of one group or category of people from those of another.” Adler (1997) argues that culture influences people’s values, which in turn affects their attitudes, and then behavior. The effect would also apply to the situation when people invest in financial

assets. The price of financial assets (e.g. share price) can be regarded as a comprehensive reflection of decisions made by investors. Hence, if investors from different countries share much common in behavioral habits and attitudes towards investing, it is likely that this similarity will result in higher levels of stock market comovement. There is still litter effort to empirically examine this possibility in the literature.

We test whether two cultural distance variables are helpful to explain the variations in stock market correlation. Specifically, we use religious commonality as one proxy for cultural distance since beliefs might affect people's behavior, attitudes and thoughts. In addition, we use a variant of the hofstede measures adjusted by the process suggested by Kogut and Singh (KS) (1988). This measure is calculated based on different cultural dimensions which might shape people's behavioral patterns in a country. Our regression results indicate that stock market correlation is positively related to common religion, and negatively related to KS measure at 1% significance level. This suggests that the smaller the cultural distance between two countries, the higher the levels of bilateral stock market comovement. Consider two country-pairs - one has the largest cultural distance, and the other has the smallest cultural distance (both defined by KS measure); a disparity of 0.076 in correlation is observed between the two pairs. This roughly equals to an increase of 30% in correlation for the lower correlated pair. The cultural effect is both statistically and economically significant. We conduct two sets of additional tests to check the robustness of the main results. First, conditional correlation is used instead of unconditional correlation to measure comovement. Second, we split the sample into thin-trading group and active-trading group, and then examine the cultural effects on these two groups separately. The results of both robustness checks consolidate the findings in the main results.

The rest of the paper is organized as follows. Section 2 discusses the cultural effects on economics, motivates our proxies for cultural distance, and reviews the economic determining factors of market linkage. Section 3 describes the data and variables. Section 4 presents the empirical setting and regression results. Conclusion and implications are given in section 5.

2. Culture, economics and capital market linkage

2.1. Culture and economics

Researchers have shown that culture can affect economics. One of the earliest works can be traced back to Weber (1905), where the author associated Protestantism with the development of capitalism. Later literature relates culture to more specific areas. King et al. (1994) indicated that the dynamics of correlation between national stock markets are largely determined by unobservable factors such as investor sentiment, while little of comovement can be explained by observable economic factors. De Jong and Semenov (2002) focus on the stock market development of OECD countries. They find that stock markets tend to be more developed in countries where inhabitants have lower levels of uncertainty avoidance and higher levels of masculinity. Chui et al. (2002) make use of the cultural measures of Schwartz (1994) and find that managers choose lower corporate leverage in countries with higher levels of conservatism and mastery. Stulz and Williamson (2003) show that “a country’s principal religion predicts the cross-sectional variation in creditor rights better than a country’s natural openness to international trade, its language, its income per capita, or the origin of its legal system.” Puri and Robinson (2007) develop a measure of optimism and relate it with people’s beliefs about future economic conditions. The authors find that “more optimistic people work harder, expect to retire later, are more likely to remarry, invest more in individual stocks, and save more.” Aggarwal et al. (2009) report strong hitherto unreported cultural effects on foreign portfolio investment. Hilary and Hui (2009) find that culture affects firm behavior. They associate the level of religiosity of states with local firms’ characteristics such as risk exposure, investment, growth and market reaction.

These studies show that, apart from well-known factors, culture does play a role in many economic and finance issues. Stulz and Williamson (2003) indicate that culture can exert its influence by affecting the predominant values, institutions, and resource allocation in a country. Social identity theory (Hogg and Abrams, 1988; Tajfel, 1981) says that the social group membership such as nationality, ethnicity, religion and occupation are important to generate personal identity, and people tend to conform to the dominant values and behavior of the group. This paper provides another piece of evidence showing the economic outcomes of cultural effects.

2.2. Cultural distance and capital market linkage

Behavioral economists argue that the imperfections in financial markets are due to the combination of cognitive biases such as overconfidence, investor overreaction, information processing and selection biases and various other human errors in reasoning and information processing. To associate cultural distance with capital market linkage, we need to choose proper metrics to measure cultural distance, reflecting the difference in those behavioral biases. Among

others, we consider two metrics: (1) *Religion*: This metric is at the central position of beliefs and is at the root of behavioral patterns of people in most social activities. Religiosity is widely used as cultural benchmark in prior works (e.g. Stulz and Williamson, 2003; Aggarwal et al., 2009; Hilary and Hui, 2009). (2) *Hofstede's cultural dimensions*: The dimensions represent different perspectives of cultural environment that people live and work with. We use four cultural dimensions for the purpose, namely, individualism, masculinity, power distance, and uncertainty avoidance. The following paragraphs outline the definitions and implications to investment-decision-making of each cultural dimension.

- (a) *Individualism*: This dimension, the opposite of which is collectivism, measures the extent to which individuals are integrated into groups. In a country with high individualism, the first priority of agents (e.g. managers) is to take care of their own interests. In this case, managers attempt to secure success rather than expected profits when making investment decisions if there will be two possible outcomes - success and failure (Hirshleifer and Thakor, 1992). The implication is that managers in countries with high individualism may adopt more conservative investing strategies to secure success and maintain their reputation. By contrary, managers may behave more aggressively in countries with low individualism.
- (b) *Masculinity*: This dimension emphasizes factors such as achievements, monetary rewards and output (Gleason et al., 2000). In a country with high masculinity, people are very assertive and competitive and have a willingness to seek competitive outcomes; managers make decisions on their own (De Jong and Semenov, 2002). Contrary to the case in high individualism countries, individual investors and portfolio managers in countries with high masculinity are likely to overreact and show overconfidence when they invest in shares, while behave conservatively in countries with low masculinity.
- (c) *Power distance*: This dimension measures the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. In cultures with high power distance, people take inequality as granted, tolerate the concentration of power, and are more reluctant to give up independence (De Jong and Semenov, 20002). By contrast, factors such as trust, equality and cooperation are important hallmarks in cultures with small power distance. Hence, we argue that in countries with high power distance, investors are more willing to pursue “abnormal” returns to show their independence and autonomy, while investors are more satisfied with reasonable returns of investment in small power distance countries.

(d) *Uncertainty avoidance*: This dimension indicates to what extent people feel comfortable or uncomfortable with uncertainty and ambiguity and try to avoid such situations. In countries with high uncertainty avoidance, people prefer certainty, security and predictability and are reluctant to accept risks (Riddle, 1992; Offermann and Hellmann, 1997), while people are likely to be more risk-loving in low uncertainty countries. Compared with the other three dimensions, uncertainty avoidance is probably the most relevant dimension to equity investment. Investors have to deal with the possibility that they do not possess some information which might affect future price movement. This is particularly the case when markets are not efficient. The information asymmetry triggers uncertainty. Hence, the level of uncertainty avoidance in a society may directly influence the attitudes and propensities of investors.

Our main hypothesis is therefore that bilateral stock market comovements should be positively associated with sharing a common religion, and negatively related to the cultural distance measured by the Hofstede's cultural dimensions. We do not at this stage investigate the individual hofstede measures, instead examining the KS overall metric.

2.3. Economic fundamentals and capital market linkage

International finance literature has examined extensively the economic determinants of international stock market linkages. The voluminous amount of papers suggests a number of candidates for control variable for our study. Karolyi and Stulz (1996) explore the determinants of stock return comovements between Japanese and U.S. stocks. The authors do not find statistically significant association between return correlations and US macroeconomic announcements, Yen/Dollar exchange rate, Treasury bill returns and industry effects. However, the correlations positively respond to the large shocks to these markets. Bracker et al. (1999) make use of Geweke measures to capture the evolution of comovement between eight developed stock markets and the US market from 1972 through 1993. The authors find a significant same day intermarket responses between each developed market and the US market. Their results also indicate that macroeconomic factors such as bilateral import dependence, the size differential of two markets are significantly associated with the extent of stock market comovement over time. Bracker and Koch (1999) investigate the determinants of correlation matrix across ten stock markets around the world from 1972 to 1993. They find that the bilateral correlation is positively related to world market volatility and negatively related to exchange rate volatility, while to a lesser extent related to term structure

differentials, real interest differentials, and world market returns. Pretorius (2002) models the bilateral correlation between 10 emerging stock markets into cross-section and panel regressions respectively. The author finds that in both settings, the correlation between two countries is positively related to the importance of trade relationship between them, and negatively related to the difference between their industrial production growth rates. The cross-section regression shows that stock markets within a region are more interdependent than those in different regions. The panel regression shows that during the 1998 Asian financial crisis, correlation coefficients were significantly higher than usual. Using daily returns during late 1980s to late 1990s, Johnson and Soenen (2003) find a high degree of contemporaneous association between eight stock markets in the Americas and the stock market in the United States. Moreover, the authors find that the stock market comovements is positively related to the share of trade with US, while negatively related to the volatility of bilateral exchange rate and the ratio of stock market capitalization over that of US. Kim et al. (2005) find a clear impact of the European Monetary Union (EMU) on the dynamics of regional market comovements for major European stock markets. Besides the effects of EMU, the authors also find that the dynamics of stock market comovement are largely dependent on the size and the development of domestic financial markets, in comparison with exchange volatility and correlation in interest rate with regional benchmarks.

2.4. Empirical framework

We regress measures of stock market comovement on the cultural distance variables, while controlling for other determining factors. Figure 1 presents our empirical framework. Path (1) in the figure shows the geographic or physical distance, the effects of which are extensively studied under traditional gravity models. Path (2) in the figure shows the differences in cultural features that shape people's behavior patterns, which is the focus in this study. Path (3) includes important economic determinants of stock market linkage as reviewed in the last section.

[Figure 1 about here]

3. Data and variables

3.1. Basic data

The stock markets in our sample are primarily those defined as emerging by the MSCI Global Investable Market Indices 2007. We use MSCI daily national stock market index for 23 emerging markets. All indices are measured in U.S. dollars. As some markets have no records in the early 1990s, we begin our sample in year 1995 and cover the price development up to end 2007. Besides the emerging markets of interests, we include as benchmarks 23 developed markets. The data source and arrangement for developed markets are the same as that for emerging markets. The list of all markets is presented in Appendix. Taking the first logarithm difference of daily index, we are able to obtain the continuously compounding rates of return. Table 1 reports the descriptive statistics for these returns. The average daily return for all emerging markets (0.035%) is quite close to that of advanced markets (0.036%), but with a higher standard deviation (2.026%) than advanced markets (1.336%). Turning to individual emerging market, we find the highest average return in Russia (0.081%) and Egypt (0.075%), and the lowest average return in Thailand (-0.022%) and Philippines (-0.015%). Only Morocco presents a lower standard deviation of return (0.867%) than that of advanced markets (1.336%). Most emerging markets are left-skewed and have high kurtosis. The Jarque-Bera tests reject the normality hypothesis for all emerging markets. Overall, the descriptive statistics suggest that the return of emerging equity markets is rather volatile and not normal distributed, which echoes the stylized facts regarding emerging markets (Bekaert and Harvey, 1995, 1997; Harvey 1995).

[Table 1 about here]

3.2. *Measuring stock market comovement*

We initially use unconditional correlation coefficients to measure the level of stock market comovement between two countries. This is the most straightforward approach to gauge the interdependence between markets, and has been widely used (e.g. Bracker and Koch, 1999; Flavin et al., 2002; Pretorius, 2002). Correlation can be also used as an indirect measure of market integration. The country-pairs are set up between each emerging market and the rest of emerging markets, and between each emerging market and each developed market in the sample. This “emerging-emerging” and “emerging-developed” pair strategy offers a large and comprehensive sample of international correlation for emerging markets². To obtain time-varying values, we calculate annual correlations

² As the focus of the paper is primarily on emerging markets we do not include analyses of developed-developed market pairings.

using daily returns of the year, and then move forward to the next year and do the same. The final sample includes 782 country-pairs and 13 years from 1995 to 2007, and has 10166 panel observations.

Table 2 presents the summary statistics for calculated correlations. The average correlations of all country-pairs present a time-varying path through years and reach the highest value at 0.422 in 2007. Correlations in 2000s are generally higher than those in 1990s, which reflect tighter global relationship for emerging markets in more recent years. In the Asian crisis year -1998, the correlation is 0.246 which is higher than years around. By country, South Africa has the highest average correlation (0.319), while Egypt presents the lowest average correlation (0.037) across years.

[Table 2 about here]

3.3. Measuring cultural distance

We adopt two methods to measure the cultural distance between two countries. First, we construct a religion dummy variable (*Religion*) that equals one if two countries share a common religion and zero otherwise. A value of one suggests a smaller cultural distance than a value of zero. Second, we estimate cultural distance following the method of Kogut and Singh (1988). The *KS measure* is a composite cultural distance index, which is formed based on the deviation along specific cultural dimensions of a country from those of the other country. The deviations were corrected for differences in the variances of each dimension and then arithmetically averaged. The cultural dimensions for calculation are those discussed in section 2.2. The calculation follows the formula:

$$KS_{ij} = \sum_{c=1}^4 \left[(I_{ci} - I_{cj})^2 / V_c \right] / 4 \quad (1)$$

where KS_{ij} is the cultural distance between country i and country j . I_{ci} is the score for the c th cultural dimension of country i , I_{cj} is the score for the c th cultural dimension of country j , V_c is the variance of the c th cultural dimension across all countries in sample. The larger the *KS measure*, the greater the cultural distance between country i and country j . The primary religion and scores for each cultural dimension are listed in Appendix.

3.4. Control variables

Based on prior research, we include a variety of control variables. First, the importance of geographic variables in explaining international capital market linkage has been emphasized by gravity models. To comply with this strand of literature, we control for geographic distance (*Distance*) between the major financial centers of two countries, and a region dummy variable (*Region*) that equals 1 if two countries are from the same region and zero otherwise. Country-pairs with smaller geographic distance and in the same region are expected to have higher stock market correlations. Second, the difference in market size could reflect the difference in liquidity, information cost and transaction cost, which is likely to affect stock market comovement. Therefore, we control for the absolute difference in stock market capitalization over GDP (*Market size*) and expect a negative relation between the difference and correlation. Third, we include a variable that indicates the bilateral trade relationship between two countries (*Trade*). Economic integration tends to go ‘hand in hand’ with financial integration in general. If two countries have tight trade relationship, their stock markets are expected to have close linkage as well. Details of the construction of the bilateral trade intensity measure are given in Table 3. Fourth, macroeconomic conditions may influence the stock market performance of a country. In this sense, we expect that smaller disparities in GDP growth (*Growth*) should lead to higher levels of stock market comovement. Last but not the least, we consider two legal institution variables, namely, *Legal origin* and *Legal system*. The former is a dummy variable that takes the value 1 if two countries have the same legal origin and zero otherwise. The latter is the absolute difference in the index of Legal Structure and Security of Property Rights. We include these variables because legal institutions have been shown to be related to cultural features (e.g. Stulz and Williamson, 2003), and we need to rule out this “extra” information to make sure that our cultural variables only capture the behavioral information of a country. We do not have strong predictions about the effects of legal institution. Table 3 tabulates the relevant information for all explanatory variables.

[Table 3 about here]

Table 4 presents the correlation matrix for all variables using observations from 1995 to 2007. We find that correlation is significantly and positively correlated with religion, while it is not correlated with KS measure. Besides, higher correlation is associated with smaller geographic distance, same region, closer trade relation and smaller GDP growth differential. The preliminary evidence shed some light on the association between market correlation and determining factors. In the next section, we will formally test these causal relationships.

[Table 4 about here]

4. Empirical methodology and results

4.1. The baseline model

This section presents the empirical model that estimates the effects of cultural distance on stock market comovement, controlling for a battery of determining factors. The estimation method is the pooled ordinary least squares (OLS) with clustered standard errors by country-pairs to deal with the serial correlation of residuals for a given pair. The baseline model is presented by the following equation:

$$SMC_{ij,t} = \alpha + \sum_{c=1}^{45} a_c + \sum_{t=1}^{12} a_t + \beta_1' REL_{ij,t} + \beta_2' KS_{ij,t} + \beta_3' CONTROLS_{ij,t-1} + \varepsilon_{ij,t} \quad (2)$$

where $SMC_{ij,t}$ stands for stock market comovement, which is the dependent variable. The subscripts ij and t stand for the pair of country i and j , and year respectively. a_c and a_t are country and year dummies respectively. $REL_{ij,t}$ is the religion dummy variable. $KS_{ij,t}$ is the KS cultural distance as In the baseline regressions, we expect β_1 to be positive, and β_2 to be negative. $CONTROLS_{ij,t-1}$ is a vector of control variables as outlined in section 3.4. We lag these control variables by one year to allow for the non-contemporaneous effects and the treatment also mitigates various endogeneity problems.

4.2. Main results

Table 5 shows the results of the baseline estimation where we regress unconditional correlations on cultural distance and control variables. As the two cultural variables are likely to overlap each other in terms of measuring cultural difference, we include them successively in column 1 and column 2. We find that the effects of cultural distance are consistent with our predictions, in that the same religion and KS measure are positively and negatively associated with correlations at 1% level respectively. This implies that country-pairs with smaller cultural distance exhibit higher levels of stock market comovement. Column 3 and 4 show that the cultural effects still hold and the size of

coefficients remain basically unchanged when we include legal institution variables. This check disentangles cultural metrics from the institutional metrics of countries and confirms the impacts of cultural distance. In column 5, we estimate the model including all variables simultaneously. Again, we can observe the similar bearings of cultural distance on market comovement as found before.

[Table 5 about here]

With respect to the magnitude of effect, two countries have 0.033 (column 1 and column 3) and 0.032 (column 5) additional correlations in their stock market returns if they share the same primary religion. An increase in one standard deviation of KS measure leads to a decrease in correlation by 0.012 (column 2), 0.010 (column 4), and 0.009 (column 5) respectively. A better way to understand the magnitude is to consider two polar country-pairs, one of which has the smallest cultural distance and the other has the largest cultural distance. To this end, the KS measure takes the smallest value of 0.018 for the pair of Korea and Peru, and takes the largest value of 6.371 for the pair of Denmark and Mexico. The estimates in column 2 imply that if the Denmark-Mexico pair had a small cultural distance as that of the Korea-Peru pair, its correlation would approximately increase by 0.076. This equals to a 31.5% increase in the average correlation of 0.240 for the Denmark-Mexico pair.

Turning to the control variables, the results are generally consistent with previous research findings. Geographic distance is negatively related to correlation, while the same region dummy is positively related to correlation at 1% level. This agrees with the arguments of gravity models, saying that large geographic distance, standing for higher transaction costs and unfamiliarity effects, may attenuate international market linkage. Bilateral trade is positively related to correlation at 1% level, suggesting that close economic linkage may reflect close linkage in financial markets. We also find that increased GDP growth differentials result in decreased levels of stock market comovements. However, we do not find significant effect of the differentials in stock market size. Our empirical models have a good fitness to the data and explain a substantial proportion of variation in unconditional correlations. The adjusted R -square is relatively high across specifications, generally between 63% and 64%. F -tests indicate that all models are jointly significant at 1% level.

4.3. Robustness check and extension

The baseline results have illustrated the association between cultural distance and stock market comovement. We perform two tests to check the robustness of the main results and extend our analysis. These tests are based on the same sample that we use in Table 5.

4.3.1. Fitted conditional correlation

We use conditional correlation as an alternative dependent variable. This is motivated by the fact that correlation is dependent on the volatility of returns and volatility follows an autoregressive process. GARCH models are widely used to capture the development of volatility. And multivariate GARCH models extend the estimation for not only return variance, but also return covariances. Therefore we can obtain fitted conditional correlations over time from a multivariate GARCH set. Compare with simple rolling correlations, conditional correlations might better reflect the time-varying process of market linkage. Before any modeling, the ARCH-LM test is conducted on the returns of all countries to make sure that this class of model is appropriate for our data. The unreported results suggest the presence of ARCH effect in all returns. Then we proceed to the next step where the bivariate GARCH models are estimated. For each country-pair, we estimate the following equations:

$$R_{i,t} = \lambda + \mu_{i,t}, \mu_{i,t} \sim N(0, h_{i,t}^2) \quad \text{for } i = 1 \text{ to } 46 \quad (3)$$

$$h_{ij,t}^2 = a_{ij} + b_{ij}h_{ij,t-1}^2 + c_{ij}\mu_{i-1}\mu_{j,t-1} \quad \text{for } i, j = 1 \text{ to } 46 \quad (4)$$

$$\rho_{ij,t} = \frac{h_{ij,t}}{\sqrt{h_{i,t}}\sqrt{h_{j,t}}} \quad \text{for } i, j = 1 \text{ to } 46 \quad (5)$$

where $R_{i,t}$ is the daily returns of national stock market index in country i , $h_{ij,t}$ stands for the variance and covariance of error terms from the mean regression (equation 3), and it follows a GARCH (1,1) process as shown in equation 4. Equation 5 gives bilateral conditional correlation coefficients. To obtain annual values, we take average of daily correlations for each year block.

[Table 6 about here]

Table 6 reports the regression results of fitted conditional correlation. Both the statistical significance and magnitude of coefficients are close to those of the baseline results. For the cultural effect, smaller (larger) cultural distance leads to higher (lower) levels of stock market comovement between countries. The coefficients of most control variables also present the expected sign and significance. We have slightly higher adjusted R -squares than those in Table 5, between 68% and 69%. This suggests that the conditional correlation which controls for bivariate volatility episodes is a more readily modeled measure of integration. Again, the joint significance tests indicates that our variables are collective significant in all specifications.

4.3.2. Active-trading vs. thin-trading markets

Emerging stock markets possess some stylized characteristics that make the analysis of these markets different from that of developed markets. Among others, the returns of emerging markets tend to exhibit higher serial correlation than that of developed markets, and tend to violate the assumption of normal distribution (Harvey, 1995). This is partially a reflection of infrequent trading and non-contemporaneous adjustment to current information (Kawakatsu and Morey, 1999). If investors do not actively participate in purchasing and selling shares, it will be less meaningful to examine the impact of cultural difference on correlation between markets. In other words, we need to show that the effects of cultural distance found earlier particularly hold for active-trading country-pairs. To test this consideration, we construct two sub-samples of country-pairs – one includes the eight most active-trading emerging markets and the other includes the eight most thin-trading emerging markets. For the top group, we exclude the pairs having relatively thin-trading developed markets.³ Figure 2 shows the stock market total value traded as a percentage of GDP, which we use to define active- and thin-trading markets. A substantial value gap among markets is observed. We find the highest average ratio in Korea (118.52%) and lowest average ratio in Colombia (2.28%). The large variation in trading depth warrants our test.

[Figure 2 about here]

[Table 7 and Table 8 about here]

³ We exclude country-pairs including Austria, Belgium, Ireland, New Zealand and Portugal, as their average stock market value total traded / GDP are lower than Thailand (the lower bound of active trading emerging markets).

Table 7 and 8 present the effects of cultural distance on unconditional and conditional correlations respectively, adjusting for trading intensity. In table 7, column 1 and 3 show that common religion remains an important explanatory variable even for thin trading markets, while it does not influence market comovements for active trading markets as shown in column 4 and 6. This is the obverse of what was expected. A possible reason could be the unbalance of sample observations for religiosity. In the sub-samples, the active-trading markets are from Asia, Africa and Middle East, the primary religions of which are rather diverse. The thin-trading markets are mostly from Latin America and they are mostly Catholic. Therefore the religion dummy for active market group has less heterogeneity than that of inactive market group. Compared with the religion dummy, the KS measure is perhaps more relevant here as it generates distinct values for each country-pair. For the thin trading group, cultural distance has no significant impact on correlations, shown by small and insignificant coefficients of the KS measure in column 2 and 3. For the active trading group, we find that KS measures are negative and significant at 1% level in column 5 and 6. Moreover, the magnitudes of coefficient (-0.015 and -0.014) are nearly double those in the corresponding baseline models (-0.008 and -0.007). Hence, the relationship between cultural distance and correlations is weaker for country-pairs where one/both of markets is/are thinly traded, and stronger for country-pairs where markets are actively traded.

Table 8 shows that for active-trading group, the KS measure is negatively related to the fitted conditional correlations obtained from bilateral GARCH models. The size of coefficients is also larger than that in the baseline estimation. However, there is no significant association between KS measure and correlations for thin-trading group. Sub-sample tests based on trading depth attest to the role of culture in the general case.

5. Conclusion and implications

Prior research has indicated that financial market linkage such as cross-border capital flows and market price comovement is subject to the geographic distance between countries. These works emphasize the role of distance as a proxy for information asymmetry and unfamiliarity among countries. This paper innovatively examines the effect of cultural distance on international market linkage for emerging markets. We underline the difference in the norms and propensities of investors' behavior in a competitive and uncertain environment. To achieve this goal, we build up a large dataset including 782 country-pairs between major emerging stock markets and other stock markets during 1995 - 2007. We adopt simple and well accepted approaches to measure stock market linkage and cultural distance between countries. We also control for a set of variables suggested by relevant

literature. Our results show that if two countries share the same religion and/or have smaller KS measure, they tend to have higher levels of stock market correlation. This general result is consistent with our prediction that the convergence of investing behavior leads to the convergence of market movement.

The cultural effects are robust to two additional checks. First, we use the fitted conditional correlations obtained from bivariate GARCH models as dependent variable. Compared with unconditional correlations, conditional ones are the outcomes of time-varying variance/covariance structure and maybe better capture the development of market comovement. The results show that both significance and magnitude of cultural variables are rather similar to those observed in the baseline results. Second, we argue that a prerequisite for cultural effect is the sufficient amount of trading in markets so that cultural effect should be stronger between active-trading markets. Therefore, we split the sample into thin-trading group and active-trading group. We find that the magnitude of cultural effect is significantly larger for the latter group.

An important message to take away from the results is that cultural distance matters in international market comovement even when capital markets around the world are argued to be integrated. As we know, major emerging economies have liberalized their capital markets during the late 1980s and early 1990s. A key component of liberalization policies is to allow foreign investors to invest in domestic securities and domestic investors to purchase foreign securities. If the full minglement of investors does happen, we should not observe any effects of cultural distance between different groups of investor. However, our results do not support this possibility. Cultural distance acts as a kind of sunk cost that can not be readily overcome. There are at least three reasons for this phenomenon. First, it seems that the home bias exists, especially when investors consider investing in emerging markets. So, investors stay on their own “tracks” and the segmentation of investing pushes cultural effects to the frontline. The information costs in cross-border investment may explain the hold back of foreign investors. Second, financial liberalization/integration is a gradual process. And this process could be long-lasting and reversal. So, foreign investors may still encounter objective barriers to invest into emerging markets even though they are willing to do so. For instance, there are still hurdles in front of common foreign investors to directly buy and sell yuan-denominated shares (“A” shares) in Chinese mainland stock exchanges, although the country launched the Qualified Foreign Institutional Investor (QFII) program in 2002. Third, it is likely that when a foreign investor involves in a market that she is not familiar with, she probably sticks to her own values and judgment of investing so that the cultural difference between investors remains. This deserves more theoretical and empirical research in the future.

Figure1. Determining factors of stock market comovement

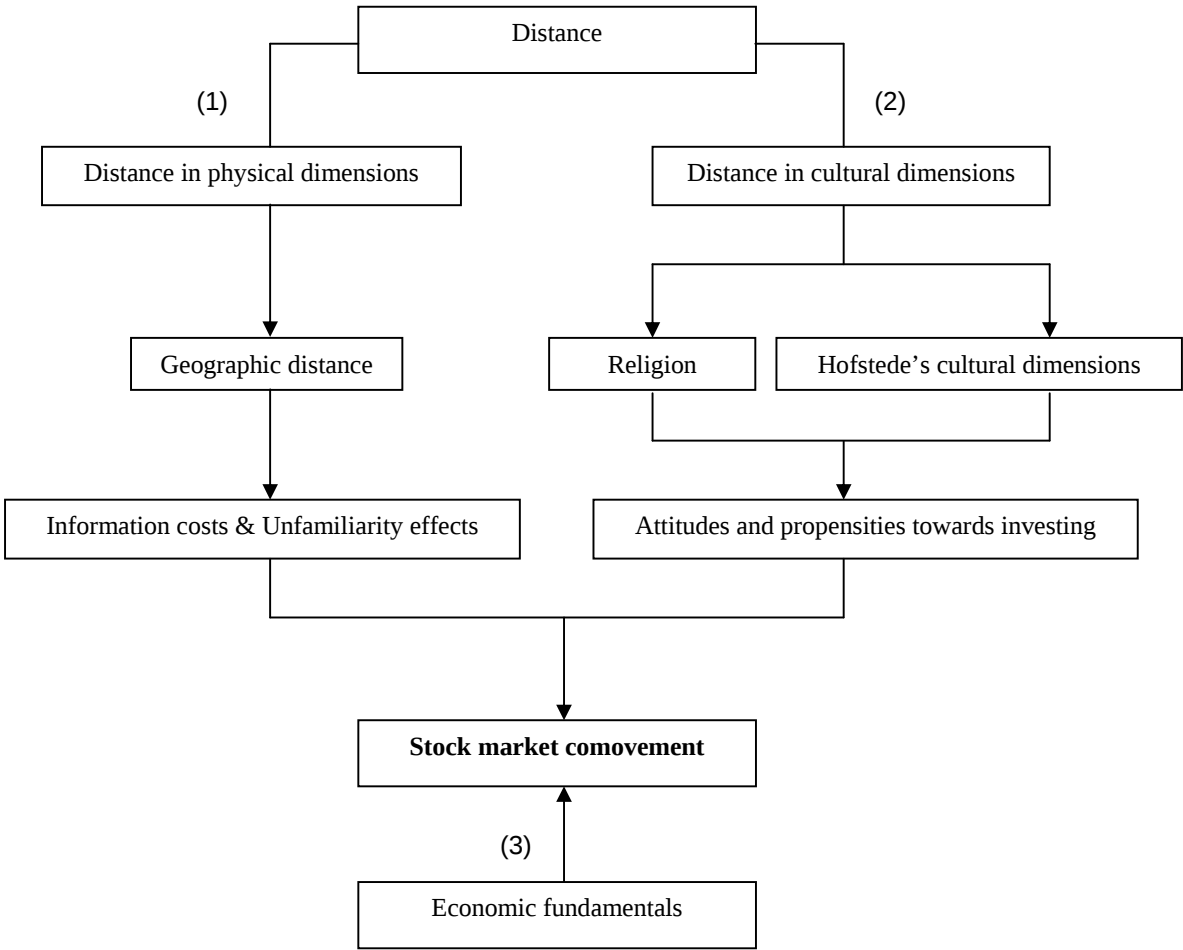


Figure 2. Stock market total value trade as a percentage of GDP for active and thin trading emerging markets

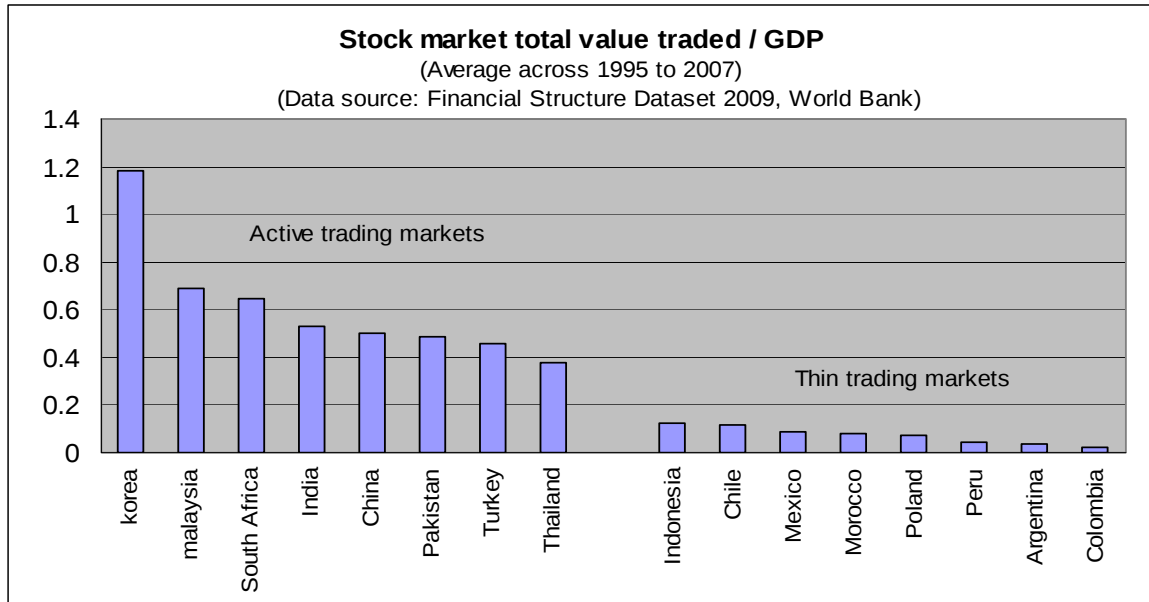


Table 1. Descriptive statistics for daily returns over 1995 to 2007

Country	Mean (%)	Median (%)	Maximum (%)	Minimum (%)	Std. Dev. (%)	Skewness	Kurtosis	Jarque- Bera
Argentina	0.028	0.015	16.341	-33.647	2.323	-1.204	25.041	69457.14
Brazil	0.049	0.084	17.335	-13.717	2.279	0.032	8.977	5048.85
Chile	0.019	0.000	8.699	-6.226	1.184	-0.044	6.764	2003.20
China	0.005	0.007	12.744	-14.442	1.964	0.021	8.001	3534.61
Colombia	0.041	0.006	16.492	-12.968	1.553	0.038	14.471	18591.57
Czech	0.062	0.079	8.764	-7.393	1.506	-0.182	5.284	755.63
Egypt	0.075	0.000	9.286	-9.005	1.516	0.165	7.712	3153.10
Hungary	0.072	0.096	12.998	-19.012	1.909	-0.527	11.515	10401.08
India	0.045	0.044	8.263	-11.951	1.595	-0.314	6.586	1872.98
Indonesia	0.011	0.026	23.774	-43.081	2.968	-1.157	30.577	108206.50
Israel	0.037	0.036	8.285	-9.793	1.463	-0.299	8.061	3669.29
Korea	0.026	0.000	26.881	-21.666	2.493	0.289	14.956	20243.48
Malaysia	0.006	0.000	25.854	-36.967	1.968	-0.850	68.536	607258.70
Mexico	0.049	0.073	17.843	-21.759	1.919	-0.003	16.949	27492.31
Morocco	0.049	0.031	6.251	-4.819	0.867	0.077	7.479	2837.57
Pakistan	0.007	0.000	14.205	-15.727	1.970	-0.454	9.342	5800.05
Peru	0.057	0.033	10.648	-9.338	1.560	-0.090	8.148	3748.90
Philippines	-0.015	0.000	21.972	-10.942	1.764	0.842	16.913	27751.69
Poland	0.040	0.024	9.017	-11.591	1.892	-0.130	5.359	796.12
Russia	0.081	0.088	24.220	-28.097	3.104	-0.375	12.545	12951.95
South Africa	0.025	0.058	7.636	-13.020	1.539	-0.589	7.642	3240.64
Thailand	-0.022	-0.030	18.100	-18.085	2.221	0.683	13.307	15272.71
Turkey	0.057	0.030	22.015	-27.420	3.162	-0.162	9.595	6160.79
Emerging markets	0.035	0.013	26.881	-0.431	2.026	-0.332	19.207	-
Advanced markets	0.036	0.047	16.005	-20.067	1.336	-0.235	7.013	-

Table 2. Descriptive statistics for daily returns for unconditional correlation

	Mean	Median	Maximum	Minimum	Std. Dev.
<i>Panel A: by year</i>					
1995	0.068	0.055	0.695	-0.216	0.118
1996	0.089	0.086	0.553	-0.165	0.099
1997	0.174	0.151	0.789	-0.207	0.161
1998	0.246	0.233	0.796	-0.163	0.165
1999	0.139	0.125	0.613	-0.175	0.115
2000	0.168	0.151	0.647	-0.138	0.154
2001	0.160	0.136	0.694	-0.145	0.143
2002	0.153	0.141	0.816	-0.192	0.147
2003	0.145	0.123	0.739	-0.165	0.120
2004	0.256	0.262	0.817	-0.123	0.147
2005	0.225	0.233	0.821	-0.181	0.153
2006	0.368	0.377	0.824	-0.081	0.171
2007	0.422	0.454	0.865	-0.097	0.196
<i>Panel B: by country</i>					
Argentina	0.188	0.156	0.796	-0.126	0.182
Brazil	0.249	0.218	0.800	-0.162	0.197
Chile	0.252	0.253	0.677	-0.210	0.176
China	0.219	0.194	0.865	-0.147	0.169
Colombia	0.134	0.095	0.641	-0.162	0.149
Czech	0.245	0.221	0.662	-0.135	0.183
Egypt	0.037	0.033	0.290	-0.181	0.076
Hungary	0.273	0.267	0.761	-0.158	0.179
India	0.156	0.134	0.597	-0.135	0.145
Indonesia	0.178	0.138	0.759	-0.126	0.162
Israel	0.228	0.225	0.637	-0.138	0.153
Korea	0.209	0.185	0.769	-0.128	0.159
Malaysia	0.175	0.149	0.763	-0.095	0.150
Mexico	0.254	0.238	0.800	-0.192	0.200
Morocco	0.055	0.031	0.423	-0.216	0.134
Pakistan	0.052	0.045	0.345	-0.141	0.078
Peru	0.210	0.180	0.728	-0.216	0.175
Philippines	0.146	0.126	0.618	-0.152	0.130
Poland	0.269	0.264	0.761	-0.136	0.176
Russia	0.222	0.190	0.672	-0.139	0.180
South Africa	0.319	0.305	0.797	-0.139	0.181
Thailand	0.191	0.180	0.666	-0.165	0.128
Turkey	0.202	0.150	0.749	-0.102	0.179

Table 3. Determinants of stock market comovement

Variables	Description	Expected sign	Statistics	
			Mean	Median
Religion _{ij}	Dummy variable: equals 1 if country <i>i</i> and country <i>j</i> share the same primary religion and 0 otherwise. The primary religion of sample countries is listed in the Appendix.	+	0.228	0.000
KS measure _{ij}	Kogut and Singh (1988) cultural distance which measures the aggregate difference in four Hofstede's cultural dimensions between country <i>i</i> and country <i>j</i> . The calculation method is shown by formula 2.	-	1.963	1.727
Distance _{ij}	The logarithm of distance between country <i>i</i> and country <i>j</i> . We use distance between major financial centers. The data is developed by Frankel et al. (1995) and Frankel and Wei (1998).	-	8.770	9.075
Region _{ij}	Dummy variable: equals 1 if both countries are in the same region and 0 otherwise. African and Middle Eastern countries are grouped into Europe in this study.	+	0.307	0.000
Trade _{ij}	$(X_{ij}/X_i + X_{ji}/X_j + M_{ij}/M_i + M_{ji}/M_j)/4$ represents the average of exports from country <i>i</i> to country <i>j</i> , as a percentage of <i>i</i> 's total exports, exports from country <i>j</i> to country <i>i</i> , as a percentage of <i>j</i> 's total exports, imports of country <i>i</i> from country <i>j</i> as a percentage of <i>i</i> 's total imports, imports of country <i>j</i> from country <i>i</i> as a percentage of <i>j</i> 's total imports. The data is calculated on a year-by-year basis from 1995 to 2007.	+	0.015	0.006
Market size _{ij}	The absolute value of the difference in the stock market capitalization (as a percentage of GDP) between countries <i>i</i> and <i>j</i> . The data is calculated on a year-by-year basis from 1995 to 2007.	-	0.611	0.382
Growth _{ij}	The absolute value of the difference in the annual GDP growth rate between countries <i>i</i> and <i>j</i> . The data is calculated on a year-by-year basis from 1995 to 2007.	-	0.093	0.061
Legal origin _{ij}	Dummy variable: equals 1 if country <i>i</i> and country <i>j</i> share the same legal origin and 0 otherwise. The legal origin of sample countries is listed in the Appendix.	?	0.265	0.000
Legal system _{ij}	The absolute value of the difference in the index of Legal Structure and Security of Property Rights between countries <i>i</i> and <i>j</i> . The index includes elements such as judicial independence, impartial courts and legal enforcement of contracts. The score ranges from 0 to 10. Higher scores mean more effective legal system. We use average score across 1995 to 2006 for each country. Data source: Economic Freedom of the World, 2008 Annual Report, available at: http://www.fraserinstitute.ca .	?	2.386	2.276

Table 4. Correlation matrix

		[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Correlation	[1]	0.141***	0.006	-0.208***	0.221***	0.120***	0.184***	-0.143***	-0.021**	-0.053***
Religion	[2]	1.000	-0.166***	-0.046***	0.009	-0.082***	-0.029***	-0.069***	0.220***	-0.022**
KS measure	[3]		1.000	0.090***	-0.188***	0.056***	-0.020**	-0.004	-0.246***	0.472***
Distance	[4]			1.000	-0.782***	0.026**	-0.302***	-0.076***	0.028***	0.093***
Region	[5]				1.000	0.027***	0.217***	0.050***	0.016	-0.163***
Market size	[6]					1.000	0.051***	-0.031***	-0.100***	0.129***
Trade	[7]						1.000	-0.001	0.037***	0.011
Growth	[8]							1.000	-0.015	0.078***
Legal origin	[9]								1.000	-0.150***
Legal system	[10]									1.000

This table presents the cross-correlations between all variables using observations for each country-pair from 1995 to 2007. Correlation is the unconditional correlation coefficients. Religion and KS measure are the two cultural distance variables. Distance and region are the two geographic variables. Market size is the absolute value of the difference in the stock market capitalization (as a percentage of GDP) between two countries. Trade captures the depth of good trade for each country-pair. Two legal institution variables are Legal origin and legal system. ***, **, * stand for significance at the 1, 5 and 10 percent levels, respectively.

Table 5. The effects of cultural distance on unconditional correlation

Variables	Unconditional correlation				
	(1)	(2)	(3)	(4)	(5)
Religion	0.033*** [5.30]		0.033*** [5.28]		0.032*** [5.12]
KS measure		-0.009*** [-4.09]		-0.008*** [-3.16]	-0.007*** [-2.69]
Distance	-0.029*** [-5.17]	-0.032*** [-5.71]	-0.031*** [-5.37]	-0.033*** [-5.75]	-0.031*** [-5.40]
Region	0.041*** [4.89]	0.034*** [3.90]	0.038*** [4.54]	0.033*** [3.75]	0.034*** [4.10]
Market size	0.001 [0.33]	0.002 [0.38]	0.004 [0.93]	0.004 [0.87]	0.004 [0.98]
Trade	0.752*** [5.77]	0.743*** [5.72]	0.755*** [5.82]	0.744*** [5.68]	0.754*** [5.90]
Growth	-0.097*** [-6.48]	-0.095*** [-6.34]	-0.093*** [-6.18]	-0.092*** [-6.13]	-0.092*** [-6.13]
Legal origin			-0.003 [-0.65]	0.001 [0.20]	-0.004 [-0.78]
Legal system			-0.008*** [-3.35]	-0.006** [-2.35]	-0.007** [-2.49]
Constant	0.436*** [8.35]	0.467*** [9.02]	0.454*** [8.52]	0.476*** [8.87]	0.456*** [8.63]
<i>F</i> -test	131.89***	125.91***	138.64***	129.03***	134.45***
Adjusted R-square	0.637	0.635	0.638	0.635	0.639
No. of Observation	9056	9056	9056	9056	9056

The dependent variable is the unconditional correlation of daily stock market indices for each year. All specifications include country and year dummy variables. We do not report the estimates of these dummies for brevity. The values of *t*-statistics are reported in brackets. ***, **, * stand for significance at the 1, 5 and 10 percent levels, respectively.

Table 6. The effects of cultural distance on fitted conditional correlation

Variables	Fitted conditional correlation				
	(1)	(2)	(3)	(4)	(5)
Religion	0.029*** [4.80]		0.029*** [4.77]		0.027*** [4.60]
KS measure		-0.010*** [-4.43]		-0.008*** [-3.46]	-0.007*** [-3.06]
Distance	-0.029*** [-5.03]	-0.031*** [-5.51]	-0.030*** [-5.23]	-0.032*** [-5.57]	-0.030*** [-5.26]
Region	0.042*** [5.16]	0.035*** [4.13]	0.039*** [4.79]	0.034*** [3.98]	0.035*** [4.29]
Market size	0.0001 [0.03]	0.0005 [0.14]	0.003 [0.79]	0.003 [0.73]	0.003 [0.85]
Trade	0.741*** [5.69]	0.733*** [5.67]	0.744*** [5.70]	0.734*** [5.62]	0.742*** [5.83]
Growth	-0.075*** [-7.01]	-0.072*** [-6.86]	-0.070*** [-6.65]	-0.069*** [-6.59]	-0.069*** [-6.62]
Legal origin			-0.003 [-0.58]	0.0007 [0.13]	-0.004 [-0.73]
Legal system			-0.009*** [-3.52]	-0.006** [-2.48]	-0.007** [-2.58]
Constant	0.394*** [7.62]	0.422*** [8.25]	0.412*** [7.84]	0.431*** [8.18]	0.414*** [7.96]
<i>F</i> -test	107.98***	105.98***	114.27***	108.70***	111.10***
Adjusted R-square	0.686	0.685	0.688	0.685	0.690
No. of Observation	9056	9056	9056	9056	9056

The dependent variable is the fitted conditional correlation of daily stock market indices for each year. The correlation coefficients are calculated from GARCH (1, 1) models. All specifications include country and year dummy variables. We do not report the estimates of these dummies for brevity. The values of *t*-statistics are reported in brackets. ***, **, * stand for significance at the 1, 5 and 10 percent levels, respectively.

Table 7. The effects of cultural distance on unconditional correlation – thin vs. active trading markets

	Thin trading			Active trading		
	(1)	(2)	(3)	(4)	(5)	(6)
Religion	0.044** [2.53]		0.046*** [2.63]	0.009 [1.04]		0.006 [0.73]
KS measure		0.002 [0.24]	0.004 [0.62]		-0.015*** [-3.58]	-0.014*** [-3.47]
Distance	-0.027 [-1.49]	-0.026 [-1.33]	-0.027 [-1.44]	-0.018 [-1.06]	-0.014 [-1.30]	-0.015 [-1.34]
Region	0.019 [0.58]	0.028 [0.82]	0.021 [0.64]	0.073*** [7.42]	0.067*** [6.50]	0.067*** [6.49]
Market size	-0.010 [-1.40]	-0.010 [-1.40]	-0.010 [-1.38]	0.006 [0.74]	0.007 [0.95]	0.007 [0.94]
Trade	0.590*** [3.12]	0.564*** [2.91]	0.588*** [3.09]	1.031*** [5.19]	1.002*** [5.73]	0.993*** [5.57]
Growth	-0.078* [-1.75]	-0.075* [-1.70]	-0.080* [-1.83]	-0.165*** [-5.36]	-0.166*** [-5.45]	-0.166*** [-5.42]
Legal origin	0.012 [0.65]	0.007 [0.35]	0.013 [0.69]	-0.024*** [-3.02]	-0.025*** [-3.15]	-0.025*** [-3.16]
Legal system	-0.013* [-1.93]	-0.090*** [-7.86]	-0.014** [-1.97]	-0.004 [-0.40]	-0.002 [-0.19]	-0.002 [-0.17]
Constant	0.537*** [2.93]	0.561*** [2.88]	0.521*** [2.74]	0.331 [3.53]	0.316*** [3.34]	0.319*** [3.37]
<i>F</i> -test	107.27***	97.25***	104.64***	85.39***	92.14***	90.90***
Adjusted R-square	0.631	0.628	0.631	0.727	0.730	0.730
No. of Observation	2447	2447	2447	1994	1994	1994

The dependent variable is the unconditional correlation of daily stock market indices for each year. All specifications include country and year dummy variables. We do not report the estimates of these dummies for brevity. The values of *t*-statistics are reported in brackets. ***, **, * stand for significance at the 1, 5 and 10 percent levels, respectively.

Table 8. The effects of cultural distance on conditional correlation – thin vs. active trading markets

	Thin trading			Active trading		
	(1)	(2)	(3)	(4)	(5)	(6)
Religion	0.029* [1.69]		0.031* [1.79]	0.006 [0.76]		0.004 [0.45]
KS measure		0.002 [0.37]	0.004 [0.64]		-0.012*** [-3.23]	-0.012*** [-3.14]
Distance	-0.031* [-1.74]	-0.029 [-1.63]	-0.030* [-1.70]	-0.019* [-1.67]	-0.016 [-1.43]	-0.016 [-1.46]
Region	0.022 [0.72]	0.029 [0.91]	0.024 [0.78]	0.074*** [7.70]	0.069*** [6.74]	0.069*** [6.73]
Market size	-0.009* [-1.74]	-0.009* [-1.74]	-0.009* [-1.72]	0.007 [1.24]	0.009 [1.46]	0.009 [1.45]
Trade	0.543*** [3.03]	0.525*** [2.89]	0.541*** [3.01]	1.013*** [4.64]	0.987*** [5.02]	0.981*** [4.92]
Growth	-0.066** [-2.11]	-0.065** [-2.10]	-0.069** [-2.24]	-0.096*** [-4.20]	-0.097*** [-4.29]	-0.097*** [-4.27]
Legal origin	-0.002 [-0.10]	-0.005 [-0.30]	-0.001 [-0.06]	-0.022*** [-2.99]	-0.022*** [-3.10]	-0.023*** [-3.11]
Legal system	-0.012* [-1.85]	-0.011* [-1.69]	-0.012* [-1.88]	-0.005 [-0.55]	-0.003 [-0.37]	-0.003 [-0.36]
Constant	0.571*** [3.28]	0.582*** [3.24]	0.555*** [3.11]	0.274*** [2.93]	0.262*** [2.78]	0.264*** [2.79]
<i>F</i> -test	73.00	69.50	70.99	81.04	86.15	85.12
Adjusted R-square	0.679	0.677	0.679	0.779	0.782	0.782
No. of Observation	2447	2447	2447	1994	1994	1994

The dependent variable is the fitted conditional correlation of daily stock market indices for each year. The correlation coefficients are calculated from GARCH (1, 1) models. All specifications include country and year dummy variables. We do not report the estimates of these dummies for brevity. The values of *t*-statistics are reported in brackets. ***, **, * stand for significance at the 1, 5 and 10 percent levels, respectively.

Appendix. Culture data

Country	Primary religion	Individualism	Masculinity	Power Distance	Uncertainty avoidance	Legal origin
<i>Emerging markets</i>						
Argentina	Catholic	46	56	49	86	Civil/French
Brazil	Catholic	38	49	69	76	Civil/French
Chile	Catholic	23	28	63	86	Civil/French
China	Other beliefs	20	66	80	30	Socialist
Colombia	Catholic	13	64	67	80	Civil/French
Czech	Catholic	58	57	57	74	Socialist
Egypt	Muslim	38	52	80	68	Civil/French
Hungary	Catholic	80	88	46	82	Socialist
India	Hindu	48	56	77	40	Common
Indonesia	Muslim	14	46	78	48	Civil/French
Israel	Judaism	54	47	13	81	Common
Korea	Protestant	18	39	60	85	Civil/German
Malaysia	Muslim	26	50	104	36	Common
Mexico	Catholic	30	69	81	82	Civil/French
Morocco	Muslim	46	53	70	68	Civil/French
Pakistan	Muslim	14	50	55	70	Common
Peru	Catholic	16	42	64	87	Civil/French
Philippines	Catholic	32	64	94	44	Civil/French
Poland	Catholic	60	64	68	93	Socialist
Russia	Other beliefs	39	36	93	95	Socialist
South Africa	Protestant	65	63	49	49	Common
Thailand	Buddhist	20	34	64	64	Common
Turkey	Muslim	37	45	66	85	Civil/French
<i>Developed markets</i>						
Australia	Protestant	90	61	36	51	Common
Austria	Catholic	55	79	11	70	Civil/German
Belgium	Catholic	75	54	65	94	Civil/French
Canada	Catholic	80	52	39	48	Common
Denmark	Protestant	74	16	18	23	Civil/Scandinavian
Finland	Protestant	63	26	33	59	Civil/Scandinavian
France	Catholic	71	43	68	86	Civil/French
Germany	Protestant	67	66	35	65	Civil/German
Greece	Greek Orthodox	35	57	60	112	Civil/French
Hong Kong	Other beliefs	25	57	68	29	Common
Ireland	Catholic	70	68	28	35	Common
Italy	Catholic	76	70	50	75	Civil/French
Japan	Buddhist	46	95	54	92	Civil/German
Netherlands	Catholic	80	14	38	53	Civil/French
New Zealand	Protestant	79	58	22	49	Common
Norway	Protestant	69	8	31	50	Civil/Scandinavian
Portugal	Catholic	27	31	63	104	Civil/French
Singapore	Buddhist	20	48	74	8	Common
Spain	Catholic	51	42	57	86	Civil/French
Sweden	Protestant	71	5	31	29	Civil/Scandinavian
Switzerland	Catholic	68	70	34	58	Civil/German
United Kingdom	Protestant	89	66	35	35	Common
United States	Protestant	91	62	40	46	Common

The table lists the primary religion, values of Hofstede's cultural dimensions, and the origin of the legal system for each country in our sample. The primary religion is the religion believed by the largest percentage of population in a country. The data on religion and legal origin are obtained from La Porta et al. (1999), and Stulz and Williamson (2003). Data on the four cultural dimensions is obtained from Hofstede's website at: http://www.geert-hofstede.com/hofstede_dimensions.php.

References

- Adler, N., 1997. International dimensions of organizational behavior. Ohio: International Thomson Publishing.
- Aggarwal, R., Kearney, C., Lucey, B., 2009. Is gravity a cultural artefact? Culture and distance in foreign portfolio investment. Manuscript, FMA Annual Meeting 2009.
- Bekaert, G., Harvey, C.R., 1995. Time varying world market integration. *Journal of Finance* 50, 467-509.
- Bekaert, G., Harvey, C.R., 1997. Emerging equity market volatility. *Journal of Financial Economics* 43, 29-78.
- Bracker, K., Docking, D.S., Koch, P.D., 1999. Economic determinants of evolution in international stock market integration. *Journal of Empirical Finance* 6, 1-27.
- Bracker, K., Koch, P.D., 1999. Economic determinants of the correlation structure across international equity markets. *Journal of Economics and Business* 51, 443-471.
- Chui, A., Lloyd, A., Kwok, C., 2002. The determination of capital structure: is national culture a missing piece to the puzzle? *Journal of international business studies* 33, 99-127.
- Cooper, I.A., Kaplanis, E., 1994. What explains the home bias in portfolio investment. *Review of Financial Studies* 7, 45-60.
- De Jong, E., Semenov, R., 2002. Cross-country differences in stock market development: A cultural view. EFA 2002 Berlin Meetings Presented Paper.
- Flavin, T.J., Hurley, M.J., Rousseau, F., 2002. Explaining stock market correlation: A gravity model approach. *Manchester School* 70, 87-106.
- Frankel, J., Stein, E., Wei, S.J., 1995. Trading blocks and the Americas: The natural, the unnatural, and the super-natural. *Journal of Development Economics* 47, 61-95.
- French, K.R., Poterba, J.M., 1991. Investor diversification and international equity markets. *American Economic Review, Papers and Proceedings*, 222-226.
- Gleason, K., Mathur, L., Mathur, I., 2000. The interrelationship between culture, capital structure, and performance: evidence from European retailers. *Journal of Business Research* 50, 185-191.
- Harvey, C., 1995. Predictable risk and returns in emerging markets. *Review of Financial Studies* 8, 773-816.
- Hilary, G., Hui, K.W., 2009. Does religion matter in corporate decision making in America? *Journal of Financial Economics* doi:10.1016/j.jfineco.2008.10.001.
- Hofstede, G., 1994. Management scientists are human. *Management Science* 40, 4-13.
- Hogg, M., Abrams, D., 1988. Social identifications: A social psychology of intergroup relations and group processes. Routledge, London.
- Johnson, R., Soenen, L., 2003. Economic integration and stock market comovement in the Americas. *Journal of Multinational Financial Management* 13, 85-100.
- Kahneman, D., Tversky, A., 1979. Prospect theory: An analysis of decision under risk. *Econometrica* 47, 263-292.
- Kang, J., Stulz, R., 1997. Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan. *Journal of Financial Economics* 46, 3-28.
- Karolyi, A., Stulz, R., 1996. Why do markets move together? An investigation of US-Japan stock return comovements. *Journal of Finance* 51, 951-986.
- Kawakatsu, H., Morey, M.R., 1999. Financial liberalization and stock market efficiency: an empirical examination of nine emerging market countries. *Journal of Multinational Financial Management* 9, 353-371.
- Kim, S.J., Moshirian, F., Wu, E., 2005. Dynamic stock market integration driven by the European Monetary Union: An empirical analysis. *Journal of Banking and Finance* 29, 2475-2502.

- King, M., Sentana, E., Wadhwani, S., 1994. Volatility and links between national stock markets. *Econometrica* 62, 901-933.
- Kogut, B., Singh, H., 1988. The effect of national culture on the choice of entry mode. *Journal of International Business Studies* Fall, 411-432.
- Offermann, L.R., Hellmann, P.S., 1997. Culture's consequences for leadership behavior: National values in action. *Journal of Cross-cultural Psychology* 28, 342-351.
- Portes, R., Rey, H., 2005. The determinants of cross-border equity flows. *Journal of International Economics* 65, 269-296.
- Pretorius, E., 2002. Economic determinants of emerging stock market interdependence. *Emerging Markets Review* 3, 84-105.
- Puri, M., Robinson, D., 2007. Optimism and economic choice. *Journal of Financial Economics* 86, 71-99.
- Riddle, D.I., 1992. Leaving cultural factors in international service delivery. *Advances in Services Marketing and Management* 1, 297-322.
- Schwartz, S., 1994. Beyond Individualism/Collectivism: new cultural dimensions of values. In Kim, U., Triandis, H. C., Kagitcibasi, C., Choi, S-C. & Yoon, G. (Eds.), *Individualism and Collectivism: Theory, Method and Applications*. California: Sage Publications, 85-99.
- Stulz, R., Williamson, R., 2003. Culture, openness, and finance. *Journal of Financial Economics* 70, 313-349.
- Tesar, L., Werner, I.M., 1995. Home bias and high turnover. *Journal of International Money and Finance* 14, 467-493.
- Tajfel, H., 1981. *Human groups and social categories*. Cambridge University Press, New York.
- Weber, M., 1905. *The protestant ethic and the spirit of capitalism*. Allen & Unwin, London.
- Wei, S.J., Frankel, J., 1995. Open regionalism in a world of continental trade blocks. NBER Working Paper Series.

