What Hinders Cross-Border Portfolio Investment in Asia?

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I. Introduction

Capital market integration has been a chief policy agenda of the ASEAN+3 for the past several years since the adoption of the Asian Bond Markets Initiative (ABMI). The regional initiative was initially motivated by the Asian financial crisis of 1997. The prevailing view had that excessive reliance on bank loans as a source of funding had resulted in the lack of well-functioning capital markets in the region. The unbalanced financial structure, it was argued, precluded a more diversified and, thereby, sound financial sector, which rendered economies of the region vulnerable to external shocks. Based on the diagnosis, ASEAN+3 finance ministers endorsed the ABMI in August 2003, committing to foster local bond markets and facilitate intraregional cross-border investment through addressing institutional barriers and developing the infrastructure needed[1].

While the consensus on the desirability of developing integrated capital markets in the region has been strong, investors in markets of the region still testify that cross-border investment in the region remains relatively low, which has been repeatedly confirmed by researchers as well. Eichengreen and Park (2005) on cross-border bank lonas, Kim, Lee and Shin (2005) on portfolio investments, Eichengreen and Luengnaruemitchai (2008) on bond investment showed that cross-border investment in Asia is lower compared to other regions. This finding sits uneasy with the fact that most of economies in the region opened up their capital markets to foreign investment around the financial crisis of 1997. An often asserted presumption for the lagged financial integration in Asia is that transaction costs of cross-border capital flows are higher in Asia due to institutional restrictions other than capital controls per se. For example, Takeuchi (2006) argued that in addition to capital controls, lack of hedging instruments, complicating taxation rules, inefficient clearing and settlement systems hinder further financial integration. In fact, this echoes the general policy formula provided by the World Bank (2002) for a country seeking to develop bond markets: it suggested that liquidity providing schemes for secondary market trading, tax policy including elimination of withholding taxes, and settlement infra should be improved to develop bond markets and attract foreign investors.

Although the notion that various regulations beyond capital controls plus lack of market infra hinder more active cross-border portfolio investment in Asia is presumed plausible, to date there is no empirical study to support or reject the hypothetical argument. Existing studies on determinants of cross-border capital flows discovered roles of geographical factors considered as informational frictions, economic factors and demographical structures (Buch 2003, Portes and Rey 2005, Park, Rhee and Yang 2006). Regarding institutional factors, however, only examined are such broad factors as the rule of law, corruption, bureaucratic quality etc (Daude and Fratzscher 2008; Eichengreen and Luengnaruemitchai 2006, 2008; Papaioannou 2009; Park, Rhee and Yang 2006; Wei 2000). While it is useful to know that quality of these fundamental social institutions may matter for cross-border capital flows, these findings do not offer much help in policymakers' designing specific financial policies.

In this study, we set out to fill this void in the literature by using a novel data set of the ABMI-GoE barrier index. The main reason for the absence of empirical studies on effects of low-level institutions or policy factors on cross-border capital flows is simply due to the

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[1] By their own words, "The ABMI aims to develop efficient and liquid bond markets in Asia, which would enable better utilization of Asian savings for Asian investments. The ABMI would also contribute to the mitigation of currency and maturity mismatches in financing" (Chairman's Press Release on the Asian Bond Markets Initiative, Aug 2003, ABMI, ASEAN+3)

absence of quantified measures of such factors. Available quantified measures or indices of policy barriers are mostly based on the IMF-AREAER data set (see Section II for detailed explanation). However, these measures are limited to capital account controls and *de jure rather than* de facto restrictions. The ABMI-GoE index, in contrast, covers all the institutional barriers that are perceived by market participants as underlying components of transaction costs of cross-border investment. The ABMI-GoE conducted a market survey and identified a list of institutional factors as barriers to cross border investment, which included foreign investor quota, foreign investor registration, foreign exchange controls, credit controls, taxation systems, and post-trading infra. Then, for each barrier they constructed a quantified measure for each country of ASEAN+3, while taking into account *de facto* as well as *de jure* restrictions (see Section II for a thorough discussion of the ABMI-GoE Index).

Using the ABMI-GoE index, we empirically analyze how effective a number of policy or market infra factors are in explaining magnitudes of cross-border portfolio flows in ASEAN+3 countries. Following the methodology of the existing literature, we employ the gravity model for empirical analyses. We embed the ABMI-GoE index in the gravity model and implement panel regression analyses. The panel regression analyses show that the institutional features perceived by market participants as barriers are indeed 'barriers'. In a series of regression that includes ABMI-GoE barrier indices one by one, coefficients to all of the ABMI-GoE barrier indices are estimated statistically significant with negative signs both for equity and bond.

Having found that the ABMI-GoE barrier indices are capable of explaining cross-border portfolio investment in Asian economies, we examine which barrier is more important than others. Given the high correlations across individual barrier indices, we combine qualitatively similar barriers and create three sets of barriers. The first set covers the barriers that directly affect the difficulty of market access. The second includes the barriers that directly incur financial cost of investment and the third concerns post-trading efficiency. In a horse race regression with these three sets of barrier indices, we find that market access and cost factors have significantly effects on cross-border equity holding in Asian economies while post trading efficiency does not have any significant effect. As for cross-border bond holdings, we obtain results indicating that barriers to market access can significantly undermine cross-border bond investment in Asian economies while post trading efficiency does not have any significant effect. Such results may be interpreted to imply that market access is the most important factor that determines cross-border portfolio investment.

The rest of the paper is organized as follows. Section II reviews the existing literature that investigated the determinants of and the index of institutional barriers to international capital flows. Section III describes our methodology and data. We explain the ABMI-GoE index in detail to show its relevancy for the purpose of our research. We also describe other data used in our estimation of the gravity model. The empirical results are presented in Section IV, where we describe how the policy factors measured by the ABMI-GoE index perform in the gravity model. Section V contains concluding remarks.

II. Related Literature

II.1. Studies on the Determinants of Cross-border Investment in Asia

A key focus of the literature on international capital flows has been on the role of information frictions. Studies by Buch (2003) on bank holdings, Ghosh and Wolf (2000) on bond flows, Mody, Razin, and Sadka (2003) on FDI flows and Portes and Rey (2005) on

equity flows show that geographical distance between the source and recipient country a la "gravity" model has significant explanatory power for international capital flows. It has been interpreted that geography works as a proxy for information frictions. Courdacier and Martin (2006) and Martin and Rey (2004) provided a theoretical basis for these relationships, showing that if markets are segmented and cross-border asset trade entails information costs, then bilateral asset holdings are positively related to the size of the markets but negatively related to the information costs.

Using a similar model, Faraqee, Le and Yan (2004) also show that the gravity equation emerges naturally. Using some proxies for information flows (telephone traffic between countries, newspaper circulation, bank branches), Portes and Rey (2005) confirmed that informational flows enhance significantly asset trade[2]. The most recent empirical study in this vein is Daude and Fratzscher (2008). They showed that while information frictions have a substantial effect, there are differences among the types of investment: FDI and loans are the most sensitive and equity and debt securities the least sensitive.

Taking the gravity model as the baseline model, another strand of the literature has studied the role of institutional factors including capital controls and the quality of social institutions in dictating international capital flows. Buch (2003), using the BIS bank loan data set for the period 1983-99, examined the role of capital controls quantified by the AREAER binary variables (see below, II.2). She found that the measure of capital controls had a negative, though quantitatively small, impact on cross-border bank claims. In contrast, Daude and Fratzscher (2008), who used the BIS data for the period 1999-2003, did not find a significant relationship between the measure of capital controls and cross-border loans, though a significant impact was detected for equity and debt flows.

Inspired by the law and finance literature that argued for the importance of quality of social institutions for financial development (La Porta et al. 1997, 1998), researchers examined if the origin of legal system had any effect on international capital flows. A robust negative (positive) relationship of the French (English) legal origin with all the types of international capital flows has been found in various specifications of regression analysis (Buch 2003, Daude and Fratzscher 2008, Papaioannou 2009). As an effort to disentangle what specific quality of social institution exerts such effects on capital flows, Wei (2000) investigated the relationship between corruption and FDI flows, and reported that corruption in a recipient country significantly reduces inward FDI flows. Daude and Fratzscher (2008) contended based on their empirical findings, that portfolio investment reacts much more strongly rather than FDI to corruption, which is also the case with quality of disclosure and accounting standards. On bank loans, Papaioannou (2009) reported also significant effects of the rule of law, risk of contract repudiation, but not of corruption. Recently, focusing on bank asset portfolios among the US and four European economies, Buch and Driscoll (2010) examined again roles of capital controls, political risk and trust with the BIS data set for 1999-2003. They found generally significant impacts of the included variables on cross-border bank loans.

Studies that shed more light on Asian economies tend to focus on comparisons between Asia and Europe, while standing on the tradition of literature that exploits the gravity model as the benchmark framework and allows for the role of institutional frictions. Kim, Lee and Shin (2005) estimated a gravity model of cross-country asset holdings for equities, bonds and loans to test if East Asian financial markets are relatively less integrated with each other than to global markets, particularly compared to the European ones. When estimated for portfolio investment, they found that the regional financial integration is much deeper in

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[2] Hau (2001), Coval and Moskowitz (2001) and Huberman (2001) also provide empirical evidence that informational costs and/or familiarity effects have a large impact on asset portfolios and price.

Europe than in East Asia. For cross-border bank loans from the BIS data set, however, they obtained an evidence of regional integration in East Asia comparable to the European region. Eichengreen and Park (2005) augmented the BIS data set with unpublished national data for Taiwan, Hong Kong, and Singapore. Unlike Kim, Lee and Shin (2005), they discovered that cross-border bank claims are smaller in Asia than in Europe, which may be due to their larger geographical coverage for Asia. They reported results suggesting that trade integration within the area, financial development and past absence (presence) of capital account controls could help explain the difference in intra-regional financial integration between Asia and Europe. Park, Rhee and Yang (2006) investigated the determinants of the bilateral holdings of stocks and bonds by estimating a gravity model. Unlike previous studies, their empirical model included demographic variables and a few low-level institutional variables such as settlement linkage to international central securities depositories and withholding tax rates. They found that institutional factors do have significant effects on cross-border holdings of bonds.

Finally, Eichengreen and Luengnaruemitchai (2008) studied cross-border bond investment and compared Asia to other regions. They analytical tool was, again, the gravity model and added indices measuring law and order, corruption, bureaucratic quality, and the investment risks. They confirmed that the proxies for the quality of social institutions of the destination country are consistently important in explaining cross-border bond holdings. Interestingly, they obtained that cross holdings are greater within Asia than across regions, though significantly lower than within Europe. Focusing on between Japan and other East Asian countries, however, Lee and Huh (2008) found that cross-border asset holdings between Japan and other East Asian countries are smaller than those between Japan and non-East-Asian countries. This is in contrast with the finding that cross-border asset holdings between France and other Euro member economies are greater than those between France and non-Euro-member countries.

Hence, existing studies established that for cross-border capital flows, 1) the gravity model captures basic determinants; 2) quality of mega-level institutions such as law and order, corruption and bureaucratic quality appear have explanatory power though the degree may differ across types of flows; 3) capital controls exert negative impacts. However, to our knowledge no preceding study exists as to roles of other low-level institutional factors.

II.3. Studies on the Index of Institutional Impediments for Cross-Border Capital Flows

Conventional indices that quantify institutional impediments for cross-border capital flows focus on capital account restrictiveness among many factors that may constitute transaction costs of cross-border capital flows. These measures build on the data published by the International Monetary Fund (IMF) in its *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).* The AREAER documents information regarding de jure controls on the capital account. In particular, beginning with the 1967 issue, the AREAER has provided binary variables indicating whether a country imposes controls on capital account transactions[3]. Though brief narrative accounts of restrictions are attached, accuracy and consistency of the explanatory information cannot be guaranteed since they

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[3] When started in 1967, the binary variables were mostly for payments of current account transactions. Among the eight categories for which binary indicators were provided, ' payments of capital transactions by residents' was the only capital account transaction category. In 1996, the capital account transactions category was disaggregated into 11 categories of capital transactions. Types of capital transactions covered by the AREAER and the format of the publication underwent several changes over the time. See Eichengreen (2001) for an account of major changes before 2000 and the Appendix to the 2010 issue of the AREAER for recent changes.

are based on voluntary submission of IMF member countries. As such, the IMF-AREAER data have been considered essentially a binary information set. Researchers have constructed indices of capital account restrictiveness by enumerating these binary indicators for all or selected categories of capital transactions, depending on their purposes of study (Chinn and Ito 2008; Glick and Hutchison 2001, 2005; Grilli and Milesi-Ferretti 1995; Miniane 2004; Schindler 2009).

Such measures of capital account restrictiveness have a well-known limitation; they do not reflect the intensity of regulations. To address the problem of measuring the intensity of controls, some researchers proposed to make use of the text information, albeit brief one, of the AREAER. Quinn (1997) and Quinn and Toyoda (2008) have compiled a composite measure of financial regulation, which ranges from 0 to 14 with 14 representing the least regulated and most open regime. This index is based upon their reading of the text information in the AREAER, and so inevitably exposed to the 'subjectivity' problem that assigning of scores relied entirely on the judgment of the coder[4].

Furthermore, by the nature of the AREAER that focuses on *de jure* controls, none of the indices based on the AREAER can take into account *de facto* capital controls. Subsequent to the Asian Financial Crises, number of major Asian economies including Korea, Thailand, and Indonesia opened up their capital markets widely to foreign investment. Still it has been pointed out that cross-border investment in portfolio, particularly bonds, remains comparatively low in Asia (Kim, Lee and Shin 2006; Eichengreen and Luengnaruemitchai 2006, 2008). Arner, Lejot and Rhee (2005) argued that, since visible *de jure* restrictions on cross-border capital market investment rarely exist in major Asian economies including Japan, Korea, Thailand and Malaysia, various *de facto* restrictions could be responsible for the relatively stagnant foreign investment in bonds in the Asian economies. Among the practical impediments they listed were restrictive enforcement of local judgment and onerous registration requirements when applicable[5]. While it is widely accepted that *de facto* as well as *de jure* restrictions should be counted to portray a full picture of institutional barriers for cross-border capital transactions, systematic efforts to construct such index are yet to be made.

As to other institutional restrictions than capital account regulation, the problem of the lack of relevant indices is more serious. Market participants often complain that opaque tax regulations and inefficient market infra raise the costs of international investing. Bekaert (1995) discusses the importance of indirect barriers to investment for equity flows into emerging markets. These indirect barriers include poor information about those markets and frictions such as inefficient settlement systems, poor accounting standards and poor investor protection. For Asian economies, Takeuchi (2006) argued that in addition to capital controls, availability of hedging instruments, complicating taxation rules, inefficient clearing and settlement systems hinder higher financial integration. Nonetheless, no quantified index for these factors that can be put to empirical tests exists. Researchers, alternatively, experimented with broad indices such as the index for law and order, corruption and bureaucratic quality (Eichengreen and Luengnaruemitchai 2006, 2008; Papaioannou 2009; Park, Rhee and Yang 2006; Wei 2000). These studies are useful as they confirm the general principle that the quality of social institutions matters for financial integration. The limitation is

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[4] In addition, consistency of the text information across countries cannot be guaranteed since they are based on voluntary provision of member countries.

[5] For a country study, Park (2003) investigated the reasons why foreigners do not invest in Korean domestic bonds although the domestic bond market has been completely opened to foreign investment. His suggested institutional impediments included withholding tax on interest income, lack of international settlement linkage, prohibition of the use of omnibus accounts in settlement of cross-border transactions of domestic securities, foreign investor registration requirement, and restriction on REPO transaction by foreign investors

that it is impossible to draw more specific policy implications from these mega level indices-based studies.

III. Data and Methodology

III.1. Measures of Institutional Barriers to Cross-border Investment

III.1.1. Explaining the ABMI-GoE Index

We will use the unique data set constructed by the 'Group of Experts on cross-border bond transactions and settlement in the ASEAN+3' (GoE hereafter). The GoE was established by the Asian Bond Market Initiative (ABMI hereafter) of the ASEAN+3 in 2008 with the task of identifying barriers to cross-border bond investment in the region. It consisted of national central securities depositaries in the region, local custodian banks, global custodian banks and international central securities depositaries (ICSD)[6]. One of the missions assigned to the GoE by the ABMI was to identify institutional barriers to cross-border investment in the ASEAN+3. In carrying out the mission, the GoE produced quantified information on institutional impediments to cross-border capital flows in the region.

Compared to the existing measures such as the AREAER, advantages of the ABMI-GoE index lie in its coverage and structure. First, the ABMI-GoE index seeks to list all the institutional restrictions, not confined to capital account controls, which might translate to transaction costs of cross-border investment. Second, the ABMI-GoE index not only covers *de jure* but also *de facto* impediments so that they can more effectively measure extent of restrictiveness that foreign investors actually face with respect to a specified category of transactions. Third, whenever discretionary judgments were needed, they were based on either survey results of market participants or deliberation of GoE members. Hence, the subjectivity of coders or raw information providers was designed to be minimized.

Construction of the ABMI-GoE barrier scores involved three stages: identification of major barrier category, collection of raw scores for each country from corresponding national members, and collective deliberation by all of the GoE members to finalize scores of each country for each barrier category.

(1) Identification of Main Institutional Barriers

As a first step toward constructing a barrier index, GoE conducted a market survey to identify main institutional barriers that take significant effects on transaction costs of cross-border capital flows. In particular, reflecting the purpose of the ABMI of which the goal is to promote bond market development in the ASEAN+3, the focus was on cross-border portfolio investment. In the outset, twenty five candidate barriers were listed by GoE members through internal discussion, which are listed in Table 1. For these twenty five categories, various questions were asked to identify the degree to which respondents regarded the candidate factors as *real* barriers. A comprehensive questionnaire of around 100 questions covering twenty barriers was sent out to major market players in the region.

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[6] For more information on the GoE and the ABMI, visit their website at "http://asean3goe.adb.org" where the full GoE report can be found.

Table 1. Candidates of Main Barriers

1. Message formats	14. Income payments
2. Securities numbering	15. Corporate events
3. Operating hours	16. Currency convertibility
4. Settlement cycles	17. Currency repatriation
5. Trade matching	18. Local currency borrowing
6. Settlement matching	19. FX settlement
7. Physical certificates	20. Bond lending and repo
8. Settlement model	21. Derivatives
9. Omnibus accounts	22. CCP
10. Direct access	23. Disclosure standards
11. Investor registration	24. Issuing process
12. Taxes	25. Trade reporting
13. Legal framework	

Based on the responses to the questionnaire, twelve main were identified, which included foreign investor quota, foreign investor registration, foreign exchange controls (convertibility and repatriation), cash and credit controls, taxation systems, omnibus accounts, and four settlement-related practices (settlement cycle, message format, securities numbering and dematerialization)[7].

(2) Construction of the ABMI-GoE Barrier Index

For each main barrier, a questionnaire of multiple questions that can be answered only by yes or no was formulated. Each GoE member representing each country (NCSDs and local custodian banks) prepared a draft score card by answering the questionnaire for his/her country. Depending on the question, the responses were scored 1 for "Yes" and 0 for "No", or 0 for "Yes" and 1 for "No", with 1 indicates the presence of barrier in the market. These scores were then added to provide a barrier score for each market for each main barrier. Below (Table 2) is an example of the score card for foreign exchange convertibility control. The full set of questions for the twelve barriers is reported in the Appendix.

Once raw scores of member countries for each main barrier were collected, the GoE held a meeting to ensure accuracy and consistency across countries of the provided information. The deliberation meeting was attended by both national members themselves who submitted scores and by global custodians and ICSDs who provided market players' perspective. Some raw scores were corrected either to maintain consistency across countries in interpreting the questions or to reflect *de facto* impediments omitted initially. Rationales of the corrections are clearly documented in the report. The obtained final score of each barrier for each country through these steps are tabulated in Table 3. Among the 13 ASEN+3 member countries, Brunei, Cambodia, Laos, and Myanmar are excluded as they did not participate in GoE. Instead Hong Kong, though it is politically a part of China, was included as a separate market considering its economic importance.

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[7] For definitions of twelve barriers, see the Appendix.

Table 2. Example of a Score Card

Area C: FX controls - conversion
Note: FX restrictions on local investors are disregarded here.

			Scoring (1=barrier) Yes	No	Answer Y / N	Comment (if needed)	Score
C	1	**Is there any restriction (by amount, purpose or method) on conversion of FCY to LCY by foreign investors?**	1		Y		1
C	2	Must FX be in support of an actual underlying trade?	1		Y		1
C	3	Can a single FX trade be effected against a number of securities trades with the same settlement date?		1	Y		0
C	4	Must the FX be for the exact amount? (i.e. no tolerance)	1		N		0
C	5	Must the local custodian have evidence of the securities trade before the FX trade is executed?	1		Y		1
C	6	Must approval be obtained from a market authority (e.g. central bank) before the FX trade is executed?	1		N		0
C	7	If approval is required from a market authority, does this generally have a quick turnaround?		1	N		1
C	8	Is third-party FX allowed?		1	Y		0
C	9	If third-party FX is allowed, is it generally practical and supported by custodians, given local regulations and settlement practices?		1	N		1
C	10	Can FX for securities investments be purchased offshore?		1	N		1
C	11	Are periodic reports to market authorities on FX transactions required? (e.g. from local custodians to central bank)	1		Y		1
		TOTAL					**7**

Table 3.   Final Barrier Scores

	Area	Total number of questions	CN	HK	ID	JP	KR	MY	PH	SG	TH	VN
A	Quotas	6	4	0	0	0	0	0	0	0	1	1
B	Investor registration	7	5	0	0	0	1	0	0	0	0	2
C	FX controls – conversion	11	8	0	7	0	2	2	4	0	3	5
D	FX controls – repatriation	5	4	0	2	0	0	0	4	0	1	4
E	Cash controls - credit balances	6	0	0	3	0	0	2	2	0	5	0
F	Cash controls – overdrafts	5	4	0	5	0	3	1	5	0	2	4
G	Taxes	18	8	0	8	3	7	0	13	2	5	6
H	Omnibus accounts	5	4	0	0	0	4	0	0	0	0	0
I	Settlement cycle etc	2	1	0	0	0	0	0	0	1	0	0
J	Message formats	3	3	0	3	1	0	3	3	0	2	3
K	Securities numbering	6	3	0	3	1	0	2	2	0	0	4
L	Additional settlement aspects	4	0	3	1	0	2	2	2	1	1	2

Note: CN–China, HK-Hong Kong, ID-Indonesia, JP-Japan, KR-Korea, MY-Malaysia, PH-The Philippines, SG-Singapore, TH-Thailand, VN-Vietnam

III.1.2. Bundling of the Twelve Barriers

The ABMI-GoE procedure may results in multiple indices, namely up to twelve ones corresponding to the twelve barriers. One can easily notice that some of the barriers are closely related with others. Hence, for the following regression analyses, we decided to group the twelve barriers to the five by the nature of each barrier. We put together the quota barrier with the investment registration to define 'Market-Access barrier'. We combined the foreign exchange conversion and the repatriation barrier and defined the combined one as 'FX barrier'. Finally, we combined the credit balance with the overdraft barrier and the omnibus account barrier with the four settlement-related barriers to create 'Credit barrier' and 'Post-trading Infra barrier'. We left the tax barrier intact, as it is relatively unrelated to the rest of the twelve barriers. Barrier indices are computed for these five barrier categories.

Table 4 summarizes the relationships of the five aggregated barriers with their relationships with their underlying twelve barriers.

Table 4. Five Barrier Indices

Barrier Category	Underlying Barriers
Market Access	Quotas Investor Registration
Foreign Exchange	Foreign Exchange Controls-Conversion Foreign Exchange Controls-Repatriation
Credit	Cash controls-Credit balances Cash controls-Overdrafts
Tax	Taxes
Post-trading Infra	Omnibus Accounts Message Format Settlement Cycles Securities Numbering Additional Settlement aspects

III.1.3. Summary Statistics of the Barrier Indices

We report final barrier indices of the five barrier categories for each of 10 countries in Table 5. Overall, Hong Kong, Japan and Singapore emerged least restricted markets. Korea, Malaysia and Thailand constitute an intermediate group. China, Indonesia, the Philippines and Vietnam are found most restrictive markets.

Not surprisingly, the five indices are highly correlated, which are documented in Table 6. Relative to the Total Barrier Index, the Foreign Exchange Barrier Index scores the highest correlation of 0.97, while the Market Access the lowest of 0.64. Among the five indices, some variations exist despite the generally high correlation. The correlation coefficients of the Market Access Index with the Credit and the Tax are only 0.10 and 0.28 respectively. The correlation coefficients of the Post-trading Infra Index with the Credit Index and the Tax are also relatively low, computed as 0.56 and 0.58 respectively. The rest of 10 cross-correlation coefficients range from 0.67 to 0.90.

To compare the ABMI-GoE barrier indices with the IMF-AREAER based index, we included Chinn-Ito index in the last two rows of Table 5 and its correlation with the ABMI-GoE indices in Table 6, respectively. Chinn-Ito index is constructed to denote higher degree of capital controls by lower number. In other words, the index is to measure 'openness' of capital account. Naturally, correlations of Chinn-Ito index with the ABMI-GoE indices are computed negative. Overall large magnitudes of the correlations suggest that degree of various regulatory barriers tend to move together, which may not be surprising.

The process of constructing the ABMI-GoE barrier indices was conducted over the two years of 2008 and 2009. Hence, they reflect the market situation of the two years. The 'snapshot' characteristic can be a potentially critical caveat of the ABMI-GoE indices when implementing empirical analyses, since it is ideal to have time-series information on how barriers evolved over time. Chinn-Ito index, which provides time-series information of capital controls, illustrate that the problem may not be that serious. For the ten countries, Chinn-Ito

index remains rather constant between 2001 and 2008, implying that the degree of capital controls of the countries in the region did not change much during the period. Surely, there is a chance that regulations other than capital controls may have undergone larger changes. While acknowledging the possibility, in order to implement panel regression analyses, we will assume that the ABMI-GoE indices constructed in 2007 and 2008 represent cross-country differences among the ten countries for the past ten years.

Table 5. Five Barrier Indices

	CN	HK	ID	JP	KR	MY	PH	SG	TH	VN
Market Access	0.69	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.08	0.23
Foreign Exchange	0.75	0.00	0.56	0.00	0.13	0.13	0.50	0.00	0.25	0.56
Credit	0.36	0.00	0.73	0.00	0.27	0.27	0.64	0.00	0.64	0.36
Tax	0.44	0.00	0.44	0.17	0.39	0.00	0.72	0.11	0.28	0.33
Post-trading Efficiency	0.55	0.15	0.35	0.15	0.30	0.30	0.35	0.05	0.25	0.50
Total	2.80	0.15	2.08	0.32	1.16	0.70	2.21	0.16	1.49	1.99
Chinn-Ito Index (2008)	-1.13	2.50	1.16	2.50	1.16	1.17	0.11	2.50	-0.08	-1.13
Chinn-Ito Index (2001)	-1.13	2.50	1.16	2.50	-0.08	-0.08	0.11	2.50	-0.08	-1.13

Note: Chinn-Ito Index refers to the index of measuring capital account restrictions, constructed by Chinn-Ito based on the IMF-ARREAR data. Higher score implies less restriction. See Chinn-Ito (2007) for the details of the construction procedure. Numbers in the table is for the year of 2008 and obtained from Ito's homepage.

Table 6. Cross-Correlation among the Five Indices

	Market Access	FX	Credit	Tax	Post	Total
Market Access	1	0.67	0.10	0.28	0.72	0.64
Foreign Exchange		1	0.70	0.73	0.90	0.97
Credit			1	0.72	0.56	0.78
Tax				1	0.58	0.82
Post-trading Efficiency					1	0.90
Total						1
Chinn-Ito Index (2008)	-0.69	-0.85	-0.63	-0.59	-0.90	-0.88
Chinn-Ito Index (2001)	-0.61	-0.72	-0.57	-0.49	-0.88	-0.78

III.2. Other Data

In addition to the GoE index, our study requires data on international asset holdings on a bilateral basis. There are limited data sources available for cross-border financial transactions that satisfy this criterion. The most widely used data on financial asset holdings is the Coordinated Portfolio Investment Survey (CPIS) published by the International Monetary Fund (IMF). The IMF conducted the survey on international portfolio asset holdings for the first time in 1997, and annually since 2001. The first CPIS involved 20 economies and then the CPIS expanded to the participation of 67 source economies including several offshore and financial centers in 2001. In each case, the bilateral positions of asset holdings of the source countries in the destination countries/territories were reported.

The total portfolio asset holdings consist of three components: short-term debts, long- term debts and equities.

Problems of survey methods and under-reporting of assets by participating countries have been pointed out as shortcomings of the CPIS data (Lane and Milesi-Ferretti, 2003). In addition, the CPIS data may not perfectly fit the purpose of this study which is to identify the barriers that hinder cross-border portfolio investment by foreigners in the domestic equities and bonds in East Asian economies. Since the CPIS data is collected based on the nationality of the issuer, foreigners' holdings of bonds of a country include by international bonds as well as domestic bonds issued by the entities of that country while the data for foreign holdings of domestic bond holdings is needed for this study. Nevertheless, the CPIS survey presents a unique opportunity to examine bilateral equity and debt holdings for a wide set of participating countries. For our study, we use the CPIS data for eight years from 2001 to 2008.

The data for GDP and the real exchange rate are from the *International Financial Statistics* of the IMF. All the gravity variables including *Dist, Area, Border, Language* and *Colony* are obtained from the data set provided by Rose (2004).

As for the institutional variables, we use the KAOPEN index constructed by Chinn and Ito (2008) for the variable *Openness.* This index has been updated through 2008. A larger value for this index means higher degree of capital account openness. For the *Right* variable, we use the property rights index from the Heritage Foundation. The property rights index is one of the components of the Index of Economic Freedom. This index measures the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. A larger value for this variable means the recipient country provides better protection of property rights, making investment in the assets of the country more attractive.

For the barrier variables, we use five individual GoE Indices: post trading efficiency index, market access index, foreign exchange index, credit index and tax index. A higher value of each of these indices means existence of higher institutional barriers in that category. We also construct the total barrier index by adding up all of these five indices.

Table 7 presents the mean and the standard deviation of the data used in the regression analysis.

III.3. Regression Model

We estimate a gravity model of bilateral asset holdings to investigate whether there exists any relation between international capital flows and the institutional barriers measured by the GoE index.

Extending the gravity model by adding two important groups of control variables, economic variables and institutional variables, the final form of the gravity model of bilateral asset holdings can be expressed as follows:

Table 7. Summary Statistics

	Observations (N=5,280)	
	Mean	Std. Dev
Log of equity	3.06	3.73
Log of long term debt	2.72	3.08
Log GDP of destination country	24.05	2.37
Product of area size	23.82	4.04
Distance	8.50	0.63
Border	0.02	0.14
Colony	0.01	0.10
Common language	0.18	0.38
Right	54.00	26.86
Openness	0.65	1.38
Total_barrier	0.27	0.18
Post_efficiency	0.30	0.15
Market_access	0.11	0.21
FX	0.29	0.27
Credit	0.48	0.39
Tax	0.29	0.21
Access+FX	0.40	0.43
Credit+Tax	0.77	0.59
Real exchange rate	4.41	3.06
Deepness	14.02	3.70

$$In(x_{sdt}) = \beta_0 + \beta_1 \ln(GDP_{st}GDP_{dt}) + \beta_2 \ln(Area_s Area_d) + \beta_3 \ln(Dist_{sd})$$
$$+ \beta_4 Border_{sd} + \beta_5 Colony_{sd} + \beta_6 Language_{sd} + \beta_7 Right_{dt} + \beta_8 Corrupt_{dt} \quad (1)$$
$$+ \beta_9 \ln(RER_{dt}) + \beta_{10} Deepness_{dt} + \beta_{11} BarrierIndex_{dt} + \varepsilon_{sdt}$$

where x_{sdt} denotes holdings of country d assets by country s investors in year t, GDP_{dt} dand GDP_{st} denote the GDP of the source country and the GDP of the destination country, $Area$ is the size of the land area of the country and $Dist_{sd}$ is the distance between countries s and d. Equation (1) includes additional gravity variables. *Border* is a binary variable which is unity if countries s and d share a common land border. *Language* is a binary variable which is unity if s and d have a common language. *Colony* is a dummy variable which is unity if the destination country is a former colony of the source country. All of these variables are expected to have a positive coefficient.

Equation (1) also includes economic variables and institutional variables that affect the attractiveness of the country *d* asset. *Deepness* is a variable that measures the financial market deepness of the destination country. The deeper the financial market of the destination country is, the more attractive are the financial assets. In this paper, we use two different measures of financial market deepness: M2 over GDP and capital market size over GDP. *RER* is the real exchange rate of the recipient country against the U.S. dollar calculated as the price level of the destination country divided by the price level of the source country converted to the destination country currency unit by multiplying the nominal exchange rate. Thus, a higher value for *RER* means real appreciation and overvaluation of the currency of the recipient country. Since the value of a currency is expected to return to the equilibrium level in the long run, the overvalued currency is likely to depreciate in the future, making investment in the assets denominated in that currency less attractive. As a result, the coefficient of *RER* is expected to have a negative value. *Right* is a measure of the property right. A larger value for this variable means the recipient country has better protection of property rights, making investment in the assets of the country more attractive. *Corrupt* is the degree the destination country is free from corruption. Thus, the coefficients of both *Right* and *Corrupt* are expected to be positive.

Finally, *BarrierIndex* denotes various barrier indices used in this study. We use five individual GoE Index: post trading efficiency index, market access index, foreign exchange index, credit index and tax index. A higher value of each of these indices means existence of higher institutional barriers. We also construct total barrier index by adding up all of these five indices. Summary statistics of regression variables are reported in Table 7.

IV. Empirical Findings

IV.1. Diagnostic Examination

Before implementing panel regression analyses, we diagnostically examine the relationships between each of the five indices and cross border investment in ASEAN+3 countries. Foreign investment in equities and bonds for each of Asian countries is plotted against each of the five indices, for which a simple linear equation is estimated as well. The results are presented in Fig 1 to 5.

As for the cross border equity holdings, a negative relationship with each of the five barrier index is clear, indicating that the five barrier works as 'barrier' to cross border investment. Explanatory power of each barrier for the variation of equity holdings measured by R-squared is considerable, hovering between 0.2 and 0.3.

Qualitatively similar results are obtained for bond investment. Negative relationships are found for the five barrier indices. However, except the Market Access barrier, fitness of the linear curve is generally low, suggesting the results may not be robust controlling other determinants of cross-border bond investment flows.

Fig 1. Market Access Barrier and Portfolio Investment

Equity Investment

$y = -0.162x + 0.206$
$R^2 = 0.329$

Bond Investment

$y = -0.310x + 0.202$
$R^2 = 0.257$
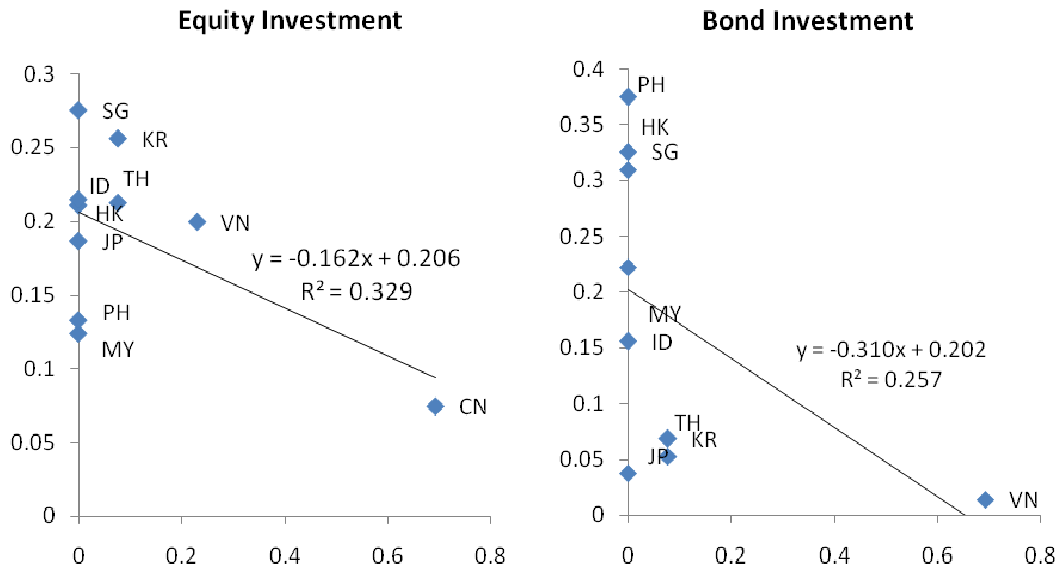
Fig 2. Foreign Exchange Barriers and Portfolio Investment

Equity Investment

$y = -0.121x + 0.223$
$R^2 = 0.306$

Bond Investment

$y = -0.105x + 0.200$
$R^2 = 0.045$
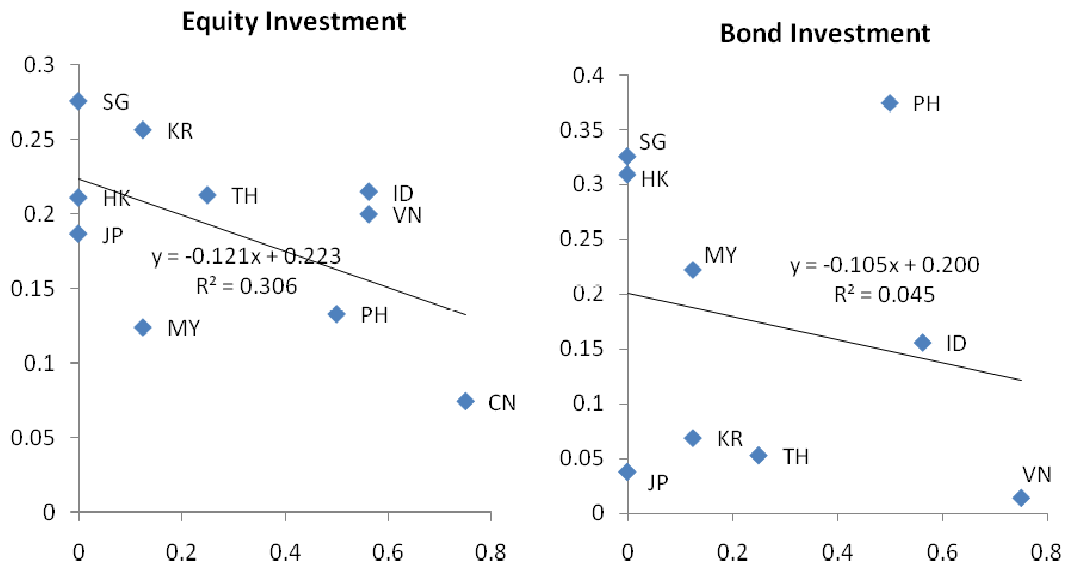
Fig 3. Credit/Cash Barriers and Portfolio Investment

Equity Investment

$y = -0.072x + 0.213$
$R^2 = 0.105$

Bond Investment

$y = -0.037x + 0.186$
$R^2 = 0.006$
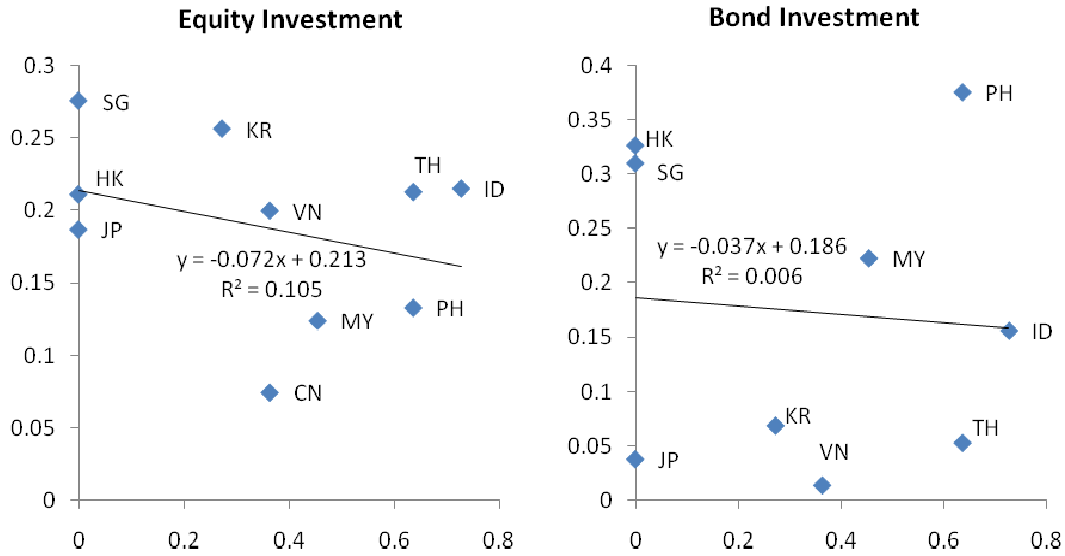
Fig 4. Tax Barriers and Portfolio Investment

Equity Investment

$y = -0.073x + 0.209$
$R^2 = 0.072$

Bond Investment

$y = -0.029x + 0.181$
$R^2 = 0.002$
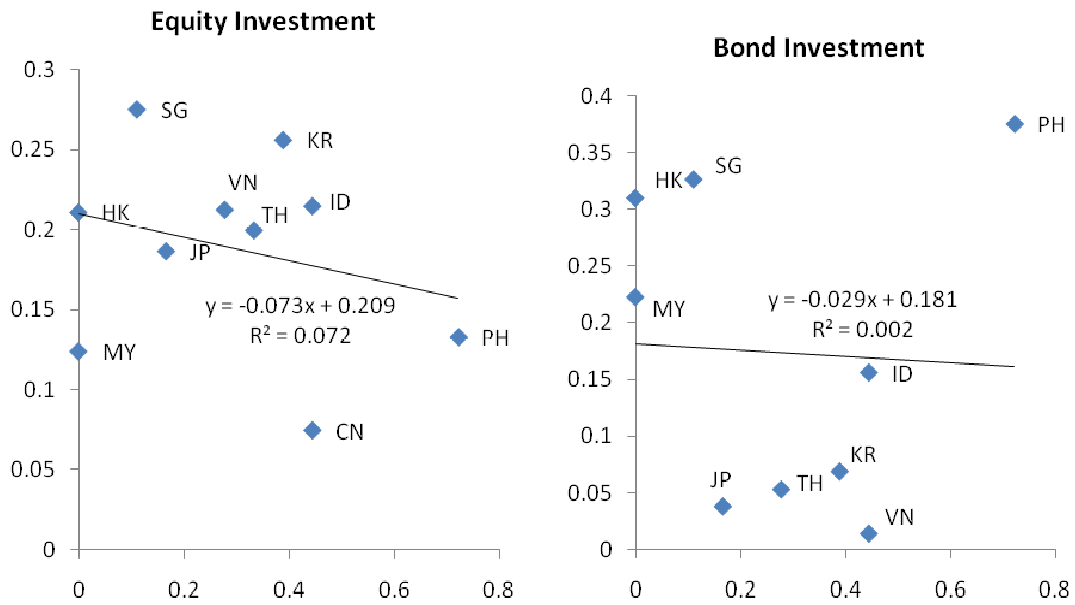
Fig 5. Post-trading Infra Barriers and Portfolio Investment

Equity Investment

Bont investment
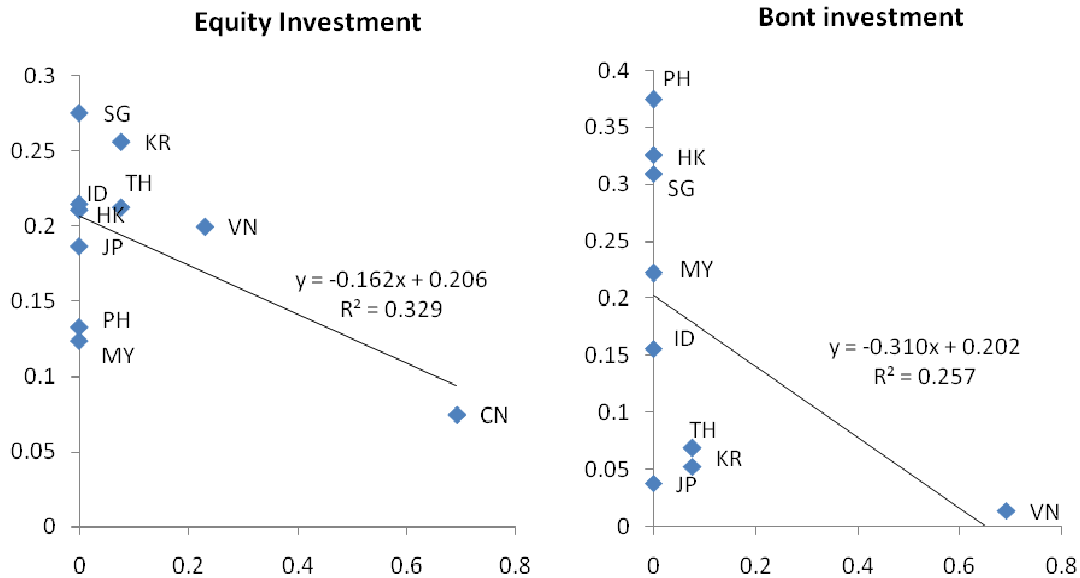
IV.2. Regression Results

Since we use a panel data to estimate equation (1), we need to choose between the fixed effect model and the random effect model. Based on the result from the Hausman test, the fixed effect model is chosen as the appropriate panel model.[8] Table 8 presents the estimation results of equation (1) for equity holdings. Note that the total barrier index which is the sum of the five individual barrier index is included as the variable that measures the degree of overall institutional barrier. Three slightly different versions of equation (1) are presented in table 8 depending on the exclusion of the variables *Openness* and *BarrierIndex*. Model 1 includes *Openness* alone and Model 2 *BarrierIndex*. Model 3 includes both *Openness* and *BarrierIndex* as explanatory variables.

The results suggest that in general the gravity model works well in explaining the volume of cross-border asset holdings for the ten East Asian countries. This confirms the empirical success of the financial gravity model in the previous literature. The model clearly shows that cross-border investment in the equities of the ten East Asian countries are positively related to the economic size of these countries and negatively related to the distance between the source country and the destination country. The distance between countries is regarded as a broad measure of information and transaction costs. For other gravity variables including border contiguity, common language, and colony, we find that sharing a border has a positive effect on cross-border equity holdings, which indicates that geographical proximity is an important factor in determining cross-border capital flows. In addition, sharing a common language has a positive effect on cross-border equity flows. Use of the same language allows investors to acquire information with ease. The coefficient of *Colony*, on the other

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[8] The Hausman test statistics are 776.8 and 399.6 for equity equation and bond equation respectively. Since the 95% critical value for the Chi-square distribution with 5 degrees of freedom is 11.07, the null hypothesis that the random error terms are uncorrelated with the explanatory variables is rejected with 95% significance level. Therefore, we choose the fixed effect model over the random effect model.

hand, is not significantly different from zero.

The result in table 8 also demonstrates that the signs of the coefficients of the economic and institutional variables are quite consistent with the prediction of the theory. The coefficient of *RER* is significantly negative implying that the more overvalued a country's currency is, the less likely that foreigners will hold the equities of that country. As for the institutional variable, *Right* is significantly positive, indicating that better protection of property rights tend to attract more foreign investment in the equities of a country. Table 8, however, shows mixed results regarding the effect of financial deepness on cross-border equity holdings. Financial deepness has a significantly positive effect on cross-border equity holdings in model 2. In model 1 and model 3 where *Openness* is included as an explanatory variable, the coefficient of *Deepness* becomes insignificant. One of the explanations for this result may be strong positive correlation between financial deepness and financial openness

The estimate for the coefficients of *Openness* and *BarrierIndex* are significant and their signs are consistent with the theoretical prediction. In particular, the estimate for the coefficient of the total barrier index, which is the sum of the five individual GoE barrier index and which can be interpreted as the overall measure of institutional barrier, is significantly negative, indicating that the institutional impediments as a whole hinders cross-border equity investment.

The estimation results for Model 3 where both of these variables are included as explanatory variables at the same time demonstrate that both of the variables have significant effects on cross-border equity holdings in East Asia. Such a result can be interpreted to imply that each of these variables embody different sets of institutional factors that could affect cross-border equity holdings. The SIC (Schwarz information criterion) provided at the end of each column also confirms that Model 3 is the best specification for equation (1). Consequently, we include both *Openness* and *BarrierIndex* in the subsequent regression analysis for equity holdings.

Our next task is to investigate if each of the five barrier areas actually undermines cross-border equity investment. Table 9 presents the effect of the individual GoE barrier index on cross-border equity holdings. Each equation in table 9 includes only one of the five GoE barrier indices. The results show that the coefficient estimates of all of the five individual barrier indices are significantly negative. That indicates that each one of the restriction on market access, the post trading inefficiency, the restriction on foreign exchange transactions, the restriction on credit extension and the taxation is capable of working as a barrier on equity investment in the ten East Asian countries.

Table 10 and 11 repeat the same analysis for cross-border bond holdings. Like equity holdings, three slightly different versions of equation (1) are presented in table 10: one with *Openness* only, one with *BarrierIndex* only and one with both *Openness* and *BarrierIndex*.

Table 10 demonstrates that the financial gravity model is capable of explaining cross-border bond holdings as well. The economic size of the source country and the destination country has a positive effect on cross-border bond holdings while the distance between them has a negative effect. In addition, sharing a common language significantly increases cross-border bond holdings. Other gravity variables including *Border* and C*olony*, however, do not have any significant effect on cross-border bond holdings. As for the economic variables, the estimate for the coefficient real exchange rate is significant and negative, which in line with the prediction of the theory. Financial deepness, however, does not have any significant effect on cross-border bond holdings and consequently is not included as the explanatory variable.

Table 8. Results from the Fixed Effect Panel Regression (Equity)

	Model 1	Model 2	Model 3
GDP	0.665	0.917	0.762
	(15.82)**	(21.68)**	(16.80)**
Area	0.158	0.045	0.164
	(4.99)**	(1.60)	(5.20)**
Dist	-1.367	-0.856	-1.323
	(-7.40)**	(-4.82)**	(-7.20)**
Border	0.695	0.614	0.632
	(1.89)*	(1.64)	(1.72)*
Colony	-0.417	-0.317	-0.426
	(-1.58)	(-1.20)	(-1.63)
Language	0.274	0.291	0.41
	(2.06)	(2.15)**	(3.05)**
Right	0.030	0.011	0.015
	(9.63)**	(2.61)**	(3.79)**
Corruption			
Openness	0.497		0.401
	(10.90)**		(8.25)**
Total_barrier		-4.380	-2.848
		(-8.89)**	(-5.49)**
RER	-0.083	0.011	-0.039
	(-3.88)**	(0.52)	(-1.72)*
Deepness	-0021	0.069	0.027
	(-1.13)	(3.40)**	(1.31)
Constant	-4.883	-10.002	-6.053
	(-2.50)**	(-5.19)**	(-3.10)**
Observations	2391	2416	2391
R-squared	0.84	0.83	0.84
SIC	9399.8	9569.8	9376.7

Note: * and ** denote that the coefficient is different from zero with 10% and 5% significance level.

Table 9. Evaluating the Effect of Individual Barrier (Equity)

	Efficiency	Access	FX	Credit	Tax
GDP	0.768	0.880	0.779	0.683	0.698
	(13.04)**	(12.22)**	(16.72)**	(16.20)**	(16.44)**
Area	0.117	0.066	0.129	0.165	0.161
	(3.26)**	(1.65)	(4.03)**	(5.23)**	(5.10)**
Dist	-1.327	-1.377	-1.323	-1.298	-1.363
	(-7.16)**	(-7.47)**	(-7.20)**	(-7.02)**	(-7.41)**
Border	0.720	0.761	0.686	0.619	0.571
	(1.96)*	(2.07)**	(2.08)**	(1.68)*	(1.55)
Colony	-0.371	-0.407	-0.407	-0.413	-0.460
	(-1.41)	(-1.55)	(-1.55)	(-1.57)	(-1.75)
Language	0.214	0.263	0.352	0.365	0.445
	(1.59)	(1.99)**	(2.65)**	(2.72)**	(3.24)**
Right	0.020	0.019	0.010	0.023	0.025
	(3.86)**	(4.28)**	(2.01)**	(6.69)**	(7.84)**
Openness	0.362	0.353	0.471	0.467	0.476
	(5.14)**	(5.89)**	(10.35)**	(10.14)**	(10.45)**
Post_efficiency	-2.226				
	(-2.49)**				
Market_access		-1.362			
		(-3.67)**			
FX			-1.815		
			(-5.52)**		
Credit				-0.757	
				(-4.06)**	
Tax					-1.026
					(-4.68)**
RER	-0.062	-0.112	-0.055	-0.026	-0.039
	(-2.71)**	(-4.91)**	(-2.52)**	(-1.01)	(-1.69)*
Deepness	-0.003	-0.018	0.019	0.008	0.007
	(-0.16)	(-0.93)	(0.93)	(0.40)	(0.36)
Constant	-5.456	-7.224	-5.521	-5.300	-5.204
	(-2.77)**	(-3.52)**	(-2.84)**	(-2.67)**	(-2.31)**
Observations	2391	2391	2391	2391	2391
R-squared	0.84	0.84	0.84	0.84	0.84

Note: * and ** denote that the coefficient is different from zero with 10% and 5% significance level.

Table 10. Results with the 2008 Data (Equity)

	Efficiency	Access	FX	Credit	Tax
GDP	0.768	1.173	0.948	0.943	0.993
	(6.38)**	(12.79)**	(10.94)**	(10.50)**	(11.38)**
Area	-0.012	-0.136	-0.191	-0.149	-0.201
	(-0.20)	(-3.13)**	(-1.58)	(-2.63)**	(-4.33)**
Distance	-1.129	-1.253	-0.851	-1.791	-0.853
	(-2.38)**	(-2.61)**	(-1.77)*	(-1.62)	(-1.74)*
Border	1.248	1.229	1.184	1.144	1.113
	(1.45)	(1.43)	(1.35)	(1.28)	(1.24)
Colony	0.286	0.201	0.229	0.120	0.052
	(0.40)	(0.28)	(0.32)	(0.16)	(0.07)
Language	0.015	0.131	0.148	0.311	0.362
	(0.04)	(0.37)	(0.41)	(0.85)	(0.96)
Post_Efficiency	-5.561				
	(-4.79)**				
Market_Access		-2.824			
		(-4.79)**			
FX			-2.069		
			(-3.53)**		
Credit				-1.046	
				(-2.31)**	
Tax					-0.991
					(-1.68)*
RER	-0.013	-0.114	-0.041	-0.015	-0.045
	(-0.23)	(-2.02)**	(-0.71)	(-0.23)	(-0.73)
Deepness	0.050	0.011	0.031	0.021	0.016
	(0.83)	(0.19)	(0.50)	(0.33)	(0.26)
Constant	-5.451	-8.900	-7.032	-6.217	-5.801
	(-1.08)	(-1.73)*	(-1.35)	(-1.18)	(-1.10)
Observations	311	311	311	311	311
R-squared	0.87	0.87	0.86	0.86	0.86

Note: * and ** denote that the coefficient is different from zero with 10% and 5% significance level.

Table 11. Results from the Fixed Effect Panel Regression (Bond)

	Model 1	Model 2	Model 3
GDP	0.430	0.559	0.491
	(9.15)**	(12.01)**	(9.78)**
Area	0.092	0.042	0.097
	(2.62)**	(1.36)	(2.78)**
Dist	-0.538	-0.268	-0.498
	(-2.63)**	(-1.38)	(-2.43)**
Border	-0.490	-0.540	-0.589
	(-1.23)	(-1.35)	(-1.47)*
Colony	0.178	0.183	0.181
	(0.64)	(0.66)	(0.65)
Language	0.294	0.330	0.391
	(1.90)*	(2.12)**	(2.48)**
Right	0.023	0.012	0.014
	(6.75)**	(2.85)**	(3.08)**
Openness	0.245		0.189
	(5.00)**		(3.67)**
Total_barrier		-2.482	-1.874
		(-4.72)**	(-3.38)**
RER	-0.094	-0.050	-0.064
	(-3.80)**	(-1.96)*	(-2.47)**
Constant	-6.442	-8.841	-6.994
	(-2.98)**	(-4.24)**	(-3.02)**
Observations	2180	2206	2180
R-squared	0.74	0.74	0.74
SIC	8793.7	8891.6	8789.6

Note: * and ** denote that the coefficient is different from zero with 10% and 5% significance level.

Table 12. Evaluating the Effect of Individual Barrier (Bond)

	Efficiency	Access	FX	Credit	Tax
GDP	0.727	0.880	0.779	0.683	0.698
	(11.93)**	(12.22)**	(16.72)**	(16.20)**	(16.44)**
Area	-0.020	0.066	0.129	0.165	0.161
	(-0.52)	(1.65)	(4.03)**	(5.23)**	(5.10)**
Distance	-0.468	-1.377	-1.323	-1.298	-1.363
	(-2.31)**	(-7.47)**	(-7.20)**	(-7.02)**	(-7.41)**
Border	-0.405	0.761	0.686	0.619	0.571
	(-1.03)	(2.07)**	(2.08)**	(1.68)*	(1.55)
Colony	0.315	-0.407	-0.407	-0.413	-0.460
	(1.14)	(-1.55)	(-1.55)	(-1.57)	(-1.75)
Language	0.184	0.263	0.352	0.365	0.445
	(1.20)	(1.99)**	(2.65)**	(2.72)**	(3.24)**
Right	0.020	0.019	0.010	0.023	0.025
	(3.86)**	(4.28)**	(2.01)**	(6.69)**	(7.84)**
Openness	0.362	0.353	0.471	0.467	0.476
	(5.14)**	(5.89)**	(10.35)**	(10.14)**	(10.45)**
Post_Efficiency	-2.226				
	(-2.49)**				
Market_Access		-1.362			
		(-3.67)**			
FX			-1.815		
			(-5.52)**		
Credit				-0.757	
				(-4.06)**	
Tax					-1.026
					(-4.68)**
RER	-0.062	-0.112	-0.055	-0.026	-0.039
	(-2.71)**	(-4.91)**	(-2.52)**	(-1.01)	(-1.69)*
Deepness	-0.003	-0.018	0.019	0.008	0.007
	(-0.16)	(-0.93)	(0.93)	(0.40)	(0.36)
Constant	-5.456	-7.224	-5.521	-5.300	-5.204
	(-2.77)**	(-3.52)**	(-2.84)**	(-2.67)**	(-2.31)**
Observations	2391	2391	2391	2391	2391
R-squared	0.84	0.84	0.84	0.84	0.84

Note: * and ** denote that the coefficient is different from zero with 10% and 5% significance level.

Table 13. Results with the 2008 Data (Bond)

	Efficiency	Access	FX	Credit	Tax
GDP	0.604	0.930	0.577	0.674	0.712
	(6.67)**	(10.52)**	(6.30)**	(6.80)**	(7.63)**
Area	0.067	-0.136	0.045	-0.163	-0.251
	(1.03)	(-1.99)**	(0.74)	(-2.60)**	(-4.95)**
Distance	-0.498	-0.862	-0.173	0.016	-0.007
	(-0.93)	(-1.71)*	(-0.33)*	(0.03)	(-0.01)*
Border	-0.912	-0.936	-1.033	-0.760	-0.422
	(-0.89)	(-0.97)	(-1.01)	(-0.70)	(-0.39)
Colony	-0.048	-0.108	-0.081	-0.256	-0.245
	(-0.07)	(-0.16)	(-0.11)	(-0.33)	(-0.32)
Language	-0.297	-0.216	-0.088	-0.062	-0.291
	(-0.73)	(-0.56)	(-0.22)	(-0.14)	(-0.67)
Post_Efficiency	-6.319				
	(-5.16)**				
Market_Access		-4.528			
		(-7.81)**			
FX			-2.442		
			(-3.63)**		
Credit				-0.383	
				(-0.78)	
Tax					1.177
					(1.23)
RER	-0.069	-0.216	-0.102	-0.089	-0.160
	(-1.08)	(-3.53)**	(-1.61)	(-1.24)	(-2.22)**
Deepness	-0.155	-0.214	-0.175	-0.168	-0.217
	(0.83)	(-3.07)	(-2.37)**	(-2.14)	(-2.69)**
Constant	-7.544	-13.100	-10.312	-9.666	-9.138
	(-1.35)	(-2.49)**	(-1.85)	(-1.64)	(-1.56)
Observations	290	290	290	290	290
R-squared	0.37	0.85	0.83	0.81	0.81

Note: * and ** denote that the coefficient is different from zero with 10% and 5% significance level.

Table 14. What Kinds of Barriers Count Most?

	Equity	Bond
GDP	0.840	1.321
	(13.17)**	(21.92)**
Area	0.102	-0.313
	(2.73)**	(-8.63)**
Dist	-1.325	-0.468
	(-7.17)**	(-2.54)**
Border	0.658	0.152
	(1.79)*	(0.41)
Colony	-0.418	0.354
	(-1.59)	(1.39)
Language	0.386	-0.168
	(2.78)**	(-1.17)
Right	0.012	
	(2.22)**	
Openness	0.392	0.227
	(5.56)**	(3.25)**
Post_efficiency	-0.025	0.764
	(-0.02)	(0.74)
Access+FX	-0.711	-4.266
	(-3.00)**	(-18.29)**
Credit+Tax	-0.307	1.422
	(-2.71)**	(13.54)**
RER	-0.005	-0.198
	(-1.82)*	(-11.90)**
Deepness	0.017	-
	(0.82)	-
Constant	-6.627	-13.358
	(-3.34)**	(-6.69)**
Observations	2391	2180
R-squared	0.86	0.79

Note: * and ** denote that the coefficient is different from zero with 10% and 5% significance level.

Regarding the institutional variables, the result is the same as that for equity holdings. Better protection of property right in the destination country has a positive effect on cross-border bond holdings. In addition, both the Chinn-Ito index and the GoE barrier index are capable of explaining cross-border bond holdings or lack of investment in the bonds of East Asian countries. Based on the SIC, we choose to include both of the Chinn-Ito index and the GoE barrier index in the model.

Overall, our estimation results for bond holdings do not conform to the prediction of economic theories as well as the results for equity holdings. One of the reasons can be found in the fact that the CPIS data includes foreign holdings of international bonds as well as domestic bonds. The variables included in the regression model are suitable to explain domestic bond holdings rather than international bond holdings. Since international issuance of equities is not active compared to international issuance of bonds, this is likely to be a problem in bond holdings. Another explanation can be found in the fact that some of the East Asian countries included in the sample do not have a well developed domestic bond market to attract foreign investors.

Table 11 investigates the effect of the individual barrier on cross-border bond holdings. The results are similar to the results for cross-border equity holdings: each of the five barriers has a significantly negative effect on cross-border bond investment in East Asian economies.

As mentioned in the previous chapter, the GoE barrier index is available only for the year 2009 since this index was constructed based on the survey conducted in 2009. As a result, we use the 2009 value for the individual barrier index for the whole period from 2001 to 2008 when we estimate the model with the panel data. That means we are assuming that there has been no change in the institutional barriers during this period. Although institutional factors tend not to change much over time, this assumption needs to be tested with the reality. However, we do not have data to test if the institutional barrier factors have been stable during the whole sample period. Instead, we estimate the model with the 2008 data only to see if the results from table 8, 9, 10 and 11 are valid.[9]

Table 12 and 13 demonstrate that our results are quite robust. Table 12 shows that every individual barrier has a significantly negative effect on cross-border equity holdings in East Asia. Table 13, however, shows that the estimation results with the 2008 data only are slightly different from those with the panel data. Three barriers including post trading efficiency, market access and foreign exchange still have significantly negative effect on cross-border bond holdings in East Asia. The other two barriers including credit and taxation, however, do not have any significant effects on bond holdings.

Having found that the barrier indices are capable of explaining cross-border equity investment in East Asian economies, the next question is which one of these barriers is more important than others. One of the ways to find an answer to this question is to include all of the five barrier indices in the regression model and see which one of these indices survive the competition. One of the problems with this approach is that these individual barrier indices are highly correlated among themselves. One of the ways to overcome this problem is to reduce the number of barrier indices by combining the barrier indices that are similar in economic nature. We created two barrier indices by combining the barrier indices on market access and foreign exchange transaction and the barrier indices on credit extension and taxation. The former represents the barrier on market access in the broad sense and the

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[9] Since the model does not have the panel structure, only source country dummies were included. In addition, the variables *Openness* and *Right* are no longer included as explanatory variables because unlike the panel data if these variables are included together with one of the barrier indicies, they no longer are statistically significant.

latter represents the cost barrier.

Table 14 presents the estimation result with these three individual barrier indices, post trading efficiency, market access in the broad sense, and cost included as the explanatory variables. The results show that market access and cost factors have significantly effects on cross-border equity holdings in East Asian economies while post trading efficiency does not have any significant effect. As for cross-border bond holdings, the result indicate that barriers to market access can significantly undermine cross-border bond investment in East Asian economies while post trading efficiency does not have any significant effect. Such results may be interpreted to imply that market access is the most important factor that determines cross-border portfolio investment.

In general, we can see that the estimation results for bonds do not look as good as those for equities. This could be ascribed to the data problem mentioned earlier. Yet, another explanation may be presented. For example, investment in Indonesian domestic bond by foreigners is heavily concentrated in the SBIs with very short term remaining maturities. SBIs are bonds issued by Bank Indonesia to control money supply. Sometimes, investment in Indonesian bonds by foreigners is concentrated in SBIs with remaining maturities with less than a week. If this is the case, cost factors such as credit and tax may be a real barrier.

In sum, competition among three areas of barriers reveal that market access appears to be the primary barrier on cross-border portfolio investment in many economies in East Asia Such a finding may imply that market access to domestic securities by foreigners in East Asia is still quite limited so that other institutional factors that affect post trading efficiency and transaction do not have much room to affect cross-border equity and bond holdings.

V. Conclusion

We examined statistical importance of a number of institutional factors, which have been alleged significant barriers by market investors and policy commentators, but never been put to empirical tests yet. Taking advantage of the novel data set constructed by the ABMI-GoE, we were able to empirically investigate explanatory power of such institutional factors as market access-hindering regulations, foreign exchange controls, credit controls, tax, and post trading efficiency. We found these alleged barriers indeed take significantly negative impacts on cross-border portfolio investment in Asian economies.

These results of the paper entail clear policy implications. To enhance cross-border portfolio investment, an economy should make its market more accessible by lowering access barriers, its financial instruments more financial attractive by addressing such cost factors as tax and restrictions on short-term credit provision, and reduce operational risks of cross-border transactions by improving post-trading infra.

One may criticize that these policy recommendations are limited as they do not speak to risks of financial integration, which were vividly highlighted by the recent global financial crisis. It is a persuasive argument that after the global crisis of 2008, the old policy consensus of advocating deregulation and market opening needs be adjusted to a balanced policy which pays due consideration to costs of opening as well as benefits. To formulate a policy framework to strike an optimizing balance, however, requires detailed information on costs and benefits that various policy tools incur. For example, when an economy considers raising taxes on foreigners' portfolio investment as a way of controlling capital inflows, information on the effectiveness of such a measure should be available in the first place. In this context, the contribution of this paper may be argued that it aimed to fill the currently

existing information gap on actual effectiveness of various policies on cross-border portfolio investment.

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Appendix: ABMI-GoE Barrier Index Questionnaire and Definitions of Each Component

(*Quoted from the "GoE Report")

A: Quotas
This refers to the existence of limits on the amount of investment that a non-resident investor (or non-resident investors as a whole) may make into a local market. The existence of a quota implies an application process and, potentially, a period of waiting for a quota to become available.

		Questions
A	1	Is there a quota on the involvement of individual foreign investors in the local market?
A	2	Is there a quota on the overall involvement of foreign investors in the local market?
A	3	Are foreign investors free to invest in any local bond issues?
A	4	Do foreign investors need more than one week to get approval?
A	5	Is the period from application to approval fixed?
A	6	Is the qualification to apply for a quota published?

B: Investor registration
This refers to the registration process that is sometimes needed for a non-resident investor to access the market for the first time. As with quotas, the existence of a registration requirement implies an application process and a period of waiting for approval. The requirement for investor registration may potentially cause problems such as:
- Onerous or unclear documentation requirements
- Length of time needed to gain approval
- Uncertainty of timing or outcome

		Questions
B	1	Is there a registration requirement for foreign investors to allow them to purchase local securities?
B	2	Is the requirement clearly defined and published? (i.e. a list of documents and a well-defined procedure)
B	3	Is the process subject to frequent requests for additional information?
B	4	If the application is in order, is the time to approve generally within 1 week?
B	5	Is renewal a straightforward process? (e.g. confirmation of no change)
B	6	Do foreign investors have to renew the registration after a certain period?
B	7	Is the period from application to approval fixed?

C: FX controls - conversion
This refers to restrictions or procedural rules on the convertibility of the local currency. FX restrictions on local investors are disregarded here. Typically, currency conversion requires evidence of an underlying securities trade. It may apply to the purchase of local currency for investment, or the sale of local currency ('repatriation') on sale or redemption of the investment, or on receipt of an income payment. In this area, market participants may potentially experience difficulties caused by:
- The need for pre-approval by a market authority (such as the central bank)
- Delays or uncertainty in the time taken to secure such approval
- Onerous documentation or reporting requirements, before or after conversion
- Lack of flexibility in the amount (e.g. if the conversion must be for the exact amount of the trade)

		Questions
C	1	Is there any restriction (by amount, purpose or method) on conversion of FCY to LCY by foreign investors?
C	2	Must FX be in support of an actual underlying trade?
C	3	Can a single FX trade be effected against a number of securities trades with the same settlement date?
C	4	Must the FX be for the exact amount? (i.e. no tolerance)

C	5	Must the local custodian have evidence of the securities trade before the FX trade is executed?
C	6	Must approval be obtained from a market authority (e.g. central bank) before the FX trade is executed?
C	7	If approval is required from a market authority, does this generally have a quick turnaround?
C	8	Is third-party FX allowed?
C	9	If third-party FX is allowed, is it generally practical and supported by custodians, given local regulations and settlement practices?
C	10	Can FX for securities investments be purchased offshore?
C	11	Are periodic reports to market authorities on FX transactions required? (e.g. from local custodians to central bank)

D: FX controls - repatriation

Refer to the FX conversion.

		Questions
D	1	Is there any restriction on sale of local securities by foreign investors (apart from those arising from FX controls)?
D	2	Is there any restriction on conversion of LCY to FCY by foreign investors?
D	3	When securities are sold, must the LCY be converted immediately to FCY?
D	4	Apart from regulatory controls, are there any practical difficulties in conversion of LCY to FCY? (e.g. lack of market liquidity, long approval times)
D	5	Can FCY, when obtained, be repatriated freely, at the investor's option?

E: Cash controls - credit balances

This refers to restrictions on non-residents holding credit balances in local currency or short term investments in money market instruments. Investors will not normally set out to hold cash balances. They will normally wish to be fully invested in the markets. However, cash balances may arise for a number of reasons essentially all due to timing differences:
- The maturity of one bond before another bond becomes available
- The receipt of a coupon payment
- The failed or delayed settlement of a purchase
- Different settlement dates on purchase and sale, e.g. sale of a government bond for T+1 and purchase of a corporate bond or equity for T+3.

Where cash credit balances are held, investors will normally wish to deposit the cash in an interest-bearing account or purchase money market instruments, to ensure that the cash is earning some income. In this area, market participants may potentially experience difficulties caused by:
- Rules setting a limit (either individually or in aggregate) on the local currency balances that may be held by non-resident investors.
- Restrictions on investment in money market instruments
- Restrictions on interest-bearing accounts

		Questions
E	1	Are there any restrictions on foreign investors (or their agents) holding LCY?
E	2	Can foreign investors hold LCY temporarily (e.g. overnight) pending settlement of a securities purchase?
E	3	Can foreign investors hold surplus LCY in an interest-bearing account?
E	4	Are there restrictions on foreign investors investing in money market instruments? (e.g. short-term T-bills, CDs)
E	5	Are special cash accounts required for foreign investors?
E	6	Are there any restrictions on the movement of LCY into, out of, and between accounts held by foreign investors?

F: Cash controls – overdrafts

This refers to restrictions or prohibitions on non-residents borrowing in local currency. The need for borrowing in local currency may arise in a number of ways:

- The failed or delayed settlement of a sale, where the proceeds are intended for use in a purchase for the same settlement date
- Different settlement dates on purchase and sale, e.g. purchase of a government bond for T+1 and sale of a corporate bond or equity for T+3

Most markets in ASEAN+3 impose some form of restriction on local currency borrowing by non-residents. This can make it more difficult and expensive to operate in a market, as prefunding may be required.

		Questions
F	1	Are there any restrictions on foreign investors borrowing LCY?
F	2	Are overdrafts allowed for overnight fails in securities settlement?
F	3	Are intra-day overdrafts allowed? (e.g. for back to back trades, using proceeds of sale to fund a purchase)
F	4	Is full pre-funding required in the local securities market by regulation?
F	5	Is pre-funding required as a matter of practicality, given settlement cut-off times, market practices etc?

H: Taxes

This refers to withholding taxes imposed on non-resident investors, whether in connection with income or capital gains. One obvious problem that may arise with tax is the rate of tax, which reduces the effective yield on the investment. Market consultations suggested that when a rate is higher than around 15-20%, it starts to have a significant yield effect on the attractiveness of local market bonds. However, the problems with taxes go much further than this and in fact yield was not the main issue mentioned by participants. The major concerns were:
- Unclear regulations, sometimes interpreted differently by different parties
- Difficulty and length of time to reclaim taxes paid (coupled with uncertainty of outcome)
- Difficulty of establishing qualification for tax treaty rates or exemptions
- Need to track historic trades in order to calculate the tax on a sale
- Market distortion that may occur through different classes of investors, or different classes of securities, being taxed at different rates.

		Questions
G	1	Are foreign investors subject to withholding tax on income?
G	2	Does the tax rate significantly reduce yields? (e.g. by 20% or more)
G	3	Is the tax on income and capital gains as applied to foreign investors simple and straightforward?
G	4	Are there many different tax rates for different classes of bonds or types of investors?
G	5	Is historical information needed in calculating the amount of tax to be withheld? (e.g. who has held the security and for how many days since the last income date)
G	6	Are the tax regulations clear and unambiguous?
G	7	Are there sometimes differences in interpretation between market authorities, or between intermediaries?
G	8	Is tax relief available at source (e.g. per double tax treaties)?
G	9	Is the procedure required to obtain tax relief at source clearly defined and published?
G	10	Is the procedure required to obtain tax relief at source regarded as complex or onerous?
G	11	Can tax generally be reclaimed after it has been deducted and paid?
G	12	Is the procedure required to reclaim tax clearly defined and published?
G	13	Is the procedure required to reclaim tax regarded as complex or onerous?
G	14	If the application is in order, is there a fixed timeframe to obtain tax reclaims?
G	15	In general, are foreign investors disadvantaged compared to local investors?
G	16	Are foreign investors subject to tax on capital gains?
G	17	Is the tax regulation published?
G	18	Can foreign investors know how much tax can be reclaimed beforehand?

I: Omnibus accounts
This refers to restrictions on the use of omnibus accounts for non-resident investors. These restrictions may be imposed at two levels: (1) on the accounts that local custodians hold at the local securities depository (or central bank system for bond settlement), and (2) on the accounts that local custodians operate in their own books for their non-resident customers. The latter case is a more serious restriction. For example, it may mean that, instead of operating a single account in the name of a global custodian, the local custodian must open and operate a number of individual 'segregated' accounts in the names of the global custodian's clients. This considerably increases the cost of custody. For tax reasons, a certain degree of segregation may be advisable, but custodians rarely wish to operate on a fully segregated basis.

		Questions
H	1	Are there any restrictions on the use of omnibus accounts for foreign investors?
H	2	Can local custodians operate omnibus accounts at the CSD for their foreign customers? (i.e. an account at the CSD covering a range of customers that does not indicate the identity of the customer)
H	3	Can global custodians / ICSDs operate omnibus accounts at the local custodian for their foreign customers? (i.e. an account at the local custodian covering a range of customers that does not indicate the identity of the customer)
H	4	Are all restrictions on omnibus accounts clearly defined and published?
H	5	Is there any documentation / certification required in connection with this process?

J: Settlement cycle
This refers to the number of days between trade date and settlement date. Most markets operate a standard settlement cycle. Typically this is T+1 for government bonds and T+2 or T+3 for corporate bonds (and equities). A short settlement cycle is better for local market participants, as it reduces counterparty risk. However, non-resident investors may find it difficult to settle on T+1 if they or their global custodian are located in a different time zone. For this reason, such investors look for the ability to negotiate a longer settlement period (T+2 or T+3 is the favoured cycle).

		Questions
I	1	Are cross-border transactions generally settled on T+2 / T+3?
I	2	Are there any other timing issues that may make it difficult for investors based overseas to operate? (e.g. local operating hours)

J: Message formats
This refers to the use (or rather, non-use) of international standards for securities messaging in a local market. The international standard message formats such as ISO20022 are regarded as necessary for enabling straight-through processing (STP) in securities post-trade processing. This involves not only settlement, but also pre-matching and corporate events messaging. If local, proprietary standards are used, there is a need for interface and translation either at the global custodian or local custodian, with associated costs of development and maintenance and the risk of error is greater.

		Questions
J	1	Does the local CSD use ISO 15022 / 20022 format for settlement messages?
J	2	Does the local CSD use ISO 15022 / 20022 format for other messages? (e.g. corporate events)
J	3	Do most local market participants (custodians, brokers) use ISO 15022 / 20022 format messages?

K: Securities numbering
This refers to the use (or rather, non-use) of international standards for securities numbering in a local market. The international standard is ISIN ('International Securities Identification Number'), in accordance with ISO 6166, which provides a globally unique identification to all securities.

		Questions
K	1	Is there an appointed issuer of ISIN codes for the local market?
K	2	Are ISIN codes now available for all local bonds, including existing issues?
K	3	Are ISIN codes available at the time that bonds are issued or auctioned?
K	4	Does the local CSD use ISIN codes for settlement messages?
K	5	Does the local CSD use ISIN codes for other messages? (e.g. corporate events)
K	6	Do most local market participants (custodians, brokers) use ISIN codes?

L: Additional settlement questions

Most markets in ASEAN+3 operate some form of matching systems but some do not, and this can create uncertainty. The absence of automated matching is likely to lead to increased settlement fails and make it more difficult to shorten the settlement cycle.

Trade Matching: Details of the trade are compared between the counterparties to ensure that there is no misunderstanding of the terms of the trade. This should of course be performed as soon as possible after the trade is executed, and in any event before the end of the business day. With automated trading systems (e.g. exchange systems or electronic OTC systems) matching is done at the time of trade, so there is no need for subsequent trade matching. However, many bond trades are done by telephone.

Pre-settlement matching: Details of the agreed trade are compared between the counterparties' settlement agents (e.g. local custodian and local broker) to ensure that all information needed for settlement is in place.

Dematerialization: Most bonds today are in dematerialised form, held in book-entry at the local securities depository or central bank system, or (in the case of most international bonds) on the books of the ICSDs. Some bonds are still in paper certificate form. The disadvantage of physical certificates are obvious - the need for manual examination, risk of loss, damage or forgery, and cost of storage. Typically, these remaining physical bonds are not of great interest to cross-border investors, and indeed are unlikely to be traded at all.

		Questions
L	1	Is there a trade matching system for the local bond market?
L	2	Is there a settlement pre-matching system for the local bond market?
L	3	Are all bonds dematerialized?
L	4	If there are physical bonds, are they all immobilized in the CSD?