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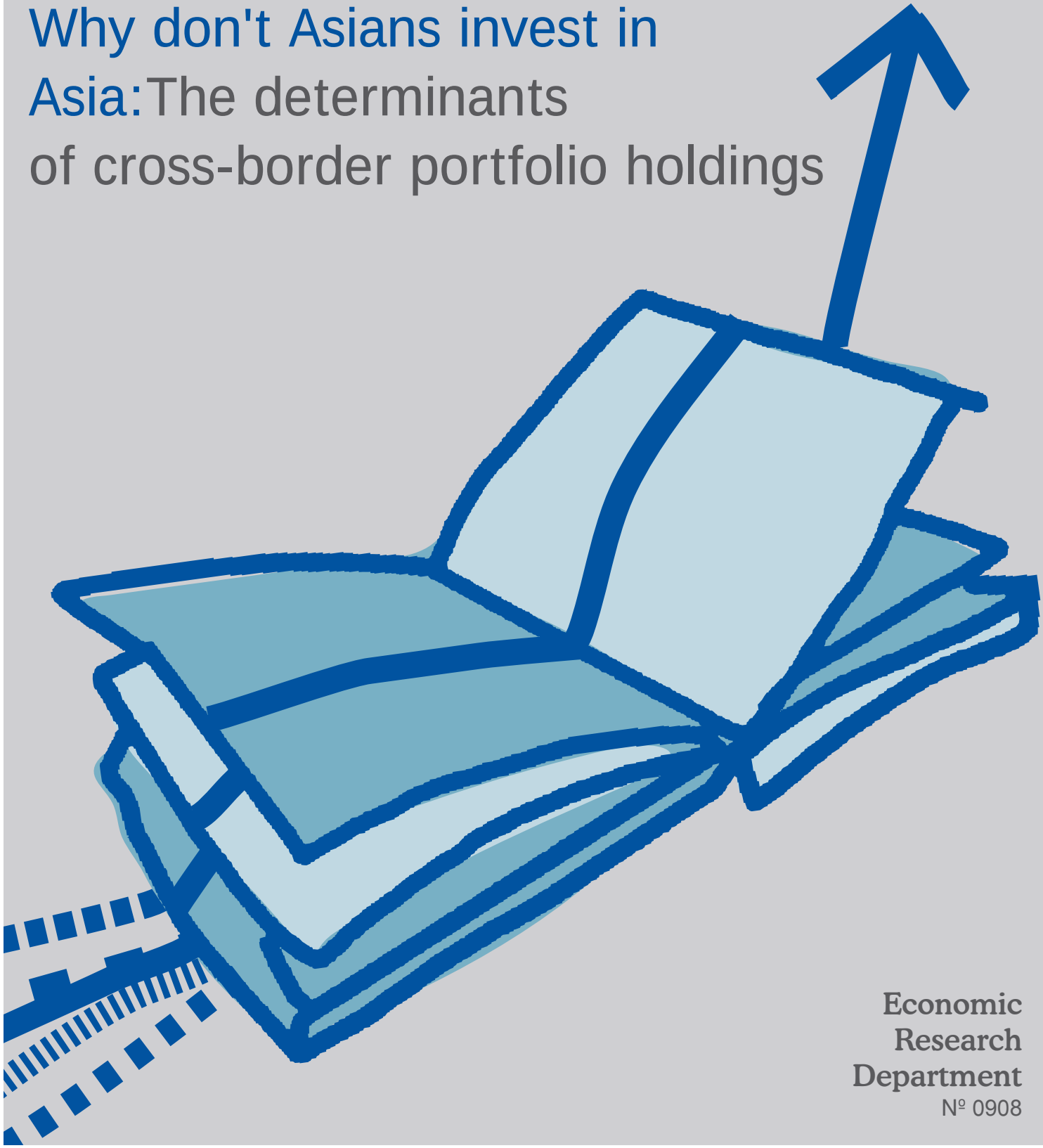

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Why don't Asians invest in Asia? The determinants of cross-border portfolio holdings

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Abstract

This paper seeks to understand why Asian foreign investment is concentrated in financial markets outside of the region instead of in Asian markets. We analyse empirically the geographical composition of the cross-border portfolio holdings of more than 40 source countries. We compare these benchmark results with those of four subgroups: advanced industrial economies; emerging market economies; European economies; and Asia-Pacific economies. The lack of liquidity in Asian financial markets turns out to be one reason why Asian capital is invested predominantly outside the region, notwithstanding the short distances and large trade flows between Asian economies. Initiatives to improve the liquidity of Asian financial markets, therefore, may be a useful way to stimulate financial integration within the region.

Key words: cross-border portfolio investment; regional financial integration; gravity model.

JEL classification: F21, F36, G11

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are our own. Opinions expressed are those of the authors and do not necessarily reflect those of the institutions with which they are affiliated.

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1. Introduction

There are two notable facts about patterns of capital flows in Asia during the decade after the Asian financial crisis of 1997-98. First, Asia switched from being a net importer of capital to an exporter of capital. Second, Asia's surplus savings were invested in developed counties outside the region rather than developing countries within the region. Asian residents invested in safe US and European financial assets, mainly bonds, while US and European residents invested in risky Asian assets, such as equities. In Asia in 2006, portfolio investment in other countries within the region accounted for only 10% of the region's foreign portfolio holdings. By contrast, in the European Union, over half of the region's portfolio investment was directed to neighbouring countries.

The concentration of Asian foreign portfolio investments outside of the region instead of in Asian markets is puzzling for at least three reasons. First, neo-classical growth theory predicts that capital should flow to emerging economies, where marginal returns are higher. The so-called Lucas paradox has been extensively explored in the literature. One strand of the literature focuses on the fundamental rate of return differential, which may be miss-specified or omitted (King and Rebelo (2005) and Tornell and Velasco (1992)). Another strand focuses on international capital market imperfections, such as sovereign risk and asymmetric information (Gertler and Rogoff (1990) and Gordon and Bovenberg (1996)).

Second, numerous studies have found geographical proximity to be an important determinant of capital flows. Gravity models have proven very successful in explaining trade as well as financial flows between two countries as a negative function of the distance between them. Portes and Rey (2005) examine the pattern of bilateral equity investment for a sample of 14 mature economies over the 1989-96 period. They find that distance is one of the most important determinants of flows, in addition to market size and the efficiency of the transactions technology. Ahearne, Griever and Warnock (2004) and Dahlquist et al (2003) also examine portfolio equity investment, focusing on a single source country, the United States, and confirm the importance of distance. Other studies have used gravity models to analyse the geography of foreign direct investment (eg, Wei, 2000; Giovanni, 2005; Stein and Daude, 2007) and of cross-border bank lending (eg, Buch, 2002; Rose and Spiegel, 2004; Papaioannou, 2008). In each of these studies, geographical proximity is found to exert a significant influence on foreign investment.

The third reason that the pattern of foreign investment in Asia is puzzling is that it contrasts with the pattern of trade in Asia. Intra-regional trade increased markedly after the Asian financial crisis. In 2006, exports to other countries in Asia, including Japan, accounted for 52% of the region's total exports, whereas portfolio investment in other countries in Asia accounted for only 10% of the region's foreign portfolio holdings. Theoretical research is ambiguous regarding the relationship between trade and financial flows. Portfolio diversification might favour a negative relationship because, insofar as business cycles tend to be more closely correlated among neighbouring countries than among distant ones, idiosyncratic risks are more easily shared across distant countries not subject to the same trade shocks. However, empirical research finds a positive relationship. Lane and Milesi-Ferretti (2008) examine portfolio equity holdings for 67 source countries at end-2001. They conclude that portfolio allocations are strongly correlated with bilateral trade in good and services. Shin and Yang (2006) also find positive evidence of complementarities

between trade in goods and trade in assets. Moreover, they find that the significance of distance in explaining bilateral flows disappears when trade is added as an explanatory variable, indicating that distance may not directly influence financial flows.

The pattern of foreign portfolio investment in Asia has several important implications for recent issues in international finance, ,including the roots of global macroeconomic imbalances during the 2000s and the global financial crisis of 2007-09. A number of explanations have been offered for global imbalances. Savings glut hypothesis is one of them (Bernanke (2005)). Savings gluts can explain the current account surplus in Asia and deficit in the United States, but can't explain patterns of gross capital flows. Other hypotheses focus on the exchange rate regime and trade patterns, e.g. Bretton Woods II by Dooley, Garber and Folkerts-Landau (2005). The large US current account deficit has been financed by emerging economies in the dollar bloc that seek to maintain export competitiveness at low real interest rates for many years. But this hypothesis is based on the strong assumption that there is no distinction between private capital flows and public capital flows. Recently financial underdevelopment or financial constraints in emerging economies has been included in the theoretical framework to explain global imbalances (Caballero, Farhi and Gourinchas (2008), Martin and Rey (2004)).

This paper seeks to understand why Asian foreign investment is concentrated in financial markets outside of the region instead of in Asian markets. This paper is different from earlier works in the existing literature in three ways. First, we analyse bond holdings, which have been neglected in previous studies, as well as equity flows. Total foreign investment in bonds is larger than foreign investment in equities – $16.3 trillion versus $13.8 trillion in 2006 according to an IMF survey – yet equities are the subject of most attention in the literature. The risk-return characteristics of bonds are very different from those of equities and, therefore, *a priori* it is unclear whether the findings from studies of bilateral equity holdings can be generalised to bond portfolios.

Second, we model country-specific factors in an innovative way. Even if bilateral factors influencing ties between source and destination countries are the same across country pairs, bilateral holdings might still vary because of differences in either source countries' preference for investing abroad or destination countries' attractiveness to foreign investors. We control for such country-specific factors by including a measure of risk-adjusted asset returns, specifically a Sharpe ratio. We view this as an improvement over previous studies' use of fixed effects to control for country characteristics (e.g., Lane and Milesi-Ferretti, 2008; Papaioannou, 2008).

Our third contribution to the literature is to highlight market liquidity as a potentially important determinant of cross-border holdings. There are a growing number of theoretical studies on the role of liquidity risk in asset prices and, therefore, in investors' portfolio choices (e.g., Morris and Shin, 2004; Acharya and Pedersen, 2005). Previous empirical studies of bilateral portfolio investment included various proxies for financial market frictions, which by definition interfere with trade and so reduce market liquidity. For example, Portes and Rey (2005) interpret telephone call traffic and multinational bank branches, which are highly significant in their regressions, as proxies for the costs of information transmission. Considering the range of possible market frictions, from bid-ask spreads to search costs and incomplete markets, we surmise that liquidity more fully captures the impact of market frictions than other proxies.

Our most striking result is that market turnover is an important determinant of bilateral portfolio holdings. This is especially true for Asian investors, indicating that Asian authorities' focus on the development of financial markets in the region is an effective way to promote intra-regional investment. Consistent with previous studies, we also find bilateral holdings to be positively associated with bilateral trade.

Interestingly, we do not find a strong link between holdings and return correlations, indicating that diversification is not a significat motivation for cross-border investment.

The remainder of the paper is organised as follows. Section 2 sets out our empirical specification, and section 3 describes the data. Section 4 reports our results. The final section presents some conclusions and suggestions for further research.

2. Empirical specification

We analyse the determinants of foreign portfolio holdings using a gravity model. 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). Theoretical justifications were later 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.

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 financial assets between the source country *s* and the destination country *d* at time *t*; $Costs_{sdt}$ represents various costs associated with trade between countries *s* and *d*, including transactions costs, information asymmetries 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 costs in terms of observable variables. Costs are typically modelled as a function of geographical or cultural distance, the argument being that information asymmetries 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.

A further extension is to add trade in goods and services as an explanatory variable. Equation (2) then becomes the following:

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

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:

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

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 important variable we introduce is market liquidity. While liquidity has several dimensions, they all tend to be correlated. We choose to focus on market depth, as measured by average turnover. Average turnover shows the order flow a market typically accommodates. Turnover is positively related to the size of the market, so to control for differences in market size across countries we scale turnover by market capitalisation. This gives the following specification:

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

where $Liquidity_{dt}$ is the ratio of turnover to market capitalisation in country *d*.

We also include a measure of risk-sharing as an explanatory variable. Considering that business cycles in Asian economies are increasingly synchronised and that the major financial centres offer a larger choice of financial instruments, limited

opportunities for risk diversification within Asia may help to explain the lack of intra-regional investment.[1]

$$\begin{aligned}\ln(Assets_{sdt}) = {} & \beta_0 + \beta_1 \ln(GDP_{st}) + \beta_2 \ln(GDP_{dt}) \\ & + \beta_3 \ln(Dist_{sd}) + \beta_4 Border_{sd} + \beta_5 Colony_{sd} + \beta_6 Language_{sd} \\ & + \beta_7 \ln(Trade_{sdt}) + \beta_8 Sharpe_{dt} + \beta_9 Sharpe\_FX_{dt} \\ & + \beta_{10} Tax_{dt} + \beta_{11} Controls\_out_{st} + \beta_{12} Controls\_in_{dt} \\ & + \beta_{13} Liquidity_{dt} + \beta_{14} \mathrm{Re}turn\_corr_{sdt} + \varepsilon_{sdt}\end{aligned} \quad (6)$$

where $\mathrm{Re}turn\_corr_{sdt}$ is asset return correlation between country s (source country) and country d (destination country) at time t.

In order to account for omitted variables and unobserved heterogeneity in our explanatory variables, we estimate equations (2) to (6) with random effects. This implies 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 $E(\lambda_i^2) = \sigma_i^2$, $E(u_{it}^2) = \sigma_u^2$, $E(\varepsilon_{it}^2) = \sigma_\lambda^2 + \sigma_u^2$, $t = s$ but $E(\varepsilon_{it}^2) = \sigma_\lambda^2$, $t \neq s$, and $E(X_{kit}\lambda_i) = 0$ for all *k, i,* and *t.* The random effects estimator is estimated by feasible generalised least square (FGLS) over all individual groups in the dataset: $\hat{\beta}_{RE} = \left[\sum_{i=1}^{N}\left(X_i'\Omega^{-1}X_i\right)\right]^{-1}\sum_{i=1}^{N}\left(X_i'\Omega^{-1}y_i\right)$, where *X* is an independent variable, *y* is the dependent variable and $\Omega = \sigma_u^2 I + \sigma_\lambda^2 ee'$.

3. Data description

To estimate equations (2) to (6), 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

[1] 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 conclude that some degree of risk-sharing is obtained through Asian economies' integration with major financial centres.

[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.

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 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 eight in the Asia-Pacific region: Australia, 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.

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, 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.

A few stylised 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 Figures 1 and 2. In equity markets, the 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 (Figures 1 and 2). 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. 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 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-Pacific with other relevant groups of countries. In particular, we compare the results for the eight Asia-Pacific 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 section 2 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, i.e. 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 degree of liquidity in domestic markets. Results for the full sample of countries based on these various specifications are reported in Table 4.

Is the gravity model a good starting point?

The left-hand columns of Table 4 report the estimation results of equation (2). Separate regressions are conducted for the two 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. 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. 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 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 positive and significant for bonds but insignificant for equities. For bonds, this result implies that the appreciation of the destination country's currency against that of the source country would induce more cross-border 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. 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.

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). 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.

The role of diversification

Finally, we include return correlations, as in equation (6). In the base-line estimation with the full sample, the coefficient for return correlations is significant and positive, which is not consistent with the international capital asset pricing model. However, in sub-samples (see below), most coefficients for return correlations are insignificant. This indicates that diversification is not a strong motive for cross-border portfolio investment.

Are there differences across country groups?

We now look into whether the Asian economies differ markedly from other groups of source countries. Using equation (6), we compare four groups of economies: developed, emerging, European and Asian. The results are reported in Table 5.

The results for developed countries are broadly similar to the results for the full sample of countries (Table 4). One difference is that, for developed countries, 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 yields fewer significant results than the developed country sample. 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 differ from those of developed countries as a group on a number of important points. First, investors respond to currency returns in both bond and equity portfolios. 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, 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, for equities, 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.

5. Conclusions

We use data on cross-border equity and bond holdings for over 40 economies in order to analyse empirically why countries invest in some economies and not in others. Our results point to market liquidity as an important factor. The lack of liquidity in Asian financial markets helps to explain why Asian investors prefer to access the major financial centres. The importance of liquidity is most pronounced for Asian investors, as well as investors in developed countries. The cross-border portfolio allocations of emerging economies as a group are also influenced by liquidity considerations but to a lesser extent than the allocations of Asian investors. Further research seems warranted to confirm the importance of liquidity considerations. In particular, it is unclear why Asian investors should value liquidity more highly than investors in other regions.

The results of this study have important implications for financial and monetary cooperation in Asia. The results lend support to initiatives that focus on the development of local financial markets as a way to entice Asians to invest in each other's markets instead of outside the region. These include the Asian Bond Markets Initiative (ABMI), which "aims to develop efficient and liquid bond markets in Asia, which would enable better utilization of Asian savings for Asian investments" (ASEAN+3, 2003), and the Asian Bond Fund 2 (ABF2).[3] The creation of deep and liquid markets in Asia would arguably stimulate greater financial integration within the region, which in turn could reduce the risk of global imbalances in the long run.

[3] The ABMI was established in 2003 by the ASEAN+3 group of countries, comprising the 10 members of the Association of Southeast Asian Nations (ASEAN) plus China, Korea and Japan. Through various working groups, the ABMI focuses on reforms to encourage more active investor participation in bond markets and to facilitate access to bond markets for a wider variety of issuers. ABF2 was created in 2005 by the Executives' Meeting of East Asia Pacific central banks. ABF2 consists of nine exchange-traded funds, the creation and listing of which helped countries to identify impediments to the development of local bond markets (Ma and Remolona, 2005).

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Table 1: Summary statistics

	Mean	Std. Dev
ln($Assets_{sdt}$) - equities	4.12	3.29
ln($Assets_{sdt}$) - bonds	4.29	2.80
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
$Sharpe_{dt}$ – equities	0.44	0.39
$Sharpe_{dt}$ - bonds	0.65	0.30
$Sharpe\_FX_{sdt}$	–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
$Liquidity_{dt}$ – equities	0.74	0.53
$Liquidity_{dt}$ – bonds	6.48	10.29

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}	$Sharpe_{dt}$
Equities	$Liquidity_{dt}$	1.000		
	GDP_{dt}	–0.012	1.000	
	$Sharpe_{dt}$	–0.102	–0.102	1.000
Bonds	$Liquidity_{dt}$	1.000		
	GDP_{dt}	–0.017	1.000	
	$Sharpe_{dt}$	0.000	–0.200	1.000

Table 3: Correlation among dependent variables

	Equities	Bonds
Equities	1.000	
Bonds	0.739	1.000

Table 4: Alternative gravity models for the full sample

	Basic model (equation (2))		with trade (equation (3))		with taxes and controls (equation (4))		with liquidity (equation (5))		with return correlations (equation (6))	
	Equities	Bonds	Equities	Bonds	Equities	Bonds	Equities	Bonds	Equities	Bonds
$\ln(GDP_{st})$	0.559*** [0.027]	0.536*** [0.022]	0.337*** [0.037]	0.166*** [0.031]	0.363*** [0.045]	–0.107** [0.065]	0.305*** [0.058]	0.130* [0.079]	0.447*** [0.061]	0.110 [0.109]
$\ln(GDP_{dt})$	0.579*** [0.027]	0.554*** [0.023]	0.371*** [0.035]	0.230*** [0.029]	0.354*** [0.054]	–0.009 [0.065]	0.240*** [0.063]	0.212** [0.083]	0.310*** [0.065]	-0.164 [0.112]
$\ln(Dist_{sd})$	– 0.671*** [0.068]	– 0.893*** [0.056]	–0.411*** [0.072]	– 0.491*** [0.059]	– 0.557*** [0.095]	– 0.353*** [0.123]	– 0.442*** [0.110]	–0.356** [0.148]	-0.161 [0.102]	0.110 [0.165]
$Border_{sd}$	0.187 [0.318]	0.013 [0.056]	0.137 [0.308]	–0.084 [0.274]	–0.113 [0.374]	0.205 [0.563]	–0.157 [0.435]	1.15* [0.660]	-0.301 [0.373]	-0.750 [0.632]
$Colony_{sd}$	0.083 [0.342]	0.036 [0.285]	–0.161 [0.339]	–0.255 [0.279]						
$Language_{sd}$	0.669*** [0.155]	0.217*** [0.132]	0.584*** [0.155]	0.072 [0.128]	1.09*** [0.207]	0.424** [0.239]	1.13*** [0.223]	0.929*** [0.274]	1.48*** [0.207]	0.894*** [0.321]
$\ln(Trade_{sdt})$			0.214*** [0.024]	0.334*** [0.020]	0.240*** [0.035]	0.690*** [0.042]	0.314*** [0.041]	0.468*** [0.056]	0.523*** [0.051]	1.192*** [0.093]
$Sharpe_{dt}$					0.606*** [0.052]	0.187** [0.076]	0.687*** [0.062]	0.059** [0.086]	0.557*** [0.040]	0.124** [0.118]
$Sharpe\_FX_{sdt}$					–0.049 [0.049]	0.328*** [0.068]	0.045 [0.062]	–0.33*** [0.085]	0.046* [0.069]	-0..112 [0.106]
Tax_{dt}					– 0.039*** [0.004]	0.012 [0.007]	– 0.026*** [0.005]	– 0.045*** [0.014]	-0.029*** [0.005]	-0.049*** [0.016]
$Controls\_out_{st}$					– 1.690*** [0.091]	– 0.758*** [0.100]	–1.70*** [0.108]	– 0.691*** [0.123]	-2.61*** [0.124]	-1.500*** [0.191
$Controls\_in_{dt}$					0.035*** [0.094]	0.645*** [0.167]	0.161 [0.109]	0.814*** [0.252]	-0.669 [0.116]	0.019 [0.282]
$Liquidity_{dt}$							0.463*** [0.077]	0.021*** [0.004]	0.529*** [0.081]	0.024*** [0.005]

$Return\_corr_{sdt}$									0.345*** [0.133]	0.320* [0.182]
Observations	6732	8010	6666	7911	4046	3420	3038	1523	2493	866
R-squared	0.227	0.274	0.26	0.33	0.36	0.42	0.37	0.46	0.53	0.68

Notes to Table 4: Dependent variables are bilateral portfolio holdings 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 but not reported. ***, ** and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10% levels, respectively.

Table 5: Gravity model (equation (6)) for subsamples of countries

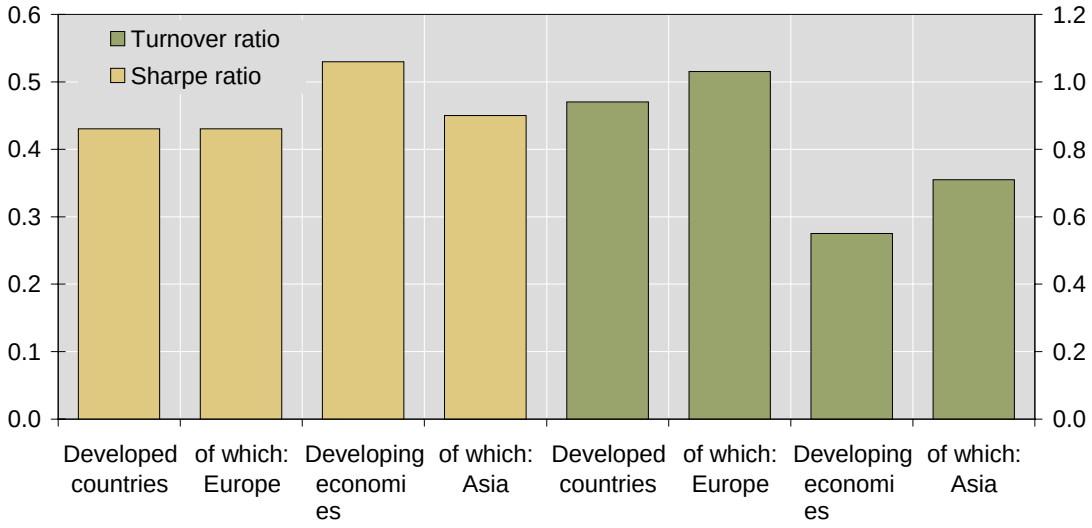
	Developed countries		Emerging markets		European Union members		Asia-Pacific economies	
	Equities	Bonds	Equities	Bonds	Equities	Bonds	Equities	Bonds
ln($Trade_{sdt}$)	0.534***	1.305***	0.180	0.392***	1.098***	1.059***	1.002***	0.967***
	[0.048]	[0.089]	[0.115]	[0.151]	[0.058]	[0.098]	[0.147]	[0.261]
$Sharpe_{dt}$	0.565***	0.268**	0.544***	0.166	0.309***	0.208**	0.246	–0.186
	[0.061]	[0.117]	[0.149]	[0.277]	[0.062]	[0.095]	[0.162]	[0.287]
$Sharpe\_FX_{sdt}$	–0.058	–0.252**	0.105	0.198	–0.138**	-0.208***	–0.046	–0.182**
	[0.060]	[0.117]	[0.144]	[0.257]	[0.059]	[0.083]	[0.154]	[0.270]
Tax_{dt}	-0.008*	–0.023	0.023*	0.018	–0.027***	0.017	–0.009	–0.039
	[0.054]	[0.016]	[0.013]	[0.023]	[0.005]	[0.020]	[0.018]	[0.054]
$Controls\_out_{st}$	–2.51***	–2.804***	0.036	0.360	[a]	[a]	–2.788***	–4.058***
	[0.163]	[0.299]	[0.189]	[0.288]			[0.283]	[0.584]
$Controls\_in_{dt}$	-1.169***	-1.256***	–1.072***	0.600	–0.922***	–1.805***	–0.485**	-0.334
	[0.121]	[0.318]	[0.271]	[0.866]	[0.134]	[0.419]	[0.249]	[0.628]
$Liquidity_{dt}$	0.954***	0.022***	0.057	0.032***	0.132	–0.013***	0.012**	0.031**
	[0.078]	[0.004]	[0.239]	[0.012]	[0.093]	[0.005]	[0.001]	[0.016]
$Return\_corr_{sdt}$	-0.019	0.093	0.431	-0.117	-0.021	0.151	0.277	-0.777*
	[0.119]	[0.189]	[0.264]	[0.313]	[0.116]	[0.169]	[0.353]	[0.448]
Observations	1829	611	464	255	1302	431	327	307
R-squared	0.58	0.74	0.21	0.54	0.63	0.78	0.73	0.85

Notes: Dependent variables are bilateral portfolio holdings 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 but not reported. ***, ** and * indicate that the estimated coefficients are statistically significant at the 1%, 5% and 10% levels, respectively.

[a] There are no controls on capital outflows to other European countries.

Figure 1: Performance and liquidity of equity markets

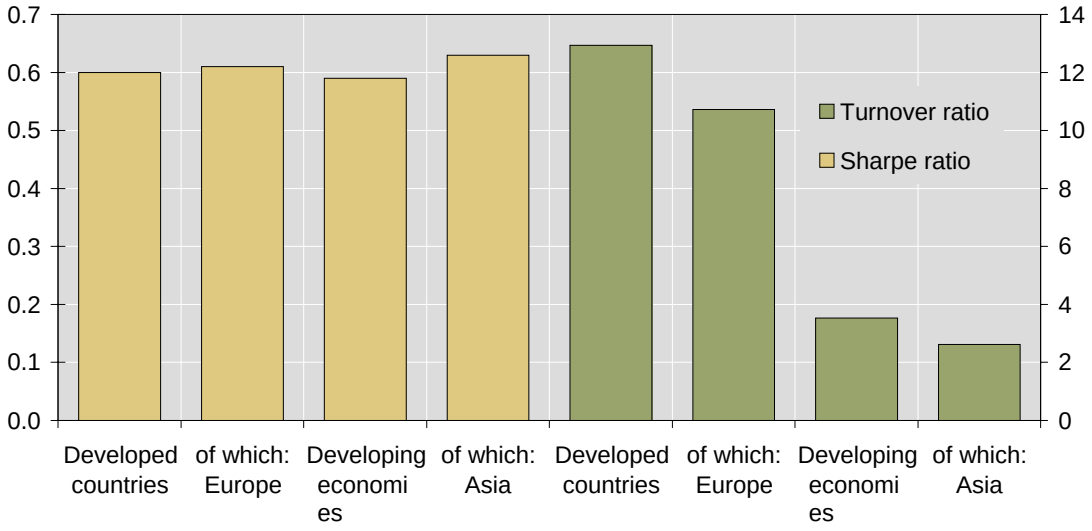
In per cent



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

Figure 2: 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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