Why is there so little regional financial integration in Asia?

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Introduction

In the 10 years that have elapsed since the Asian financial crisis, the conditions needed for financial integration have improved. Asian economies have accumulated enormous amounts of foreign assets, particularly international reserves, due to domestic savings that have exceeded investment. In addition, Asian economies have learned the lesson of balance sheet weaknesses, which has resulted in the rapid decline of the share of foreign currency denominated debt. 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 through portfolio flows, including exchange-traded funds, private equity and hedge funds. All in all, cross-border financial transactions (both the export and the import of capital) have increased substantially in Asia in the past 10 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. The most important benefits are risk-sharing and allocative efficiency, which contribute to economic growth and integration. Portfolio diversification allows the sharing of idiosyncratic risks across countries, facilitating the insurance of income against country-specific shocks, thereby smoothing consumption over time. Financial integration, by facilitating the allocation of capital to its most productive use, should foster economic growth (Edison et al (2002); Rogoff et al (2006)). The drawbacks of financial integration 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 of capital flows could result in higher output volatility and even lower average growth for a certain period of time, although the evidence is inconclusive (Rogoff et al (2006)). In any event, the benefit of faster, sustainable 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 from the Asian crisis – that countries with poorly developed financial systems are more vulnerable to crises (Demirguc-Kunt and Detragiache (1999)). The type of financial integration has been partially analysed, in particular the different kinds of flows a country receives (foreign direct investment, for example, being considered more stable than 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 financial integration of a country with countries whose

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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 than risk-sharing, inasmuch 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 consists of 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 specialised the countries are (Imbs (2004)). The European Union is probably the best example of regional financial integration reinforcing economic integration. Peer pressure has facilitated the upgrading and harmonisation 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 in improving welfare.

Considering the volume of foreign investment in Asia, it is fair to say that the region is financially globalised but that less progress has been made towards financial integration within the region (García-Herrero and Wooldridge (2007)). Financial globalisation in Asia implies – given the region's position as a net capital exporter – a large flow of capital from the Asian economies to the developed world, which obviously does not follow the neoclassical model and is 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 economies. This is strikingly different from trade patterns in the region – intraregional flows account for over half of Asia's trade. It is also in stark contrast with investment patterns in Europe – over half of the region's portfolio investment is in other European countries

The pattern of capital flows in Asia raises several concerns. One is its sustainability, a key question in the current juncture. Another is the missed opportunity for capital market development in the region and the fact that capital market development would reinforce 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)); another is that these patterns may affect the degree of business cycle synchronisation (Rogoff et al (2006); Imbs (2004); García-Herrero and Ruiz (2007)).

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 size of the economy and the financial market has a positive effect on bilateral financial integration, while distance has a negative effect because of 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 bilateral trade in assets are complementary.

Both the results from the gravity model – especially distance – and the complementarity of trade and financial linkages are at odds with the Asian economies being more integrated with the rest of the world than with each other.

One hypothesis is that risk-sharing is the driving force behind financial integration. Since the East Asian economies display relatively synchronised business cycles, limited opportunities for risk diversification within the region may explain the more rapid increase in financial integration with other areas of the world. This is especially true for the major financial centres, which offer a much greater choice of financial instruments for risk-sharing. 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 economies' integration with major financial

centres. The paper does not compare the importance of the risk-sharing motive with that of other motives, however. In fact, there may be other explanations worth exploring, such as the underdevelopment of Asian financial markets relative to their size and tax- and risk-adjusted returns.

Against this background, it is important to identify the factors responsible for the slow pace of financial integration within the region to date. This is what we attempt in this paper, using data on cross-border portfolio holdings for more than 40 economies – seven of which are in Asia – for 2001–05. We show that limited liquidity in Asian financial markets helps to explain why regional financial integration lags behind integration with the major financial centres.

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 is related positively to their national income and negatively to 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*; $Costs_{sdt}$ 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 transaction costs in terms of observable variables. Transaction 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 that 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 that equals one if *s* and *d* share a land border; $Colony_{sd}$ is a binary variable equal to one if *d* was once a colony of *s*; and $Language_{sd}$ is a binary variable that 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. 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, Faruquee et al (2004) also show that the gravity equation emerges naturally.

Numerous empirical studies, including Portes and Rey (2005) and Shin and Yang (2006), have found that such models explain cross-border transactions in financial assets well. 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 that are geographically or culturally close.

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:

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

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

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

where $Sharpe_{dt}$ denotes 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*; $Sharpe\_FX_{dt}$ denotes 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 a growing body of literature on the role of liquidity in asset prices and, thus, in investors' decisions (Acharya and Pedersen (2005); Morris and Shin (2004)). The 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:

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

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

To estimate equations (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 the residency of the issuer and type of security. The survey captures foreign investment in short- and long-term debt securities as well as in equity securities. Securities held as official reserves and those deemed to be 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 – especially investments through collective vehicles – are misallocated across countries. 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 surveys from 2001 to 2005, 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 economies that report CPIS data comprise 23 industrial and 50 developing economies. Every source economy is asked to report its investment in each of almost 200 destination economies. This allows us to construct source-destination 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 economies, including seven in Asia: Hong Kong SAR, Indonesia, Korea, Macao SAR, the Philippines, Singapore and Thailand. We have five years of annual data; thus, the final panel has 11,617 observations. The number of observations varies each year so the panel is unbalanced.

GDP data are from the IMF's International Financial Statistics, 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 economy, 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 JPMorgan'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, 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 bilateral tax treaties between countries,

since different source countries have different withholding tax rates in a destination country. These data are compiled annually by PriceWaterhouseCoopers. 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, data availability restricts us to using market turnover as a proxy for liquidity. Average annual turnover shows the order flow the market typically accommodates, and, in this sense, is a measure of market depth. 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 that interest us, whereas bid-ask spreads and other measures of liquidity are more difficult to obtain.

Turnover is positively related to the size of the market. 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 from national sources on the turnover of local government bonds. For short-term debt securities, turnover data are not readily available; we therefore use the turnover of local government bonds as a proxy.

We estimate equations (3) to (5) with random effects, based on the following specification of the error term: $\varepsilon_{it} = \lambda_i + u_{it}$, where λ_i is heterogeneity specific to investment flows between *s* and *d*.[2] For an efficient estimator, we assume that $E\left(\lambda_i^2\right) = \sigma_i^2$, $E\left(u_{it}^2\right) = \sigma_u^2$, $E\left(\varepsilon_{it}^2\right) = \sigma_\lambda^2 + \sigma_u^2$, $t = s$ but $E\left(\varepsilon_{it}^2\right) = \sigma_\lambda^2$, $t \neq s$, and $E\left(X_{kit}\lambda_i\right) = 0$ for all *k*, *i*, and *t*. The random effects estimator is estimated by feasible generalised least square (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* is an independent variable, *y* is the dependent variable and $\Omega = \sigma_u^2 I + \sigma_\lambda^2 ee'$.

Stylised 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 with 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, the differences in levels are less pronounced within a given asset class. Returns are much higher in developing than in developed economies, but so too is volatility. Consequently, Sharpe ratios are similar, as shown in Graphs 2 and 3. In equity markets, the

[2] We do not report the fixed-effect "within" estimation results because of the impossibility of estimating time-invariant factors such as distance, area, land border and language. We include time dummies 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 the time dummies.

Sharpe ratio averages 0.43 among developed economies and 0.53 among developing economies. In bond markets, the difference is even smaller.

Turnover ratios also differ significantly across asset classes. The average turnover ratio is highest for bonds, at 6.48, and then for equities, at 0.74. But in contrast with 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 as in developing economies: 0.94 versus 0.55. In bond markets, the difference between developed and developing economies 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.

Results

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

We test the hypotheses embedded in the models outlined in the second section as building blocks, since we find that all of them play a role, albeit to varying extents. The first hypothesis is based on the gravity model only – ie the destination of cross-border financial transactions is attributable to geographical and cultural distance as well as to economic size. 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). 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 a key component of the network effects that influence international economic relations (Rauch (2001)). Geographical distance – a proxy 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 is not surprising, for several reasons. First, trade in goods 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 from international financial diversification and the volume of trade in goods. Finally, openness in goods markets may increase countries' 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 for 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). In the same equation, we also control for 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 negative 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 for bonds. First, withholding taxes are seen to discourage cross-border equity holdings, as one would expect. No significant impact is found on bond holdings, though. This latter result is probably driven by shortcomings in our data that prevent us from distinguishing between local currency and foreign currency (international) bonds. Withholding taxes are applied to onshore transactions and so they affect mainly 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 this appears to be counterintuitive, it is possible that such controls are generally introduced in countries experiencing a boom in capital inflows or that the controls are simply ineffective.

The role of liquidity in the financial sector

We now include in our analysis the degree of liquidity in the destination country, as in equation (5). As shown in Table 8, market turnover is significant for bond and equity holdings

and positive, as expected. In addition, the model fits the data better than in previous cases, as shown by the higher R-squared.

Are there differences across country groups?

We now look into whether the Asian economies differ markedly from other groups of source countries. Using equation (5), we compare four groups of economies: developed, emerging, European and Asian.

The results for developed countries, reported in Table 9, differ from the results for all other countries (Table 8) in several ways. First, investors respond to exchange rate gains in the same way, whether they are generated by equities or bonds. Second, the withholding tax is not statistically significant in discouraging bilateral asset holdings because most developed countries no longer apply a withholding tax.

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

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

Finally, Asian economies, as shown in Table 12, exhibit a unique characteristic, even when compared with emerging economies as a group. This is the very significant positive influence of liquidity in explaining holdings of equities and bonds from Asian economies by 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 economies, the risk-adjusted return in local currency and even exchange rate gains do not seem to matter. This is also true for withholding taxes in the host economy. Finally, controls on capital outflows in the source economy are very relevant, which is definitely not the case for other emerging economies.

Conclusions

We use data on cross-border equity and bond holdings for over 40 economies in order to analyse empirically why countries maintain financial linkages with some economies and not with others in an attempt to understand why the Asian economies have focused on financial integration with economies outside the region, notwithstanding the demonstrated relevance of distance and trade in explaining financial linkages. Our results point to market liquidity as an important factor. The lack of liquidity in Asian financial markets explains why Asian investors prefer to access the major financial centres. The importance of liquidity is unique to Asia, compared with developed countries as a group or the subsample of European countries. Emerging economies as a group are also affected by liquidity considerations when

directing their cross-border financial investment, but to a much lesser extent than the Asian economies.

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.

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

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

Table 2

Correlation among explanatory variables

Dependent variable		Liquidity$_{dt}$	GDP$_{dt}$	Sharpe$_{dt}$
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	–0.102	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	6732	8010	2935
R-squared	0.227	0.274	0.186

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	6666	7911	2899
R-squared	0.26	0.33	0.24

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]	[1]
$Sharpe\_FX_{sdt}$	0.190*** [0.052]	–0.547*** [0.062]	–0.347*** [0.096]
Observations	5016	3420	2379
R-squared	0.28	0.42	0.23

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.

[1] 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]	[1]
$Sharpe\_FX_{sdt}$	–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	4046	3420	1581
R-squared	0.36	0.42	0.25

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.

[1] 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]	[1]
$Sharpe\_FX_{sdt}$	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	3038	1523	1158
R-squared	0.37	0.46	0.31

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.

[1] Results could not be reported due to lack of data.

Table 9

Subsample 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]	[1]
$Sharpe\_FX_{sdt}$	–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	1829	891	854
R-squared	0.45	0.56	0.36

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.

[1] Results could not be reported due to lack of data.

Table 10

Subsample of developing economies

	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]	[1]
$Sharpe\_FX_{sdt}$	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	601	569	296
R-squared	0.17	0.34	0.18

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.

[1] Results could not be reported due to lack of data.

Table 11

Subsample of western European economies

	Equity	Long-term debt	Short-term debt
$\ln(Trade_{sdt})$	0.896*** [0.076]	0.879*** [0.158]	0.610*** [0.152]
$Sharpe_{dt}$	0.581*** [0.061]	–0.021 [0.073]	–0.291* [0.161]
$Sharpe\_FX_{sdt}$	–0.115** [0.050]	–0.323*** [0.076]	[1]
Tax_{dt}	–0.012 [0.013]	–0.003 [0.026]	0.029 [0.027]
$Controls\_out_{st}$	[2]	[2]	[2]
$Controls\_in_{dt}$	–0.200* [0.108]	–1.41*** [0.541]	–0.939*** [0.293]
$Liquidity_{dt}$	0.0009 [0.003]	–0.026*** [0.006]	–0.012 [0.009]
Observations	1302	604	562
R-squared	0.52	0.59	0.32

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.

[1] Results could not be reported due to lack of data. [2] There are no controls on capital outflows to other European countries.

Table 12

Subsample of Asian economies

	Equity	Long-term debt	Short-term debt
$\ln(Trade_{sdt})$	1.01***	1.411***	0.925***
	[0.147]	[0.222]	[0.223]
$Sharpe_{dt}$	0.221	–0.046	[1]
	[0.159]	[0.17]	
$Sharpe\_FX_{sdt}$	–0.367	–0.457**	–0.088
	[0.153]	[0.180]	[0.308]
Tax_{dt}	–0.008	–0.01	–0.041
	[0.018]	[0.056]	[0.031]
$Controls\_out_{st}$	–2.796***	–1.18***	–2.332***
	[0.283]	[0.290]	[0.437]
$Controls\_in_{dt}$	–0.496**	1.21**	–0.22
	[0.249]	[0.479]	[0.47]
$Liquidity_{dt}$	0.013***	0.027*	0.037**
	[0.001]	[0.017]	[0.019]
Observations	327	307	203
R-squared	0.73	0.58	0.48

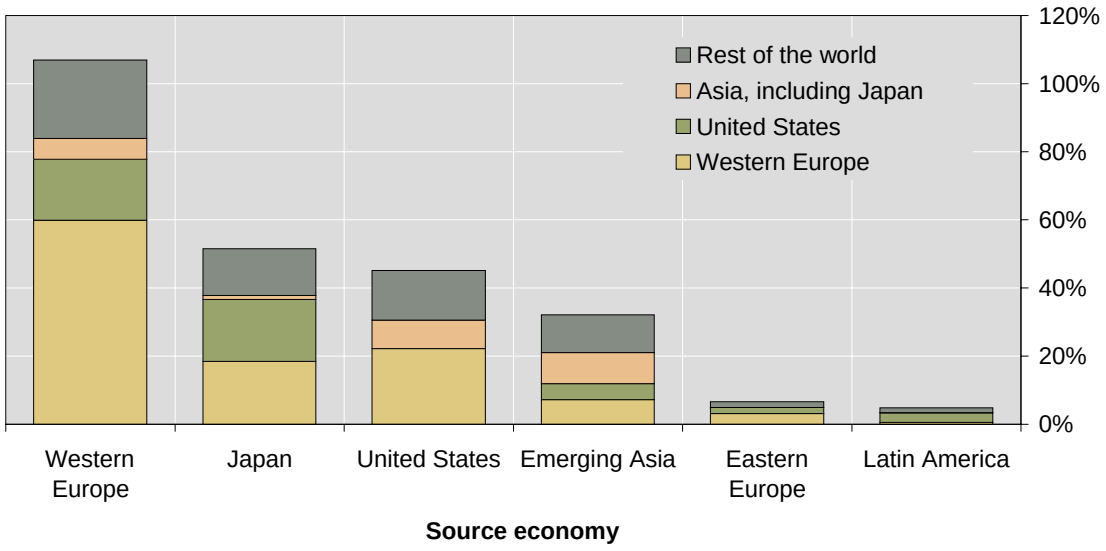
Dependent variables are bilateral portfolio flows between source country *s* and destination country *d*. All explanatory variables except the dummy variables are logs. Robust standard errors of the estimated coefficients are reported in parentheses. Intercepts are included (not reported). ***, ** and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

[1] Results could not be reported due to lack of data.

Graph 1

Foreign portfolio investment by destination economy

At end-2006, as percentage of source economies' GDP



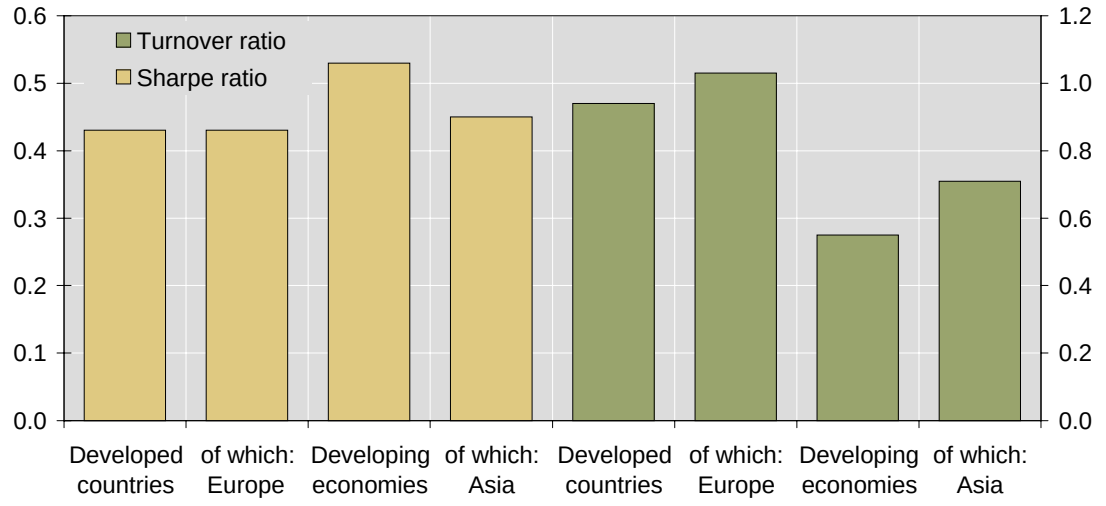
Based on preliminary CPIS data for 2006, excluding securities held as part of official reserves.

Sources: IMF; authors' calculations.

Graph 2

Performance and liquidity of equity markets

In per cent

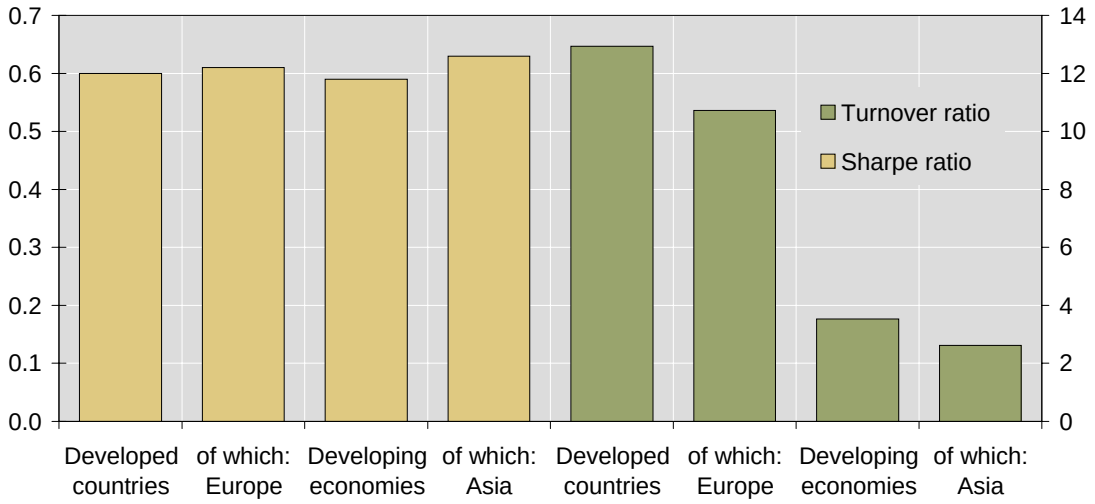


Turnover ratio is plotted on the right-hand scale; Sharpe ratio is plotted on the left-hand scale.

Graph 3

Performance and liquidity of bond markets

In per cent



Turnover ratio is plotted on the right-hand scale; Sharpe ratio is plotted on the left-hand scale.

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