Why is there so little regional financial integration in Asia?

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Abstract

This paper seeks to understand why the financial integration of Asian economies has focused on countries outside the region. We analyze empirically the geographical destination of cross-border portfolio holdings for more than 40 countries. We then compare these benchmark results with those of four subgroups: Asia, Europe, industrial and emerging countries. The lack of liquidity in Asian financial markets turns out to be very relevant in explaining why the region's capital is invested predominantly in major financial centers, notwithstanding the short distance and large trade flows within Asia. The importance of liquidity is a special characteristic of Asia when compared with developed countries or Europe, and even with emerging countries. Initiatives to foster the liquidity of Asian financial markets, therefore, would be a useful way of stimulating regional financial integration.

Key words: regional financial integration, Asia

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Contents

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1. Introduction

In the ten years since the Asian financial crisis, conditions to foster financial integration have improved. Asian economies have accumulated enormous amounts of foreign assets, particularly international reserves, due to higher domestic savings than investment. In addition, Asian economies have also learnt the lesson of balance sheet weaknesses so that the share of foreign currency denominated debt has declined rapidly. This does not mean, however, that foreign capital has abandoned the region. In fact, it continues to pour in through foreign direct investment as well as portfolio flows, including exchange-traded funds, private equity and hedge funds. All in all, cross-border financial transactions (either to export or to import capital) have increased substantially in Asia in the last ten years. Such progress in financial integration will certainly have an impact on Asian economies and, therefore, deserves analysis.

In general terms, a country's financial integration with the rest of the world has many benefits but also some drawbacks. Among the benefits, the most important ones are risk sharing and allocative efficiency, and thereby economic growth and integration. Regarding the former, portfolio diversification allows sharing of idiosyncratic risks across countries, facilitating the insurance of income against country-specific shocks and, thereby, smoothing consumption over time. Regarding the latter, by facilitating the allocation of capital to its most productive use, financial integration should foster economic growth (Edison et al (2002); Rogoff et al (2006)). The costs are also well known: In a world with imperfect capital markets, financial integration may heighten a country's vulnerability to macroeconomic and financial crises. In particular, contagion and reversals in capital flows could result in higher output volatility and even lower average growth for a certain period of time, although the evidence is inconclusive (Kose et al (2006)). In any event, the benefit of higher permanent growth should, in principle, outweigh the risks in the long-run although countries' initial circumstances as well as the type of financial integration may tilt that balance somewhat differently.

The importance of countries' initial circumstances has received attention in the literature. There is overwhelming evidence – including the Asian crisis – that countries with well poorly developed financial systems are more vulnerable to crises (Demirguc-Kunt and Detragiache (1999)). The type of financial integration has been partially analyzed, in particular differences in the types of flow with which a country integrates financially (foreign direct investment being considered more stable than more short term flows). However, much less is known about the direction of cross-border flows and how that might change the costs and benefits of financial integration. In other words, the fact that a country integrates financially with countries whose business cycles are very different (and not with its main economic partners) may have a bearing on the costs and benefits of financial integration.

In principle, regional financial integration should be more likely to reinforce economic integration but not risk sharing in as far as business cycles tend to be more closely correlated among neighbouring countries than among distant ones. The mirror case would be global financial integration, which basically refers to linkages with major financial centres. In fact, network externalities and economies of scale make financial integration a much more uneven process than economic integration. There is already some evidence that risk sharing is better achieved through global financial integration, all the more so the more specialized the countries are (Imbs (2004)). The case of European Union is probably the best example of regional financial integration reinforcing economic integration. Peer pressure has facilitated the upgrading and harmonization of local practices in the functioning of the financial system, including accounting, tax treatment and even regulation and supervision. Finally, the importance of local information and common time zones for financial markets could still create a role for regional integration to improve welfare.

Considering foreign investment in Asia, it is fair to say that the region is financially globalized but that less progress has been made towards financial integration within the region (García-Herrero and Wooldridge (2007)). Financial globalization in Asia implies – given its position as

net capital exporter – a large flow of capital from Asian countries to the developed world, which obviously does not follow the neoclassical model and falls more in line with the Lucas paradox. As shown in Graph 1, Asians direct only about one quarter of their foreign portfolio investment to other Asian countries. This is strikingly different to the pattern followed for trade in Asia, where intra-regional flows account for over half of Asia's trade. It is also in stark contrast with the experience in Europe, where over half of the region's portfolio investment is in other European countries

This pattern of capital flows in Asia raises several concerns. One is its sustainability, a key question in the current juncture. Another is missing the opportunity for capital market development within the region and the reinforcing effect on economic integration. More generally, there are several reasons why it is useful to better understand geographical patterns in financial links. The first is that such patterns may influence the matrix of correlations in asset prices (Forbes and Chinn (2003)), and another is that it may affect the degree of business cycle synchronization (Rogoff et al (2006); Imbs (2004); García-Herrero and Ruiz (2006)).

Recent empirical research has found that the degree of financial integration between two countries – measured as the value of bilateral portfolio holdings – is well depicted by the usual gravity model (Portes and Rey (2005)). This means that the degree of bilateral financial integration is positively explained by the size of the economy and that of the financial market, and negatively by distance, reflecting transaction and information costs. Beyond the usual determinants of a gravity model, trade relations have also been found to foster financial integration between two economies (Shin and Yang (2006)). This basically implies that bilateral trade in goods and assets are complementary.

Both the results from the gravity model – especially distance – and the complementary found between trade and financial linkages are at odds with Asia being more integrated with the rest of the world than within the region.

One hypothesis is that risk sharing is the driving force behind financial integration. Since East Asian economies display relatively synchronized business cycles, the limited risk diversification may explain the more rapid increase in financial integration with other areas of the world. This is even truer for major financial centres where the availability of financial instruments for risk sharing is so much larger. Using the consumption-smoothing model developed by Asdrubali et al (1996), Jeon et al (2005) estimate the degree of global consumption risk sharing in East Asia and confirm that some degree of risk sharing is obtained through Asian countries' integration with major financial centers. The paper, however, does not compare the importance of the risk sharing motive with others. In fact, there may be other hypotheses worth exploring, such as the underdevelopment of Asian financial markets beyond their size, as well as tax and risk-adjusted return factors.

Against this background, it seems important to identify the underlying factors which explain Asia's model of financial integration so far, i.e. mainly with major financial centers outside the region and much less so within the region. This is what this paper aims at, using data on cross-border portfolio holdings for more than 40 countries – seven of which are Asian for the period 2001 to 2005. The results of the paper shows that poor liquidity in Asian financial markets helps explain the still low degree of regional financial integration, compared to that with major financial centres.

2. Model and data

We analyse the determinants of foreign investment using a gravity model. Gravity models, originally developed to explain gravitational forces in physics, were adopted by economists to explain bilateral trade in goods. They proved very successful, with most empirical studies finding that trade between two countries depends positively on their national income and

negatively on the distance between them. Gravity models were subsequently employed to explain cross-border financial flows.

Theoretical support for the use of gravity models to explain trade in goods was expounded by Anderson (1979), Bergstrand (1985) and Evenett and Keller (2002). In its simplest form, the gravity equation can be expressed as follows:

$$\ln(Trade_{sdt}) = Costs_{sdt} + \ln(GDP_{st}) + \ln(GDP_{dt}) \quad (1)$$

where $Trade_{sdt}$ denotes trade in goods and services between the source country *s* and the destination country *d* at time *t*; $Cost_{sdt}$ represents transaction costs associated with trade between the source and the destination countries – *s* and *d*, respectively - including transportation costs and trade barriers. Finally, GDP_{st} and GDP_{dt} represent gross domestic product for countries *s* and *d,* respectively.

Equation (1) can be extended by permitting the coefficients of GDP to be freely estimated and specifying transactions costs in terms of observable variables. Transactions costs are typically modelled as a function of geographical or cultural distance, the argument being that costs are likely to be lower between trading partners which are geographically close or have similar cultural histories, perhaps owing to colonial links. The gravity model then takes the following form:

$$\begin{aligned}\ln(Trade_{sdt}) &= \beta_0 + \beta_1 \ln(GDP_{st}) + \beta_2 \ln(GDP_{dt}) \\ &+ \beta_3 \ln(Dist_{sd}) + \beta_4 Border_{sd} + \beta_5 Colony_{sd} + \beta_6 Language_{sd} + \varepsilon_{sdt}\end{aligned} \quad (2)$$

where $Dist_{sd}$ is the distance between countries *s* and *d*; $Border_{sd}$ is a binary variable which equals one if *s* and *d* share a land border; $Colony_{sd}$ is a binary variable which equals one if *d* was once a colony of *s*; and $Language_{sd}$ is a binary variable which equals one if *d* and *s* share a common language.

Theoretical justifications have recently been offered for the use of gravity models to explain financial transactions as well. Martin and Rey (2004) show that under a number of assumptions – namely that markets for financial assets are segmented, cross-border asset trade entails transaction or information costs, and the supply of assets is endogenous bilateral asset holdings should be positively related to the size of the market, negatively related to transaction and information costs and positively related to expected returns on assets. Using a similar theoretical model, Faraquee, Li and Yan (2004) also show that the gravity equation emerges naturally.

Numerous empirical studies have found that such models explain cross-border transactions in financial assets well, including Portes and Rey (2005) and Shin and Yang (2006). In these studies, the distance variables are proxies for information frictions. Asymmetric information is likely to be less of an obstacle to investment between countries which are geographically or culturally close together.

Some studies of the determinants of trade in financial assets include trade in goods and services as an explanatory variable, to capture complementarities between trade flows and financial flows. Equation (2) then becomes the following:

$$\begin{aligned}\ln(Assets_{sdt}) &= \beta_0 + \beta_1 \ln(GDP_{st}) + \beta_2 \ln(GDP_{dt}) \\ &+ \beta_3 \ln(Dist_{sd}) + \beta_4 Border_{sd} + \beta_5 Colony_{sd} + \beta_6 Language_{sd} \\ &+ \beta_7 \ln(Trade_{sdt}) + \varepsilon_{sdt}\end{aligned} \quad (3)$$

Another potentially important influence on foreign investment is the risk and return characteristics of available assets. Returns, risk and correlations are key inputs into the construction of a diversified portfolio. Withholding taxes can have a significant impact on returns, and so the tax treatment of non-resident investors is also an important consideration. So are capital controls which might restrict the entry of foreign investors into the country *d*, or their exit from country *s*. We control for these factors in the following way:

$$\begin{aligned}\ln(Assets_{sdt}) &= \beta_0 + \beta_1 \ln(GDP_{st}) + \beta_2 \ln(GDP_{dt}) \\ &+ \beta_3 \ln(Dist_{sd}) + \beta_4 Border_{sd} + \beta_5 Colony_{sd} + \beta_6 Language_{sd} \\ &+ \beta_7 \ln(Trade_{sdt}) + \beta_8 Sharpe_{dt} + \beta_9 Sharpe\_FX_{dt} \\ &+ \beta_{10} Tax_{dt} + \beta_{11} Controls\_out_{st} + \beta_{12} Controls\_in_{dt} + \varepsilon_{sdt}\end{aligned} \quad (4)$$

where $Sharpe_{dt}$ is risk-adjusted returns on investments in country *d*, as measured by the Sharpe ratio (ie, returns less the risk-free rate divided by the standard deviation of returns) and calculated in the currency of country *d*; $Sharpe\_FX_{dt}$ is risk-adjusted currency returns, to capture exchange rate gains and losses on investments in country *d*; Tax_{dt} is the withholding tax applied in country *d*; $Control\_out_{st}$ measures controls on capital outflows from country *s*; and $Control\_in_{st}$ measures controls on capital inflows to country *d*.

The final variable we introduce is market liquidity. There is growing literature on the role of liquidity in asset prices and, thereby, in investors' decisions (Acharya and Pedersen (2005); Morris and Shin (2004)). An absence of trading activity can be a significant deterrent to foreign investment because it raises the costs of entering and exiting financial positions. This gives our final specification:

$$\begin{aligned}\ln(Assets_{sdt}) &= \beta_0 + \beta_1 \ln(GDP_{st}) + \beta_2 \ln(GDP_{dt}) \\ &+ \beta_3 \ln(Dist_{sd}) + \beta_4 Border_{sd} + \beta_5 Colony_{sd} + \beta_6 Language_{sd} \\ &+ \beta_7 \ln(Trade_{sdt}) + \beta_8 Sharpe_{dt} + \beta_9 Sharpe\_FX_{dt} \\ &+ \beta_{10} Tax_{dt} + \beta_{11} Controls\_out_{st} + \beta_{12} Controls\_in_{dt} \\ &+ \beta_{13} Liquidity_{dt} + \varepsilon_{sdt}\end{aligned} \quad (5)$$

where $Liquidy_{dt}$ is the turnover of assets in country *d*.

Estimating the above equations, we report only random-effect estimation, based on the formation of error-term[2]; $\varepsilon_{it} = \lambda_i + u_{it}$ where λ_i is heterogeneity specific to investment flows

[2] We do not report the fixed-effect "within" estimation results because of the drawback of the impossibility of estimating time-invariant factors such as distance, area, land border, and language. In addition, we also include time dummy in the error-term of the specification. However, the span of our sample is too short to capture the time-specific component. Therefore, we do not report it.

between *s* and *d,* and to have an efficient estimator, we assume $E(\lambda_i^2) = \sigma_i^2$, $E(u_{it}^2) = \sigma_u^2$, $E(\varepsilon_{it}^2) = \sigma_\lambda^2 + \sigma_u^2$, $t = s$ but $E(\varepsilon_{it}^2) = \sigma_\lambda^2$, $t \neq s$, and $E(X_{kit}\lambda_i) = 0$ for all *k, i, t.* The random effects estimator can be estimated by feasible generalized least square estimation (FGLS) over all individual groups in the dataset; $\widehat{\beta}_{RE} = \left[\sum_{i=1}^{N}\left(X_i'\Omega^{-1}X_i\right)\right]^{-1}\sum_{i=1}^{N}\left(X_i'\Omega^{-1}y_i\right)$, where *X*s are independent variables and *y* is a dependent variable, and $\Omega = \sigma_u^2 I + \sigma_\lambda^2 ee'$

To estimate (3) to (5), we require data on bilateral investment. The most comprehensive source of such data is the IMF's Coordinated Portfolio Investment Survey (CPIS). In this survey, investors in as many as 73 economies report their holdings of foreign securities, disaggregated by residency of the issuer and type of security. The survey captures foreign investment in short- and long-term debt securities as well as equity securities. Securities held as official reserves and those deemed foreign direct investment are excluded.

The quality of the CPIS data has improved over time but there are still shortcomings. The coverage of portfolio investors is incomplete. Some investments are misallocated across countries, especially investments through collective vehicles. There is no information on the currency composition of investments in individual markets. Although the first survey was carried out in 1997, we limit our analysis to the 2001 to 2005 surveys, which are more comparable in terms of data quality and coverage.

Gravity models typically specify flows as the dependent variable, but use of the CPIS data requires us to replace flows with outstanding stocks. The CPIS data refer to portfolio holdings, not flows. Changes in holdings are not a good proxy for flows because the reporting population changed between surveys and holdings are valued at market prices. In any case, holdings are less volatile than flows and so arguably better capture long-term influences on portfolio allocations. Short term market conditions have an important impact on flows.

The 73 source countries which report CPIS data comprise 23 industrial countries and 50 developing countries. Every source country is asked to report its investment in each of almost 200 destination countries. This allows us to construct source-destination country pairs for holdings of short-term debt securities, holdings of long-term debt securities and holdings of equity securities. The sample is restricted to observations where there are no missing data for holdings, GDP and trade. This leaves 42 source countries, including seven in Asia: Hong Kong SAR, Indonesia, Korea, Macao, the Philippines, Singapore and Thailand. We have five years of annual data, and so the final panel has 11,617 observations. The number of observations varies by year so the panel is unbalanced.

GDP data are from the IMF's International Financial Statistics, and trade data from the IMF's Direction of Trade Statistics. Nominal (US dollar) data on portfolio holdings and trade flows were converted to real values using the US GDP deflator. Other gravity variables are from Andrew Rose's website.

The Sharpe ratio is computed using five years of annualised monthly returns. A five-year period was taken to smooth the impact of economic cycles. Portfolio returns are denominated in the currency of the destination country, and currency returns are measured in terms of the destination currency against the source currency.

For equity securities, returns are based on the main local market index, as disseminated by either Bloomberg or Datastream. For long-term debt securities, returns are based on JP Morgan's Emerging Market Bond Index (EMBI) and Government Bond Index (GBI). The EMBI comprises US dollar- and euro-denominated sovereign bonds and excludes industrial and high-income countries. The GBI comprises local-currency government bonds, mainly from industrial and high-income countries. Many institutional investors aim to replicate these indices, and so their performance is likely to be representative. For those countries included in both the EMBI and the GBI – Hungary, Korea, Mexico, Poland and South Africa – we

calculate a weighted average of returns, where the weights are based on the country's outstanding stocks of foreign-currency and local-currency debt. For short-term debt securities, returns refer to onshore three-month interbank rates.

Taxes refer to withholding taxes on dividends and interest income for equity investments and bond investments, respectively. We also consider the bilateral tax treaties between countries so that different source countries have different withholding tax rates in a destination country. These data are compiled annually by Price Waterhouse Coopers. For controls on capital inflows and outflows, we use the dummy variables defined by the IMF for a range of current and capital account transactions and published in the Annual Report on Exchange Arrangements and Exchange Restrictions.

Finally, for liquidity, data availability restricts us to using market turnover as a proxy. Average annual turnover shows the order flow the market typically accommodates. In this sense, it is a measure of the depth of the market. Tightness and resiliency are also important dimensions of liquidity, but they are more difficult to measure. Turnover data are available for many of the markets we are interested in, whereas bid-ask spreads and other measures of liquidity are more difficult to obtain.

Turnover is positively related to the size of the market, and so to control for differences in market size across countries, we compute the turnover ratio: turnover divided by market capitalisation. Turnover and market capitalisation data for many equity markets are available from the World Federation of Exchanges (FIBV). For long-term debt securities, we use data on the turnover of local government bonds, from national sources. For short-term debt securities, turnover data are not readily available and therefore we use the turnover of local government bonds as a proxy.

3. Stylized facts

A few facts are worth highlighting before presenting our results. As shown in Table 1, on summary statistics, the cross-sectional variation in liquidity tends to be higher than the cross-sectional variation in returns. In other words, differences in turnover across markets are larger than differences in performance. This is especially true of debt securities markets. In bond markets, the coefficient of variation equals 0.46 for $Sharpe_{dt}$, compared to 1.59 for $Liquidity_{dt}$.

Sharpe ratios differ significantly across asset classes. The average Sharpe ratio is highest for bonds at 0.65, followed by equities at 0.44, and finally currency returns at -0.12. However, within a given asset class, the differences in levels are less pronounced. Returns are much higher in developing countries than in developed countries, but so too is volatility. Consequently, Sharpe ratios are similar, as shown in Graphs 2 and 3. In equity markets, the Sharpe ratio averages 0.43 among developed countries and 0.53 among developing countries. In bond markets, the difference is still smaller.

Turnover ratios also differ significantly across asset classes. The average turnover ratio is highest for bonds at 6.48, then equities at 0.74. But in contrast to Sharpe ratios, there is considerable dispersion around those averages (Graphs 2 and 3). In equity markets, the turnover ratio is nearly twice as high in developed countries as in developing countries: 0.94 versus 0.55. In bond markets, the difference between developed and developing is even larger.

A possible explanation for such differences in cross-country variation is that financial integration facilitates the equalisation of risk-adjusted (expected) returns, whereas liquidity tends to concentrate in a few instruments and markets. Notably, the relationship between

liquidity and returns is weak. More generally, correlation among the explanatory variables is low, as indicated in Table 2.

Correlations among dependent variables are reported in Table 3. Equities and long-term debt securities move loosely together, with a coefficient of 0.74. Equities and short-term debt securities are not highly correlated. Long-term and short-term debt securities are less highly correlated than equities and bonds. Overall, the correlation coefficients are not so high as to create serious endogeneity problems in the gravity model estimation.

4. Results

We now turn to the empirical exploration of hypotheses behind the direction of cross-border financial positions. The question is first analyzed for the world as a whole, using our sample of 42 countries and distinguishing among different kinds of assets. Second, different sub-samples are examined, in order to compare Asia with other relevant groups of countries. In particular, we compare the results for the eight Asian countries in our sample (Australia, Hong Kong SAR, Indonesia, Korea, Macao SAR, Philippines, Singapore and Thailand) with developed countries, emerging markets and members of the European Union.

We test the hypotheses imbedded in the models outlined in Section 2 as building blocks since we find that all of them play a role to a larger or lesser extent. The first hypothesis is based on the gravity model only, ie geographical and cultural distance, as well as economic size, are behind the destination of cross-border financial transactions. The second hypothesis is that trade relations may be the driving force behind financial linkages. The third hypothesis – novel to this paper puts risk-return considerations at the forefront, both tax-adjusted and not. It also controls for the feasibility of such transactions by considering controls on capital inflows and outflows. The fourth and last hypothesis – also novel deals with the development of the financial system with special attention given to the degree of liquidity in domestic markets.

Is the gravity model a good starting point?

Table 4 reports the estimation results of equation (2) above. Separate regressions are conducted for the three main types of financial assets. The gravity model fits well for all kinds of cross-border holdings. In particular, the sizes of the source and destination economies are always positive and significant determinants of cross-border linkages. The same is true when two countries share the same language. In fact, language is generally found as a key component of the networks effects that influence international economic relations (Rauch (2001)). In turn, geographical distance – proxing for information frictions discourages financial exposures, as expected.

Do trade links matter?

Including bilateral trade relations in the gravity model, as in equation (3), clearly improves the fit of the model in all three specifications. The results are reported in Table 5. Trade between two countries is positive and significant in fostering financial linkages.

The complementarity between bilateral trade and financial transactions should be expected for several reasons. First, goods trade entails corresponding financial transactions, such as trade credit and export insurance. Second, as Obstfeld and Rogoff (2001) show, there is a close connection between the gains to international financial diversification and the extent of goods trade. Finally, openness in goods markets may increase the willingness to conduct cross-border financial transactions, reducing home bias through some kind of “familiarity” effect.

What about risk-return considerations?

We now add risk-adjusted returns to equation (3). Specifically, we consider two components of portfolio returns: the return on assets in the currency of the destination country and the return stemming from the exchange rate gains and losses when converted to the currency of the source country. This new model, summarised in Table 6, offers a better fit than the previous one both for equity and bonds. In fact, both aspects of the risk-adjusted return are significant. The Sharpe ratio for portfolio returns is positive and significant, as one would expect. The Sharpe ratio for currency returns is also significant but the sign is positive for equities and negative for bonds. For equities, this result implies that the appreciation of the destination country's currency against that of the source country would induce more cross-border equity flows.

Risk adjusted returns may well differ depending on the tax treatment of non-residents. We include this potential explanatory variable as an additional regressor, as depicted in equation (4) above. In the same equation, we also control for the existence of restrictions on the entry of foreign capital into the destination country as well as on the exit of capital from the source country. The results are presented in Table 7. Most of the previous results are maintained, although exchange-rate related gains are now significant, and with a negative sign, for holdings of bonds and no longer significant for equities.

Some of the new variables are found to be significant, which explains the better fit both for equities and bonds. First, withholding taxes are seen to discourage cross-border equity holdings, as one would expect. No significant impact is found for bond holdings, though. This latter result is probably driven by shortcomings in our data, which prevent us from distinguishing between local currency and foreign currency (international) bonds. Withholding taxes are applied to onshore transactions and so they mainly affect local currency bonds. Consequently, withholding taxes might influence the type of instruments investors choose to buy but do not necessarily deter foreign investment in bonds altogether.

Second, the source country's controls on capital outflows discourage all kinds of bilateral financial linkages. The estimated coefficients are not only highly significant but also very large, as one would expect. By contrast, the destination country's controls on inflows do not seem to be effective; indeed, they are found to encourage cross-border portfolio holdings. While counterintuitive, one should think that such controls are generally introduced in countries experiencing a boom in capital inflows. In fact, it may simply be reflecting the ineffectiveness of such controls.

The role of liquidity in the financial sector

We now include in our analysis the degree of liquidity of the destination country, as in equation (5). As shown in Table 8, market turnover is significant for bond and equity holdings, and with the expected positive sign. In addition, the model fits the data now better than in previous cases, as shown by the higher R-squared.

Are there differences across country groups?

We now look into the differences among groups of source countries to see whether Asian economies differ markedly from others. Using equation (5), we compare four groups: the developed word, emerging economies, European countries, and Asian ones.

The results for developed countries are reported in Table 9. They differ from the results for all countries (Table 8) in several ways. First, investors respond to exchange rate gains in the same way be it for equity or bonds. Second, the withholding tax is not statistically significant

in discouraging bilateral asset-holdings. This is because most developed countries no longer apply a withholding tax.

The group of emerging countries, reported in Table 10, yields fewer significant results. In particular, exchange rate-related gains do not seem to affect the destination of emerging countries' investment. The Sharpe ratio for portfolio returns is only relevant for equities. The withholding tax in the destination country is insignificant, as well as the source country's controls on capital outflows. However, the controls on inflows do discourage emerging countries' cross-border investment in equities. The liquidity of destination markets is found relevant in explaining the destination of bond holdings.

The results for European countries, in Table 11, also differ from those of developed countries in a number of important points. First, the risk-adjusted return in the source country's domestic currency does not necessarily foster investment from Europe. It actually discourages that in short-term bonds. Second, capital controls on inflows always discourage investment from European countries, be it in equities or in bonds. Third, a higher liquidity in the destination country does not seem to encourage investment from European countries, if anything the opposite for bonds.

Finally, Asian countries, in Table 12, depict a unique characteristic, even when compared with emerging countries as a whole. This is the very significant positive influence of liquidity in explaining holdings of equity and bonds from Asian countries to the rest of the world. Recall that the CPIS data on portfolio holdings exclude securities held as part of official reserves, and so our results are not biased by the large portfolios of central banks in the region (which are presumably even more heavily weighted towards liquid assets).

Among Asian countries, the risk-adjusted return in local currency or even exchange rate gains do not seem to matter. This is also true for withholding taxes in the host country. Finally, controls on capital outflows in the source country are very relevant, which differs markedly with other emerging countries.

5. Conclusions

We use data on cross-border equity and bond holdings for over 40 countries in order to analyze empirically why countries maintain financial linkages with some economies and not with others. The main reason for this question is to understand why the financial integration of Asian countries has focused on countries outside the region, notwithstanding the demonstrated relevance of distance and trade in explaining financial linkages.

Our results point to market liquidity an important explanatory factor behind Asia's greater financial integration outside that inside the region. The lack of liquidity in Asian financial markets explains why Asian investors prefer to resort to major financial centers. The importance of liquidity is unique to Asia, when compared with developed countries or Europe. Emerging countries are also affected by liquidity considerations when directing their cross-border financial investment, but to a much lesser extent than Asian countries.

On the basis of these results, it would appear that Asian economic authorities should take measures to deepen the liquidity of their financial markets if they want to promote financial integration within the region. Further research on this point seems warranted. In particular, the robustness of our results could be confirmed by estimating alternative specifications of the gravity equation. As noted in the introduction, one interesting extension would be to incorporate a measure of risk sharing as an explanatory variable.

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Table 1: Summary statistics

	Mean	Std. Dev
ln($Assets_{sdt}$) - equity securities	4.12	3.29
ln($Assets_{sdt}$) - long-term debt securities	4.29	2.80
ln($Assets_{sdt}$) - short-term debt securities	3.88	2.54
ln(GDP_{st})	8.69	1.21
ln(GDP_{dt})	8.55	1.19
ln($Dist_{sd}$)	7.99	0.87
$Border_{sd}$	0.03	0.17
$Colony_{sd}$	0.05	0.21
$Language_{sd}$	0.14	0.34
ln($Trade_{sdt}$)	2.32	3.28
$Sharpe_{dt}$ – equity securities	0.44	0.39
$Sharpe_{dt}$ - long-term debt securities	0.65	0.30
$Sharpe_{dt}$ - short-term debt securities		
$Sharpe\_FX_{sdt}$	-0.12	0.43
Tax_{dt} - dividend income	17.4	8.02
Tax_{dt} - interest income	14.1	7.87
$Controls\_out_{st}$	0.56	0.49
$Controls\_in_{dt}$	0.38	0.48
$Liquidity_{dt}$ – equity securities	0.74	0.53
$Liquidity_{dt}$ – long-term debt securities	6.48	10.29
$Liquidity_{dt}$ – short-term debt securities	7.79	11.30

Note: These summary statistics are based on the bilateral variables for the portfolio holdings

Table 2: Correlation among explanatory variables

Dependent variable		*Liquiditydt*	*GDPdt*	*Sharpedt*
Equity securities	$Liquidity_{dt}$	1.000		
	GDP_{dt}	-0.012	1.000	
	$Sharpe_{dt}$	-0.102	-0.102	1.000
Long-term debt securities	$Liquidity_{dt}$	1.000		
	GDP_{dt}	-0.017	1.000	
	$Sharpe_{dt}$	0.000	-0.200	1.000
Short-term debt securities	$Liquidity_{dt}$	1.000		
	GDP_{dt}	-0.005	1.000	
	$Sharpe_{dt}$	-0.007	0.097	1.000

Table 3: Correlation among dependent variables

	Equities	Long-term debt	Short-term debt
Equities	1.000		
Long-term debt	0.739	1.000	
Short-term debt	0.590	0.682	1.000

Table 4: Gravity model

Regressors	Dependent variable		
	Equity	Long-term debt	Short-term debt
ln(GDP_{st})	0.559*** [0.027]	0.536*** [0.022]	0.221*** [0.029]
ln(GDP_{dt})	0.579*** [0.027]	0.554*** [0.023]	0.391*** [0.031]
ln($Dist_{sd}$)	-0.671*** [0.068]	-0.893*** [0.056]	-0.509*** [0.073]
$Border_{sd}$	0.187 [0.318]	0013 [0.056]	0.236 [0.318]
$Colony_{sd}$	0.083 [0.342]	0.036 [0.285]	-0.376 [0.338]
$Language_{sd}$	0.669*** [0.155]	0.217*** [0.132]	0.502*** [0.167]
Observations R-squared	6732 0.227	8010 0.274	2935 0.186

Note: Dependent variables are bilateral portfolio flows between source country s and destination country d. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.

Table 5: Model with trade (equation 3)

	Equity	Long-term debt	Short-term debt
ln(GDP_{st})	0.337*** [0.037]	0.166*** [0.031]	-0.109** [0.049]
ln(GDP_{dt})	0.371*** [0.035]	0.230*** [0.029]	0.091** [0.045]
ln($Dist_{sd}$)	-0.411*** [0.072]	-0.491*** [0.059]	-0.169*** [0.080]
$Border_{sd}$	0.137 [0.308]	-0084 [0.274]	0.113 [0.305]
$Colony_{sd}$	-0.161 [0.339]	-0.255 [0.279]	-0.611 [0.331]
$Language_{sd}$	0.584*** [0.155]	0.072 [0.128]	0.441*** [0.160]
ln($Trade_{sdt}$)	0.214*** [0.024]	0.334*** [0.020]	0.310 [0.034]
Observations R-squared	6666 0.26	7911 0.33	2899 0.24

Note: Dependent variables are bilateral portfolio flows between source country s and destination country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively

Table 6: Model with risk-adjusted returns

	Equity	Long-term debt	Short-term debt
ln(GDP_{st})	0.311*** [0.049]	-0.103** [0.056]	-0.107 [0.071]
ln(GDP_{dt})	0.263*** [0.051]	0.033 [0.057]	0.050 [0.063]
ln($Dist_{sd}$)	-0.580*** [0.091]	-0.436*** [0.103]	-0.579*** [0.099]
$Border_{sd}$	-0.325 [0.365]	0.601 [0.488]	-0.058 [0.397]
$Language_{sd}$	0.863*** [0.189]	0.565 [0.222]	0.590*** [0.192]
ln($Trade_{sdt}$)	0.322*** [0.033]	0.656*** [0.035]	0.336*** [0.044]
$Sharpe_{dt}$	0.826*** [0.055]	0.376*** [0.071]	(a)
$Sharpe\_FX_{sdt}$	0.190*** [0.052]	-0.547*** [0.062]	-0.347*** [0.096]
Observations R-squared	5016 0.28	3420 0.42	2379 0.23

Note: Dependent variables are bilateral portfolio flows between source country s and partner country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.
(a) Results could not be reported due to lack of data.

Table 7: Model with taxes and capital controls (equation 4)

	Equity	Long-term debt	Short-term debt
ln(GDP_{st})	0.363*** [0.045]	-0.107** [0.065]	-0.221*** [0.071]
ln(GDP_{dt})	0.354*** [0.054]	-0.009 [0.065]	0.009 [0.074]
ln($Dist_{sd}$)	-0.557*** [0.095]	-0.353*** [0.123]	0.012 [0.119]
$Border_{sd}$	-0.113 [0.374]	0.205 [0.563]	-0.179 [0.418]
$Language_{sd}$	1.09*** [0.207]	0.424** [0.239]	0.643*** [0.214]
ln($Trade_{sdt}$)	0.240*** [0.035]	0.690*** [0.042]	0.359*** [0.053]
$Sharpe_{dt}$	0.606*** [0.052]	0.187** [0.076]	(a)
$Sharpe\_FX_{sdt}$	-0.049 [0.049]	-0.328*** [0.068]	-0.263*** [0.115]
Tax_{dt}	-0.039*** [0.004]	0.012 [0.007]	0.002 [0.009]
$Controls\_out_{st}$	-1.690*** [0.091]	-0.758*** [0.100]	-1.196*** [0.162]
$Controls\_in_{dt}$	0.035*** [0.094]	0.645*** [0.167]	-0.362 [0.16]
Observations R-squared	4046 0.36	3420 0.42	1581 0.25

Note: Dependent variables are bilateral portfolio flows between source country s and partner country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.
(a) Results could not be reported due to lack of data.

Table 8: Model with liquidity (equation 5)

	Equity	Long-term debt	Short-term debt
ln(GDP_{st})	0.305*** [0.058]	0.130* [0.079]	-0.271*** [0.106]
ln(GDP_{dt})	0.240*** [0.063]	0.212** [0.083]	0.053 [0.090]
ln($Dist_{sd}$)	-0.442*** [0.110]	-0.356** [0.148]	0.015 [0.140]
$Border_{sd}$	-0.157 [0.435]	1.15* [0.660]	0.038 [0.468]
$Language_{sd}$	1.13*** [0.223]	0.929*** [0.274]	0.778*** [0.243]
ln($Trade_{sdt}$)	0.314*** [0.041]	0.468*** [0.056]	0.436*** [0.064]
$Sharpe_{dt}$	0.687*** [0.062]	0.059** [0.086]	(a)
$Sharpe\_FX_{sdt}$	0.045 [0.062]	-0.33*** [0.085]	-0.197 [0.137]
Tax_{dt}	-0.026*** [0.005]	-0.045*** [0.014]	-0.003 [0.013]
$Controls\_out_{st}$	-1.70*** [0.108]	-0.691*** [0.123]	-1.21*** [0.188]
$Controls\_in_{dt}$	0.161 [0.109]	0.814*** [0.252]	-0.56*** [0.184]
$Liquidity_{dt}$	0.463*** [0.077]	0.021*** [0.004]	0.001 [0.006]
Observations R-squared	3038 0.37	1523 0.46	1158 0.31

Note: Dependent variables are bilateral portfolio flows between source country s and partner country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.
(a) Results could not be reported due to lack of data.

Table 9: Sub-sample of developed countries

	Equity	Long-term debt	Short-term debt
ln($Trade_{sdt}$)	0.432*** [0.059]	0.208** [0.098]	0.588*** [0.093]
$Sharpe_{dt}$	0.623*** [0.0538]	0.095 [0.095]	(a)
$Sharpe\_FX_{sdt}$	-0.156*** [0.049]	-0.470*** [0.097]	-0.265* [0.144]
Tax_{dt}	0.007 [0.011]	-0.021 [0.017]	0.01 [0.017]
$Controls\_out_{st}$	-2.61*** [0.153]	-1.24*** [0.237]	-0.78** [0.332]
$Controls\_in_{dt}$	0.213** [0.098]	0.304 [0.293]	-0.901*** [0.212]
$Liquidity_{dt}$	0.006** [0.004]	0.02*** [0.004]	0.006 [0.007]
Observations R-squared	1829 0.45	891 0.56	854 0.36

Note: Dependent variables are bilateral portfolio flows between source country s and partner country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.
(a) Results could not be reported due to lack of data.

Table 10: Sub-sample of developing countries

	Equity	Long-term debt	Short-term debt
ln($Trade_{sdt}$)	0.147** [0.073]	0.216*** [0.067]	0.123 [0.093]
$Sharpe_{dt}$	0.654** [0.138]	0.017 [0.17]	(a)
$Sharpe\_FX_{sdt}$	0.059 [0.154]	0.074 [0.17]	0.478 [0.364]
Tax_{dt}	0.004 [0.014]	0.015 [0.016]	-0.0008 [0.018]
$Controls\_out_{st}$	-0.21 [0.164]	0.029 [0.16]	-0.015 [0.273]
$Controls\_in_{dt}$	-0.530** [0.24]	0.559 [0.731]	-0.421 [0.419]
$Liquidity_{dt}$	0.013 [0.008]	0.028*** [0.009]	-0.021 [0.014]
Observations R-squared	601 0.17	569 0.34	296 0.18

Note: Dependent variables are bilateral portfolio flows between source country s and partner country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.
(a) Results could not be reported due to lack of data.

Table 11: Sub-sample of western European countries

	Equity	Long-term debt	Short-term debt
ln($Trade_{sdt}$)	0.896***	0.879***	0.610***
	[0.076]	[0.158]	[0.152]
$Sharpe_{dt}$	0.581***	-0.021	-0.291*
	[0.061]	[0.073]	[0.161]
$Sharpe\_FX_{sdt}$	-0.115**	-0.323***	(a)
	[0.050]	[0.076]	
Tax_{dt}	-0.012	-0.003	0.029
	[0.013]	[0.026]	[0.027]
$Controls\_out_{st}$	(b)	(b)	(b)
$Controls\_in_{dt}$	-0.200*	-1.41***	-0.939***
	[0.108]	[0.541]	[0.293]
$Liquidity_{dt}$	0.0009	-0.026***	-0.012
	[0.003]	[0.006]	[0.009]
Observations	1302	604	562
R-squared	0.52	0.59	0.32

Note: Dependent variables are bilateral portfolio flows between source country s and partner country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.
(a) Results could not be reported due to lack of data.
(b) There are no controls on capital outflows among European countries.

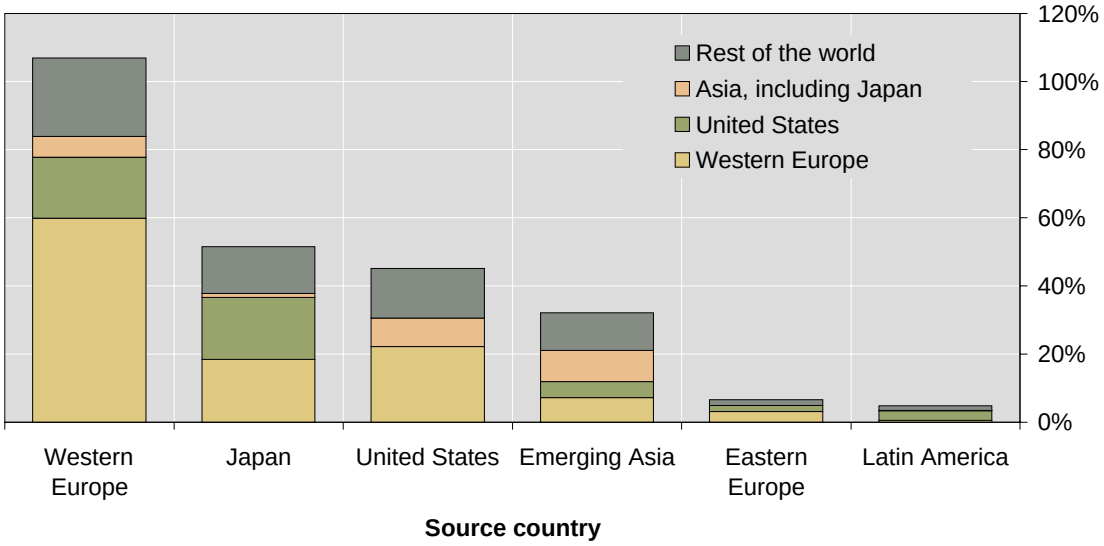
Table 12: Sub-sample of Asian countries

	Equity	Long-term debt	Short-term debt
ln(*Trade*$_{sdt}$)	1.01*** [0.147]	1.411*** [0.222]	0.925*** [0.223]
Sharpe$_{dt}$	0.221 [0.159]	-0.046 [0.17]	(a)
Sharpe_FX$_{sdt}$	-0.367 [0.153]	-0.457** [0.180]	-0.088 [0.308]
Tax$_{dt}$	-0.008 [0.018]	-0.01 [0.056]	-0.041 [0.031]
Controls_out$_{st}$	-2.796*** [0.283]	-1.18*** [0.290]	-2.332*** [0.437]
Controls_in$_{dt}$	-0.496** [0.249]	1.21** [0.479]	-0.22 [0.47]
Liquidity$_{dt}$	0.013*** [0.001]	0.027* [0.017]	0.037** [0.019]
Observations	327	307	203
R-squared	0.73	0.58	0.48

Note: Dependent variables are bilateral portfolio flows between source country s and partner country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, **, and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10 % levels, respectively.
(a) Results could not be reported due to lack of data.

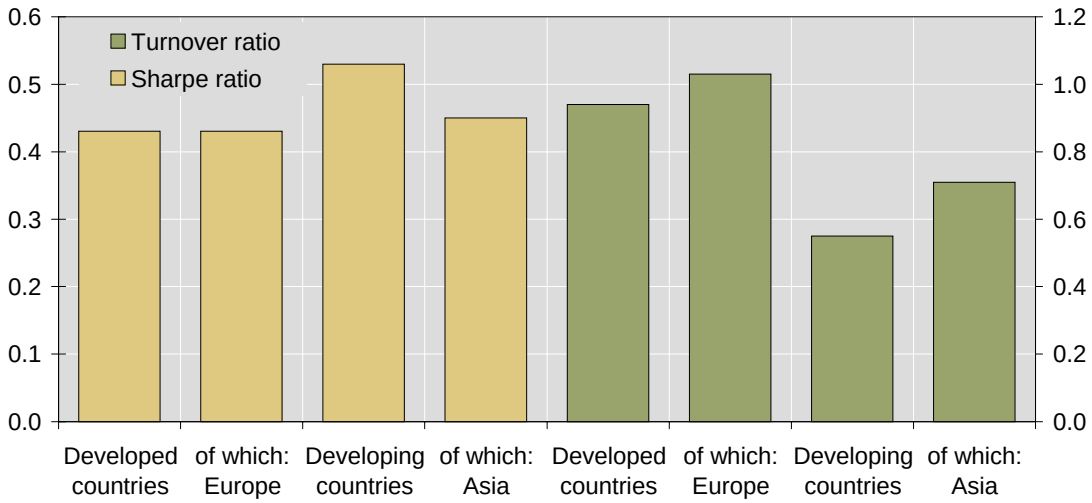
Graph 1: Foreign portfolio investment by destination country

(at end-2006, as a percentage of source countries' GDP)



Notes: Based on preliminary CPIS data for 2006; excluding securities held as part of official reserves.
Sources: IMF; authors' calculations.

Graph 2: Performance and liquidity of equity markets



Graph 3: Performance and liquidity of bond markets