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# Bond Investment Home Bias in East Asia*

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This paper takes a regional perspective to investigate the bond home bias phenomenon in East Asia, in other words, East Asian investors' preference on domestic bonds over the foreign bonds in neighboring countries. Based on the International Capital Asset Pricing Model (I-CAPM) and panel data estimation method, this research finds that East Asian economies exhibit strong home bias in bond investment. With regard to the driving factors behind the bond investment home bias, regional bond market integration, better regulatory quality, higher bank financing ratio and larger financial openness significantly reduce bond investment home bias. On the contrary, larger bond market capitalization appears to increase bond home bias.

JEL Classification: G11, G15
Keywords: East Asia, bond investment, home bias, I-CAPM, bond market integration

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# 1. INTRODUCTION

Global financial integration in recent years has offered investors the opportunity to build more diversified portfolio[1)] in the world financial markets (Lane and Milesi-Ferretti, 2003). International Capital Asset Pricing Model (I-CAPM) predicts that rational investors need to hold the world market portfolio to diversify the inherent risks in their assets and maximize risk-adjusted returns in the frictionless financial markets (Levy and Sarnat, 1970; Solnik, 1974). Because the profit and risk profile for assets differs across different geographical regions and the assets may exhibit low or negative correlations between each other, investors are advised to participate in the international financial markets to enjoy the benefits of portfolio diversification. As the old saying "Don't put all your eggs in one basket" suggests, foreign portfolio investment provides investors with diversification benefits. However, in practice, a large number of investors ignore the diversification benefit and have great preference for domestic assets over international ones. This phenomenon is named home bias phenomenon. It is universal worldwide.

Since French and Poterba (1991) noticed the home bias phenomenon in the first place, this well-known puzzle has been widely investigated by academics. They have come up with various explanations for the home bias phenomenon. Some researchers emphasize the importance of capital controls, exchange rate volatility, transaction and information costs in shaping this phenomenon. Larger exchange rate volatility and information cost discourage the investors to participate in the foreign financial markets (Ahearne *et al.*, 2004; Fidora *et al.*, 2006). Another branch of researchers focus on the impact of institutional quality. Their results are controversial. Nowadays, there is a growing interest in the role of financial integration in determining the home bias phenomenon. Theoretically speaking, integrated

[1)] Portfolio investment cover a wide range of assets, such as bonds, equities, funds, certificates of deposit and so on. In addition, Portfolio investment can also contain financial derivatives, such as futures, options, warrants and physical investments (commodities, real estate and lands).

financial markets provide the domestic investors better opportunities to tap the foreign securities with higher risk-adjusted returns and thus lower the home bias phenomenon. Sørensen *et al.* (2007) and Baele *et al.* (2007) have empirically testified the negative link between the financial market integration and equity home bias in the euro area.

This study aims to conduct a research on the bond home bias phenomenon in East Asia. This is because, different from other region, since 1997 Asian financial crisis, regional bond market integration has been the central pillar of financial cooperation in East Asia. East Asian governments and various working groups have put forward various initiatives to promote the regional bond markets under the framework of ASEAN+3, such as the Asian Bond Markets Initiative (ABMI), the Asian Bond Funds (ABFs), the Asian Bond Market Forum (ABMF). Financial market integration is the process where financial markets in the region become more correlated with each other, where the cross-border capital flows increase and the prices on identical financial assets from different countries tend to equalize. Both of the researches on the bond investment home bias phenomenon and bond market integration involve the regional cross-border capital flows. Thus, this study may give some implications to the undergoing bond market integration process in East Asia.

This study enriches our understanding of the evolution of the bond home bias phenomenon in East Asia. Lower bond home bias implies that investors are willing to diversify their portfolio investment in the international bond markets, which may enhance the efficient allocation of regional financial resources and risk sharing in the long run. The link between bond market integration and the bond investment home bias reveals the role of bond market integration in efficient allocation of funds and portfolio diversification. It is therefore important to examine the current state of bond home bias in East Asia, as well as the factors affecting the home bias phenomenon in the region. The findings of this study may guide policymakers on the policies dealing with the bond investment home bias phenomenon in East Asia. Furthermore, this study analyzes the bond

investment home bias phenomenon from a regional perspective and give some implications to the bond market integration in East Asia.

The research on the portfolio investment home bias phenomenon in East Asia[2)] is limited and the only few researches are concentrated on equity markets. This study tries to contribute to the previous literature in two ways. First, this analysis takes a regional perspective to explore the bond investment home bias phenomenon in East Asia, in other words, whether the East Asian investors have a great preference on domestic bonds over the regional ones. To my knowledge, there is no research analyzing the home bias in East Asia against neighboring economies. Second, this research investigates the impact of undergoing regional financial integration on the bond investment home bias phenomenon in East Asia.

The remainder of this paper is structured as follows. The second section reviews literature on the definition of the home bias phenomenon and the factors affecting the home bias phenomenon. The third section presents the methods to measure the bond investment home bias phenomenon and discusses the current situation of bond home bias in East Asia. The fourth section illustrates the key hypotheses, empirical specification to find out the determinants of bond investment home bias in East Asia and the data. The fifth section estimates the regression and illustrates the empirical results. The final section presents the conclusions and provides some policy implications.

## 2. LITERATURE REVIEW

The home bias puzzle, has attracted massive investigation since it was found. A plentiful literature attempts to find out the reasons that explain the portfolio investment home bias phenomenon (Chan *et al.*, 2005;

2) East Asia, defined here, contains eight East Asia economies (Japan, Hong Kong, Korea, Singapore, Malaysia, Thailand, Indonesia and the Philippines). Because the bond markets in Brunei Darussalam, Cambodia, Lao PDR, Myanmar and Viet Nam are planned to be created or in the early stages of development. They are excluded in the analysis. Moreover, the outward portfolio investment data of China are not available. China is also not included in the research.

Schoenmaker and Bosch, 2008; Obstfeld and Rogoff, 2001). This section illustrates the literature on the definition of the home bias phenomenon and the factors affecting this phenomenon.

### 2.1. Definition of the Home Bias Phenomenon

Home bias refers to the investors' propensity to invest in a large amount of domestic assets, ignoring the benefits of international diversification. It is one of the unsolved puzzles in international finance literature. This phenomenon was found by French and Poterba (1991) in the first place, whose research showed that investors in several advanced countries had a great preference for domestic assets. For example, investors in the United States directed 94% of their equity investment in domestic equity markets. However, the optimal weight on foreign assets was about 40% for US investors, far higher than the observed share (6%). Similarly, the domestic equities accounted for 98% of total equity investment from Japan and 82% from United Kingdom. The investors in the two countries also exhibited home bias phenomenon in equity investment.

This phenomenon is opposite to what the International Capital Asset Pricing Model (I-CAPM) predicts. The I-CAPM extends the concept of the Capital Asset Pricing Model (CAPM)[3] to international investment and suggests that rational investors should hold the world market portfolio to diversify the inherent risks in their assets and maximize risk-adjusted returns in the frictionless financial markets. The CAPM assumes that all rational investors have similar expectations about the mean and variance of future returns in the assets. Thus, the optimal weight of the domestic assets should be equal to relative size of domestic market in the world bond market capitalization.

Later, various researches confirm the findings of French and Poterba

[3] Capital Asset Pricing Model (CAPM) is developed by Sharp (1964) and Lintner (1965). The theory suggests that the expected returns of certain securities or a portfolio equal a risk-free interest rate plus a risk premium. If this expected return does not meet or less than the required return, the investment is not optimal.

(1991) and assert that the home bias phenomenon is not a unique case for investors from advanced economies but a universal one for the investors worldwide. This phenomenon can be detected in all kinds of portfolio investment. For example, Chan *et al.* (2005) conduct a comprehensive analysis on stock holdings of mutual funds from 26 developed and developing countries during the period from 1999 to 2000. Their results indicate that all the mutual funds invest disproportionately large capital in the domestic equity markets. García-Herrero and Vazquez (2007) collect a bank-level dataset on the asset investment of 38 international banks in 8 advanced countries during the period from 1995 to 2004. Their analysis reveals an evident home bias phenomenon in the 38 international banks. Despite the establishment of various subsidiaries abroad, the international banks heavily underestimate the gains from international diversification. Baele *et al.* (2007) assemble the data on foreign asset holdings covering 25 industrial countries. The home bias phenomenon is prevalent in all the sample countries and vary from 0.55 in Belgium to 0.98 in Greece. On average, the countries exhibit home bias of 0.7 to 0.8. Park and Mercado (2014) compare the equity investment home bias among different regional groups. According to their research, European countries have the lowest home bias in equity investment, followed by the United States and Japan. The home bias in Emerging Asia is generally higher than advanced economies. However, home bias has exhibited a downward trend in all the regions.

### 2.2. Factors Determining the Home Bias Phenomenon

Researchers have come up with a range of possible explanations for the home bias phenomenon. Early explanation for home bias is information and transaction costs. Coval and Moskowitz (1999) find out that the home bias phenomenon appears even among different districts within a certain country. Mutual fund managers exhibit a significant propensity for equities in their own geographic vicinities. Investors may be reluctant to carry out financial

transactions in the markets, where they are not familiar with the assets. Ahearne *et al.* (2004) conduct a research on home bias from the perspective of US investors from 1994 to 1997. They use the share of one country's equities that are publicly listed in the exchanges in the United States as an indirect measure of information cost. The results show that information cost is an important factor behind the home bias phenomenon, but the link between transaction costs and home bias is not robust. The studies by Domowitz *et al.* (2000) and Warnock (2002) confirm that transaction cost does not have a significant impact on the US investors' home bias phenomenon in portfolio investment. By contrast, Faruqee, Li, and Yan (2004) indicate that transactions costs, such as bilateral phone costs and distance, are the major determinants of equity home bias.

Other researches emphasize the role of currency risk in explaining the home bias phenomenon in portfolio investment. Based on the data from 40 advanced and emerging countries, the research by Fidora *et al.* (2006) focuses on the effect of exchange rate volatility on the home bias in both bond and equity investment. They find great support for their hypothesis that the reduction of real exchange rate volatility significantly decreases the equity home bias. Schoenmaker and Bosch (2008) confirm the importance of exchange rate risk since home bias have declined substantially amongst the euro area countries since the introduction of the euro in 1999, especially the bond home bias. However, some researchers claim that the currency risk is not an important reason for home bias (Sørensen *et al*., 2007). This is because many countries, which do not join in any currency unions, have also experienced a large decrease in equity home bias since late 1990s. In addition, real exchange rate volatility is more pronounced for bond home bias than equity home bias. Further, Vanpée *et al.* (2012) confirm the impact of foreign exchange rate risk on the portfolio home bias.

Another branch of studies highlight the importance of policy and institutional quality in determining the home bias phenomenon. Chan *et al.* (2005) use several indexes to measure the protection of investor rights: law index, accounting standard index, anti-director rights, the efficiency of

judicial system and the dummy variable to capture the type of legal system. They conduct a comprehensive analysis on the equity holdings of the mutual funds in 26 countries for the period from 1999 to 2000. They do not find a significant correlation between the investor protection and the home bias phenomenon. Park and Mercado (2014) analyze the link between regulatory quality and equity home bias in emerging Asia. Using a pooled ordinary least square (OLS) estimation, they find that better regulatory quality can significantly lower the equity home bias. Further, the study by Vanpée *et al.* (2012) suggests that country and corporate governance practices affect both the bond and equity home bias.

There are also researchers arguing that economic and financial market development affect the home bias phenomenon. Chan *et al.* (2005) investigate the equity holdings of mutual funds from 26 developing and developed countries. They construct four proxies to measure the economic and financial development: gross domestic product (GDP) per capita, the real growth rate of GDP, trade openness and inward foreign direct investment (FDI). The results show that financial market development plays an important role in lowering equity home bias, but the effect from the country's economic development seems insignificant. Vanpée *et al.* (2012) compare the bond and equity home bias in OECD countries from 2001 to 2010. Two variables are adopted as proxy measures of financial market development: market capitalization and domestic credit provided by the banks. The results reveal that the level of financial market development is more influential for bond home bias than equity home bias.

Nowadays, there is an increasing interest in the link between global (regional) financial integration and the home bias in portfolio investment. Theoretically speaking, financial market integration is assumed to reduce home bias in portfolio investment. In the integrated financial market, local investors are better informed of the assets in the foreign markets and have easy access to hold the foreign assets with higher risk-adjusted yields. Consequently, they are more willing to participate in the international financial markets. Baele *et al.* (2007) explore the home bias phenomenon of

25 advanced economies. Their results show financial market integration leads to a decrease in equity home bias. Park and Mercado (2014) investigate whether the financial integration in emerging Asia contributes to the decreasing equity home bias. Their estimates reveal that the financial integration in the region plays crucial role in lowering the equity home bias. Mondria and Wu (2010) also demonstrate the negative link between financial market integration and equity home bias.

A majority of the studies on the home bias phenomenon have focused on equity investment home bias. Moreover, most studies are conducted on the developed countries or from the perspective of the US investors. The main barrier for the research on bond investment home bias in emerging economies is the data limitation (Lewis, 1999). To my knowledge, the only study on the bond home bias in Asia is conducted by Borensztein and Loungani (2011). They investigate the bond home bias of Asian investors against other regional groups, such as, industrialized countries, Latin America and Eastern Europe. The latest research by Park and Mercado (2014) provides an example to analyze the home bias phenomenon from a regional perspective. They make a research on the equity investment home bias against the regional equity markets in East Asia. The results find a strong link between the East Asian financial integration and the equity investment home bias phenomenon and claim that the financial integration lowers the equity home bias. However, the empirical analysis on bond investment home bias against regional markets has never been done.

This research tries to fill the gap in the literature by investigating the bond investment home bias phenomenon in East Asia from a regional perspective. It contributes to the previous literature from two aspects. First, this study investigates the East Asian investors' bond investment home bias phenomenon from a regional perspective, in other word, whether the East Asian investors have a great preference on domestic bonds over the regional bonds. Second, the research investigates the impact of increasing regional financial integration on the bond investment home bias phenomenon in East Asia.

# 3. BOND INVESTMENT HOME BIAS IN EAST ASIA

## 3.1. Measuring Bond Investment Home Bias

Home bias reflects the extent to which investors overweight their investment in domestic markets. It is most commonly measured by calculating the difference between actual foreign portfolio weight and optimal foreign portfolio weight (Fidora *et al.*, 2006; Baele *et al.*, 2007; Sørensen *et al.*, 2007). The formula is given as below:

$$HB_{i,t} = 1 - \frac{AFP_{i,t}}{OFP_{i,t}}, \quad (1)$$

Where, $HB_{i,t}$ stands for home bias in portfolio investment. $AFP_{i,t}$ stands for the actual share of foreign portfolio investment. $OFP_{i,t}$ stands for the optimal share of foreign portfolio investment. If the actual share of foreign portfolio investment ($AFP_{i,t}$) is lower than the optimal share of foreign portfolio investment ($OFP_{i,t}$) in country *i*, country *i* is considered as home biased. In such case, $HB_{i,t}$ takes the value from 0 to 1. If the actual share of foreign portfolio investment ($AFP_{i,t}$) is equal to the optimal share of foreign portfolio investment ($OFP_{i,t}$), the portfolio investment in country *i* is fully diversified and the country does not exhibit home bias. There may be occasion that investors hold more foreign portfolio than the optimal foreign portfolio suggests. In such case, $HB_{i,t}$ takes negative value and the country is said to be foreign biased.

The share of actual foreign portfolio investment ($AFP_{i,t}$) is calculated as the foreign portfolio holdings ($FPA_{i,t}$) scaled by the total domestic and foreign portfolio holdings. The difference between the financial market capitalization ($FMC_{i,t}$) and foreign portfolio liabilities ($FPL_{i,t}$) is the domestic portfolio holdings. The following formula presents the calculation method for actual foreign portfolio holdings ($AFP_{i,t}$):

$$AFP_{i,t} = \frac{FPA_{i,t}}{FPA_{i,t} + (FMC_{i,t} - FPL_{i,t})}. \quad (2)$$

One of the main assumptions of I-CAPM is that the markets are fully integrated. Even though East Asian bond markets are not fully integrated, they are undergoing bond market integration process in a steady way. So following most of the previous studies (Warnock, 2002; Borensztein and Loungani, 2011; Baele *et al.*, 2007 and Sørensen *et al.*, 2007), this paper assumes I-CAPM is a good choice to estimate optimal foreign bond holdings. The I-CAPM provides the theoretical benchmark for optimal foreign portfolio holdings ($OFP_{i,t}$). According to the theory, rational investors should hold the world market portfolio to diversify the inherent risks in their assets and maximize risk-adjusted returns in the frictionless financial markets (Levy and Sarnat, 1970; Solnik, 1974). In other words, the optimal weight of the domestic assets should be equal to relative size of domestic market in the world market capitalization. For example, the bond market in the United States accounts for 40% of world bond market capitalization. It implies that the optimal allocation in the United States' bond market should be 40%.

### 3.2. Patterns of Bond Investment Home Bias in East Asia

Owing to the data limitation, this analysis investigates the bond investment home bias phenomenon in eight East Asian economies, namely, Hong Kong, Indonesia, Japan, Malaysia, Korea, the Philippines, Singapore and Thailand. Because the outward portfolio investment data of China are not available, China is excluded in the analysis. The data used to calculate bond investment home bias are collected from IMF's Coordinated Portfolio Investment Survey (CPIS), AsianBondsOnline and Bank for International Settlement. The data from CPIS are often considered as an ideal proxy measure of foreign bond investment. IMF began to conduct the survey on international portfolio asset holdings in 1997 and provided annual data since 2001. The sample in this analysis starts from 2001 and ends in 2013 on a yearly basis.

**Table 1 Actual Domestic and Foreign Bond Investment**

(unit: billions of USD)

| | | Hong Kong | Indo-nesia | Japan | Korea | Mala-ysia | Philip-pines | Singa-pore | Thai-land |
|---|---|---|---|---|---|---|---|---|---|
| 2001 | Domestic | 49.87 | 43.32 | 6,047.97 | 425.72 | 86.20 | 31.93 | 53.54 | 21.48 |
| | Foreign | 18.80 | 0.14 | 13.21 | 1.33 | 0.13 | 0.11 | 16.70 | 0.22 |
| 2002 | Domestic | 63.70 | 51.54 | 7,153.12 | 509.37 | 89.00 | 39.72 | 66.59 | 32.35 |
| | Foreign | 21.14 | 0.09 | 13.20 | 1.20 | 0.16 | 0.13 | 14.80 | 0.03 |
| 2003 | Domestic | 64.05 | 56.14 | 8,481.74 | 543.52 | 99.48 | 42.62 | 74.00 | 52.94 |
| | Foreign | 28.16 | 0.20 | 11.26 | 1.08 | 0.12 | 0.24 | 16.33 | 0.05 |
| 2004 | Domestic | 66.01 | 51.88 | 9,454.49 | 679.49 | 95.90 | 49.61 | 86.97 | 60.89 |
| | Foreign | 29.60 | 0.13 | 11.17 | 1.33 | 0.13 | 0.09 | 21.36 | 0.06 |
| 2005 | Domestic | 69.89 | 44.78 | 8,813.19 | 751.45 | 118.74 | 52.66 | 87.03 | 82.49 |
| | Foreign | 34.15 | 0.28 | 12.10 | 1.60 | 0.29 | 0.77 | 27.75 | 0.61 |
| 2006 | Domestic | 70.15 | 63.17 | 8,729.82 | 897.07 | 144.07 | 55.59 | 107.63 | 118.94 |
| | Foreign | 40.62 | 0.27 | 13.76 | 5.32 | 0.39 | 0.89 | 38.94 | 0.71 |
| 2007 | Domestic | 74.40 | 67.45 | 9,213.99 | 928.57 | 161.25 | 65.20 | 122.95 | 163.60 |
| | Foreign | 51.56 | 0.30 | 18.97 | 3.43 | 0.70 | 0.94 | 57.32 | 1.01 |
| 2008 | Domestic | 77.00 | 93.28 | 11,779.19 | 754.37 | 191.00 | 70.16 | 141.91 | 165.02 |
| | Foreign | 61.48 | 0.73 | 21.19 | 1.46 | 1.72 | 0.36 | 40.97 | 6.88 |
| 2009 | Domestic | 127.90 | 89.03 | 11,778.02 | 940.31 | 198.50 | 72.69 | 154.40 | 203.41 |
| | Foreign | 55.54 | 0.74 | 20.89 | 1.73 | 2.40 | 0.44 | 47.00 | 15.65 |
| 2010 | Domestic | 153.62 | 115.72 | 13,962.32 | 1,026.04 | 239.60 | 76.28 | 176.27 | 251.14 |
| | Foreign | 100.60 | 1.19 | 28.42 | 2.50 | 5.66 | 1.39 | 59.42 | 12.08 |
| 2011 | Domestic | 188.50 | 120.27 | 15,005.08 | 1,107.07 | 252.03 | 78.48 | 182.51 | 265.94 |
| | Foreign | 144.31 | 1.19 | 34.43 | 2.21 | 6.46 | 1.73 | 59.97 | 8.35 |
| 2012 | Domestic | 220.21 | 112.84 | 13,898.46 | 1,265.73 | 288.96 | 88.19 | 222.65 | 273.74 |
| | Foreign | 177.31 | 1.16 | 43.99 | 3.07 | 9.52 | 2.39 | 79.77 | 5.54 |
| 2013 | Domestic | 52.35 | 101.94 | 11,725.28 | 1,400.61 | 267.40 | 106.90 | 233.99 | 259.29 |
| | Foreign | 243.71 | 1.42 | 45.43 | 4.63 | 10.15 | 1.88 | 90.86 | 7.18 |

Source: Author's calculation based on the data from IMF's Coordinated Portfolio Investment Survey (CPIS) (accessed on Sep. 28th 2014).

Table 1 provides summary statistics on the pattern of domestic and foreign bond investment from the eight East Asian economies. In general, the domestic bond investment are much higher than the investment in foreign bond markets from 2001 to 2013, which confirms the survey of Yamaguchi (2014) that Asian investors have a great preference for domestic bonds over both the regional bonds and international bonds. Among the eight East Asian economies, Japan has the highest share of domestic bond holdings. Japan

**Table 2 Actual and Optimal Foreign Bond Investment Share**

(unit: percent)

| | | Hong Kong | Indo-nesia | Japan | Korea | Mala-ysia | Philip-pines | Singa-pore | Thai-land |
|---|---|---|---|---|---|---|---|---|---|
| 2001 | Actual | 27.37 | 0.32 | 0.22 | 0.31 | 0.15 | 0.34 | 23.78 | 1.00 |
| | Optimal | 99.09 | 99.38 | 14.32 | 93.82 | 98.68 | 99.43 | 99.07 | 99.65 |
| 2002 | Actual | 24.91 | 0.17 | 0.18 | 0.24 | 0.18 | 0.32 | 18.18 | 0.10 |
| | Optimal | 99.17 | 99.37 | 14.83 | 93.77 | 98.83 | 99.43 | 99.11 | 99.59 |
| 2003 | Actual | 30.54 | 0.35 | 0.13 | 0.20 | 0.13 | 0.57 | 18.08 | 0.10 |
| | Optimal | 99.27 | 99.40 | 14.56 | 94.39 | 98.86 | 99.45 | 99.15 | 99.44 |
| 2004 | Actual | 30.96 | 0.25 | 0.12 | 0.20 | 0.14 | 0.19 | 19.72 | 0.09 |
| | Optimal | 99.30 | 99.50 | 15.97 | 93.79 | 98.95 | 99.46 | 99.08 | 99.44 |
| 2005 | Actual | 32.83 | 0.62 | 0.14 | 0.21 | 0.24 | 1.45 | 24.18 | 0.73 |
| | Optimal | 99.23 | 99.52 | 19.89 | 92.99 | 98.75 | 99.39 | 99.00 | 99.23 |
| 2006 | Actual | 36.67 | 0.42 | 0.16 | 0.59 | 0.27 | 1.58 | 26.57 | 0.59 |
| | Optimal | 99.24 | 99.35 | 23.81 | 91.97 | 98.56 | 99.36 | 98.82 | 98.95 |
| 2007 | Actual | 40.93 | 0.45 | 0.21 | 0.37 | 0.43 | 1.42 | 31.80 | 0.61 |
| | Optimal | 99.28 | 99.34 | 26.88 | 92.16 | 98.47 | 99.34 | 98.74 | 98.72 |
| 2008 | Actual | 44.40 | 0.77 | 0.18 | 0.19 | 0.89 | 0.51 | 22.40 | 4.00 |
| | Optimal | 99.43 | 99.33 | 24.18 | 94.78 | 98.66 | 99.48 | 98.96 | 98.95 |
| 2009 | Actual | 30.28 | 0.83 | 0.18 | 0.18 | 1.19 | 0.60 | 23.34 | 7.15 |
| | Optimal | 99.16 | 99.30 | 27.40 | 93.68 | 98.63 | 99.46 | 98.90 | 98.75 |
| 2010 | Actual | 39.57 | 1.02 | 0.20 | 0.24 | 2.31 | 1.79 | 25.21 | 4.59 |
| | Optimal | 99.11 | 99.20 | 27.33 | 94.08 | 98.54 | 99.48 | 98.91 | 98.67 |
| 2011 | Actual | 43.36 | 0.98 | 0.23 | 0.20 | 2.50 | 2.16 | 24.73 | 3.04 |
| | Optimal | 99.00 | 99.23 | 27.62 | 94.19 | 98.56 | 99.49 | 98.89 | 98.71 |
| 2012 | Actual | 44.60 | 1.02 | 0.32 | 0.24 | 3.19 | 2.64 | 26.38 | 1.98 |
| | Optimal | 98.78 | 99.18 | 31.71 | 93.24 | 98.23 | 99.39 | 98.62 | 98.61 |
| 2013 | Actual | 82.32 | 1.37 | 0.39 | 0.33 | 3.66 | 1.73 | 27.97 | 2.69 |
| | Optimal | 98.37 | 99.21 | 37.23 | 91.89 | 98.13 | 99.31 | 98.30 | 98.54 |

Source: Author's calculation based on the data from IMF's Coordinated Portfolio Investment Survey (CPIS) (accessed on Sep. 28th 2014).

invested USD 11.73 trillion in domestic bond market, in contrast, the regional foreign bond investment merely was USD 45.43 billion in 2013. Similarly, in Korea, the domestic bond holdings amounted to USD 1.4 trillion, however, the regional foreign bond holdings was USD 4.63 billion in 2013. Furthermore, the domestic bond holdings still exhibit an upward trend in most of East Asian economies.

Table 2 offers a comparison between the actual and optimal share of foreign

**Table 3 General Development of Bond Home Bias in East Asia (against regional bonds)**

| | Hong Kong | Indonesia | Japan | Korea | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|---|---|---|
| 2001 | 0.724 | 0.997 | 0.985 | 0.997 | 0.999 | 0.997 | 0.760 | 0.990 |
| 2002 | 0.749 | 0.998 | 0.988 | 0.997 | 0.998 | 0.997 | 0.817 | 0.999 |
| 2003 | 0.692 | 0.996 | 0.991 | 0.998 | 0.999 | 0.994 | 0.818 | 0.999 |
| 2004 | 0.688 | 0.998 | 0.993 | 0.998 | 0.999 | 0.998 | 0.801 | 0.999 |
| 2005 | 0.669 | 0.994 | 0.993 | 0.998 | 0.998 | 0.985 | 0.756 | 0.993 |
| 2006 | 0.630 | 0.996 | 0.993 | 0.994 | 0.997 | 0.984 | 0.731 | 0.994 |
| 2007 | 0.588 | 0.995 | 0.992 | 0.996 | 0.996 | 0.986 | 0.678 | 0.994 |
| 2008 | 0.553 | 0.992 | 0.993 | 0.998 | 0.991 | 0.995 | 0.774 | 0.960 |
| 2009 | 0.695 | 0.992 | 0.994 | 0.998 | 0.988 | 0.994 | 0.764 | 0.928 |
| 2010 | 0.601 | 0.990 | 0.993 | 0.997 | 0.977 | 0.982 | 0.745 | 0.953 |
| 2011 | 0.562 | 0.990 | 0.992 | 0.998 | 0.975 | 0.978 | 0.750 | 0.969 |
| 2012 | 0.548 | 0.990 | 0.990 | 0.997 | 0.968 | 0.973 | 0.733 | 0.980 |
| 2013 | 0.163 | 0.986 | 0.990 | 0.996 | 0.963 | 0.983 | 0.715 | 0.973 |

Source: Author's calculation based on the data from IMF's Coordinated Portfolio Investment Survey, http://cpis.imf.org/ (accessed on Sep. 28th 2014).

bond investment for eight East Asian economies. The home bias is best illustrated in the table. The actual foreign bond investment are lower than the optimal foreign bond investment and the gaps are considerably large in all the eight East Asian economies. For example, if Japanese investors' foreign bond investment in the regional bonds is in line with the world bond market portfolio, this ratio should be 37.23%. But the actual ratio of foreign bond investment is 0.39%. Only Hong Kong and Singapore have made a considerable foreign investment in the region, accounting for 82.32% and 27.97% respectively, but still lower than the suggested share. The remaining economies have generally distributed less than 4% in the regional foreign bond markets.

The historical development of bond investment home bias in East Asia (against the region) is depicted in table 3. Despite the considerable expansion of the intra-regional bond investment in East Asia, the actual foreign holdings are still far lower than the optimal bond holdings warranted by the I-CAPM. The bond home bias phenomenon is ubiquitous in the East

Asian region. Most of the East Asian economies exhibit strong home bias in bond investment. The home bias indexes against regional markets approach one. Bond home bias in Hong Kong is the lowest, followed by Singapore. Furthermore, the bond home bias in Hong Kong and Singapore have witnessed a slight decrease trend during the period from 2001 to 2013, implying that investors from Hong Kong and Singapore have directed more and more bond investment into the regional bond markets during the past years. Whereas, the home bias in other economies remains nearly unchanged.

## 4. THE LINK BETWEEN HOME BIAS AND BOND MARKET INTEGRATION

Previous section shows that all of the East Asian economies exhibit high level of bond investment home bias. The bond home bias in Hong Kong and Singapore has shown a downward trend but to a very limited extent, while the home bias in other economies remain nearly unchanged. The aim of this section is to examine the impact of undergoing regional financial integration on the bond investment home bias phenomenon in East Asia. Key hypotheses, model specification and data used in the analysis will be discussed in this section.

### 4.1. Key Hypotheses

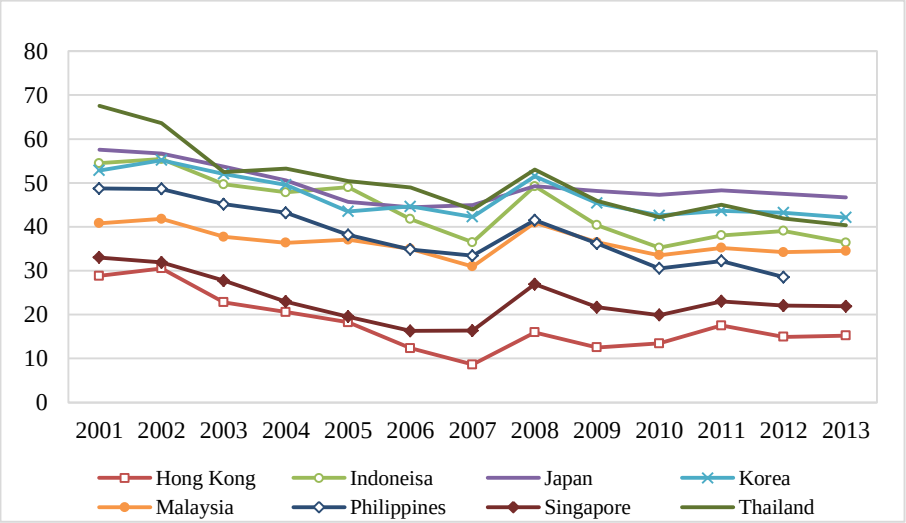
The key hypothesis behind this analysis is that more integrated East Asian bond market lowers the bond investment home bias within the region. Sørensen *et al.* (2007) and Park and Mercaco (2014), the degree of bond market integration is measured by the aggregate intra-regional foreign bond assets and liabilities scaled by GDP. In the integrated bond markets, investors are able to trade bonds at a lower cost and face less information asymmetry (Baele *et al.*, 2007). As a result, a negative relationship is

expected between the bond market integration and the home bias phenomenon. The research by Park and Mercado (2014) demonstrates that increasing financial integration in emerging Asia lowers the equity home bias.

### 4.2. Control Variables

First, this analysis takes bond market size and domestic credit provided by banking system as the proxy measures of financial market development. Bond market size is measured by the ratio of bond market capitalization to GDP. Larger market tends to be more stable and liquid (McCauley and Remolona, 2000). On one hand, domestic investors are less willing to diversify their assets in foreign markets, which implies a positive relationship between market size and home bias. On the other hand, market size has been demonstrated as an important factor attracting foreign investors' participation in the local bond market (Eichengreen and Luengnaruemitchai, 2006), which suggests a negative correlation between the bond market size and bond investment home bias. This empirical analysis reveals which effect dominates in the East Asian region. Bank financing is defined as the ratio of domestic credit provided by the banking sector to total domestic financing, which measures the importance of banking sector in the financial system. The domestic credits provided by banking system have exhibited a slight downward trend, replaced by equity and bond financing in the region (figure 1). In the country, the majority of whose capital is channelled through the banking sector, its financial system is thought to be less diversified. The bond market may be less developed and not attractive for the international investors, which implies a positive relationship between bank financing and home bias. However, foreign bond market may also become a substitute for domestic investors (Mann and Meade, 2002; Baele *et al.*, 2007), which may decrease the bond home bias. There is a tradeoff between the two effects. The research by Baele *et al.* (2007) has demonstrated the negative correlations between the bank financing and equity investment home bias.

**Figure 1 Bank Financing Ratio in East Asia**

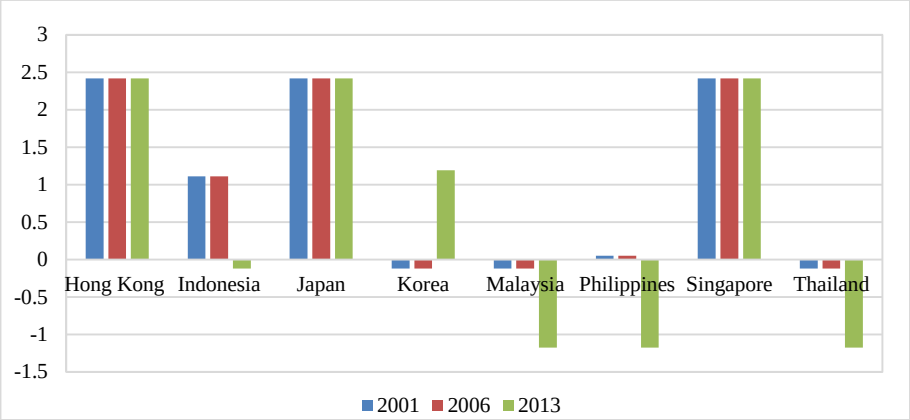



Source: Data are extracted from AsianBondsOnline (accessed on April 8th 2014).

Second, this analysis controls for exchange rate volatility, which is thought as another important factor affecting the portfolio investment home bias phenomenon. Volatile currency not only induces the bias of domestic investors toward the domestic bond market, but also decreases the willingness of foreign investors to participate in the local market. Thus, exchange rate volatility is expected to increase bond investment home bias. Fidora *et al.* (2006) provides empirical support for the positive effect of exchange rate volatility on portfolio home bias. Furthermore, his research suggests that exchange rate volatility is more influential for bond home bias than equity home bias. The results have been confirmed by Borensztein and Loungani (2011).

Third, this analysis controls for financial openness, measured by the Chinn-Ito index (KAOPEN). It is expected to affect home bias in a negative way. In the economies with low degree of financial openness, foreign participators are less willing to enter the local bond markets. In the meanwhile, domestic investors find it difficult to invest abroad. As a consequence, domestic investor will concentrate in the domestic market and

**Figure 2 Financial Openness in East Asia**

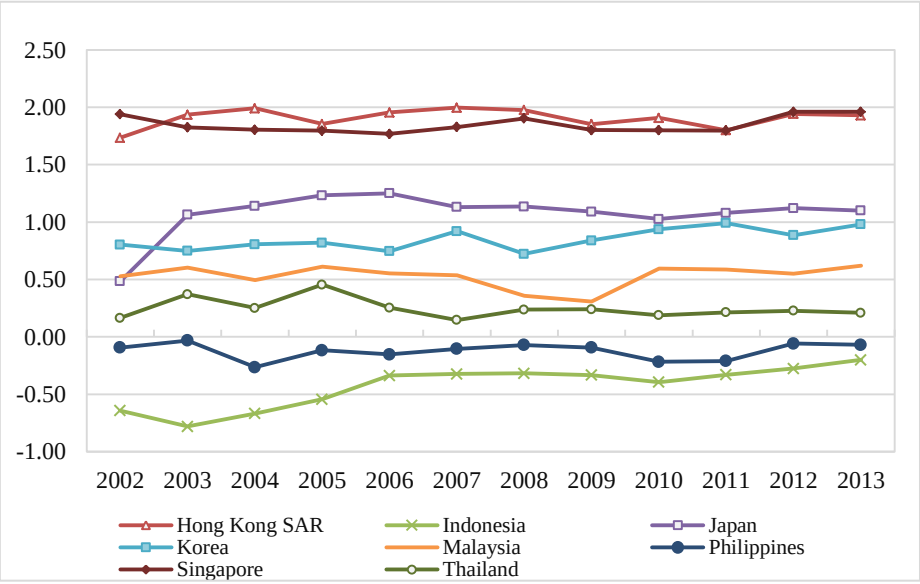



Source: Data are obtained from website: http://web.pdx.edu/~ito/Chinn-Ito_website.htm (accessed on April 8th 2014).

few foreign investors participate in the local bond market, which increase home bias in portfolio investment. The figure 2 shows the Chinn-Ito index (KAOPEN) for the eight East Asian economies. Hong Kong, Japan and Singapore have the most liberal financial markets in the world. Korea have steadily opened its financial market during the last decade. In contrast, Indonesia, Malaysia, the Philippines and Thailand have recovered some capital controls since the 2008 world financial crisis.

Fourth, this analysis uses regulatory quality index to test whether the bond home bias is correlated with regulatory quality of the economy. There is a significant cross-sectional variation in regulatory quality among the East Asian economies (figure 3). Hong Kong and Singapore have the best regulatory quality in East Asia, followed by Japan, Korea and Malaysia, while the Philippines and Indonesia have the lowest regulatory quality. Regulatory quality reflects the effectiveness of governments' regulations and policies to promote the development of private sectors. In this regard, better regulatory quality tends to enhance transparency and in turn decrease information asymmetry in the market. Existing literature argues that financial markets are developed better in countries with high regulatory quality. Investors may be reluctant to carry out financial transactions in the

**Figure 3 Regulatory Quality in East Asia**




Source: Data are obtained from World Bank's World Governance Indicator.

countries where the market is not transparent and their property cannot be well protected. Better regulatory quality may attract more foreign participants, but at the same time retain more domestic investors. There is also a tradeoff between the two effects.

### 4.3. Model Specification

This study follows the model specification of Ahearne *et al.* (2004) and Chan, Covrig and Ng (2005) to investigate the determinants of bond investment home bias in East Asia. Exchange rate volatility, domestic credit by banking system, regulatory quality and financial openness are chosen in the baseline estimation. Transaction and information costs are not included in the specification, assuming that the variable financial integration has captured the effect of them. Finally, six independent variables are included in the specification: exchange rate volatility, bond market integration, bond

market capitalization, regulatory quality, domestic credit provided by banking system and financial openness. The following specification is used for the cross-sectional regression analysis:

$$HB_{it} = \alpha_0 + \alpha_1 Int_{it} + \alpha_2 EX_{it} + \alpha_3 Size_{it} + \alpha_4 Regu_{it} + \alpha_5 Bank_{it} + \alpha_6 FO_{it} + \varepsilon_{it}. \quad (3)$$

Where, $HB_{it}$ represents the bond investment home bias in economy $i$, which is measured by the relative difference between the actual and optimal foreign bond investment weights, suggested by the I-CAPM. $Int_{it}$ represents the degree of East Asian bond market integration. $EX_{it}$ represents the yearly exchange rate volatility. $Size_{it}$ represents the bond market capitalization. $Bank_{it}$ refers to the domestic credit provided by the banking system. Finally, $FO_{it}$ stands for the financial openness in economy $i$. $\varepsilon_{it}$ refers to the error term.

### 4.4. Data Description

This analysis is conducted based on a panel dataset from eight economies, namely, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore and Thailand. The Asian Bond Market Initiative (ABMI) was introduced to develop the regional bond market in 2003 and thus this year is a turning point for regional bond market development in East Asia. So the sample starts in 2003 and ends in 2013 on a yearly basis. The data included in the study are obtained from various reliable sources. The data on home bias and the extent of East Asian bond market integration are calculated by the author. Bank financing and bond market capitalization data are collected from the AsianBondsOnline website and the BIS. Since the US dollar is the dominant intra-regional trading currency in East Asia and most of East Asian economies informally peg the national currencies to the US dollar, exchange rate volatility is calculated from the national currency exchange rate against the US dollar. The exchange rate data are obtained from IMF's International

Financial Statistics (IFS) database. The data on regulatory quality are obtained from the World Bank's world governance indicators. Finally, Chinn-Ito index (KAOPEN)[4] is used as the proxy measure for financial openness, which is based on the cross-border financial transactions regulations reported in the Annual Report on Exchange Arrangements and Exchange Restrictions by IMF. The larger value of KAOPEN signals more open financial environment (Chinn and Ito, 2008).

Table 4 presents the descriptive statistics on mean, standard variance and skewness of all explanatory variables included in the empirical analysis from 2003 to 2013. There is a large variation in the economic and financial development

**Table 4 Descriptive Statistics for Variables in the Analysis (2003-2013)**

| | Mean | Median | Max | Min | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| Home Bias | 0.912 | 0.990 | 0.999 | 0.163 | 0.150 | –2.107 | 8.180 |
| Integration | 0.111 | 0.039 | 0.974 | 0.004 | 0.160 | 2.731 | 12.267 |
| Market Size | 0.901 | 0.841 | 2.654 | 0.177 | 0.593 | 1.387 | 4.611 |
| Exchange Rate Volatility | 5.113 | 4.611 | 27.581 | 0.000 | 4.885 | 2.137 | 9.533 |
| Bank Financing | 36.437 | 37.050 | 59.100 | 8.620 | 11.481 | –0.432 | 2.630 |
| Financial Openness | 0.888 | 1.021 | 2.422 | –1.175 | 1.338 | –0.053 | 1.528 |
| Regulatory Quality | 0.680 | 0.542 | 1.996 | –0.781 | 0.795 | 0.273 | 1.948 |

Source: The data are analyzed by author using Eviews 6.0 and tabulated with Ms. Excel.

**Table 5 Correlation Matrix of Regression Variables**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| (1) Integration | 1 | - | - | - | - | - |
| (2) Exchange Rate Volatility | –0.142 | 1 | - | - | - | - |
| (3) Regulation Quality | 0.579 | 0.111 | 1 | - | - | - |
| (4) Market Size | 0.072 | 0.547 | 0.458 | 1 | - | - |
| (5) Financial Openness | 0.175 | –0.089 | 0.654 | 0.229 | 1 | - |
| (6) Bank Financing | –0.870 | 0.267 | –0.501 | 0.114 | –0.155 | 1 |

Source: The data are analyzed by author using Stata 10.0 and tabulated with Ms. Excel.

[4] The Chinn-Ito index is available at the website: http://web.pdx.edu/~ito/Chinn-Ito_website.htm (accessed on April 8th 2014).

among the East Asian economies. Table 5 shows the correlation matrix of regression variables. Bond market integration and bank financing are highly correlated with each other. To avoid multi-collinearity, this analysis does not include bond market integration and bank financing together in the same regression.

## 5. EMPIRICAL RESULTS

### 5.1. Presentation of Results

Panel data estimation method is used in the empirical analysis. In the first place, Hausman test is conducted to determine whether fixed-effect or random-effect model should be used for the panel data estimation. The results of Hausman test are shown in table 6. According to the results, random-effect model is preferable for the estimation. So random-effect GLS estimation is finally used in the analysis.

**Table 6 Results of Hausman Test**

| | Coefficient | | (b-B) Difference | Sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| | (b) Consistent | (B) Efficient | | |
| Integration | –0.5366 | –0.5545 | 0.0179 | 0.0201 |
| Regulation | –0.0017 | –0.0215 | 0.0198 | 0.0091 |
| Exchange Volatility | 0.0039 | –0.0041 | 0.0080 | 0.0032 |
| Size | 0.0377 | 0.4123 | –0.0035 | 0.0175 |
| Bank Financing | –0.0002 | –0.0001 | –0.0003 | 0.0000 |
| Financial Openness | 0.0005 | 0.0010 | –0.0005 | 0.0003 |

b = consistent under $H_0$ and $H_a$; obtained from xtreg

B = inconsistent under $H_a$, efficient under $H_0$; obtained from xtreg

Test $H_0$: difference in coefficients not systematic

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)=5.52

Prob >chi2 = 0.4788

Source: The data are analyzed using Stata 10.0, tabulated by author with Ms. Excel.

**Table 7 Regression Results of Bond Investment Home Bias**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Constant | 0.96*** (41.63) | 0.96*** (38.08) | 0.95*** (42.60) | 0.97*** (43.82) | 0.76*** (11.02) | 0.76*** (11.15) |
| Integration | –0.57*** (–15.25) | –0.57*** (–14.88) | –0.59*** (–15.33) | –0.58*** (–15.51) | | |
| Exchange Rate Volatility | 0.00 (0.19) | 0.00 (0.11) | 0.00 (0.10) | | 0.00 (0.05) | |
| Regulatory Quality | –0.04*** (–2.84) | –0.03** (–2.34) | | –0.04*** (–2.82) | –0.02 (–0.79) | –0.02 (–0.76) |
| Bond Market Size | 0.04** (2.44) | 0.04** (2.29) | 0.04** (2.16) | 0.05*** (2.65) | –0.04 (–1.33) | –0.04 (–1.47) |
| Bank Financing | fhjk | | | | –0.01*** (–3.67) | –0.01*** (–3.69) |
| Financial Openness | | –0.002 (–0.46) | –0.008 (–1.38) | –0.005 (–0.77) | –0.21* (–1.75) | –0.21* (–1.72) |
| Obs. | 88 | 88 | 88 | 88 | 88 | 87 |
| *R*-squared | 0.7268 | 0.7272 | 0.7256 | 0.7229 | 0.0513 | 0.0572 |

Note: *, ** and *** mean significance at 10%, 5% and 1% level respectively and *t*-values are in parentheses.
Source: The results are analyzed using Stata 10.0, tabulated by author with Ms. Excel.

The estimation results for bond investment home bias against regional bonds in East Asia are given in table 7. Six specifications are estimated to ensure the robustness of the results. Due to the high correlation between the bond market integration and bank financing, they are not included in one estimation simultaneously. Factors that are significantly negative correlated with bond investment home bias are regional bond market integration, regulatory quality, bank financing and financial openness. The only factor raising home bias is bond market capitalization. The effect from exchange rate volatility is not prominent.

### 5.2. Analysis of the Results

There is a robust negative relationship between the bond market integration and bond home bias, which supports the first hypothesis that the

undergoing regional bond market integration process lowers the bond investment home bias in East Asia. In the process of financial market integration, the capital controls are steadily removed, financial regulations become more harmonious and transaction costs are lessened, all of which help attract more foreign participation in the domestic bond market and meanwhile facilitate international portfolio diversification of domestic investors. The domestic investors have a growing appetite for the regional foreign bonds. As a consequence, the regional bond market integration significantly decreases the bond investment home bias in East Asia. The result is consistent with the findings of Chan *et al.* (2005), Baele *et al.* (2007) and Bekaert and Wang (2009) for advance countries.

Larger bond market capitalization significantly increases bond investment home bias against regional bonds. With sizable domestic bond market, the domestic investors are more reluctant to leave the domestic bond markets than the foreign investors are eager to enter. The estimates are consistent with the results of Baele *et al.* (2007) and Mercado (2013), both of which detect a significantly positive relationship between the equity market capitalization and home bias in equity investment. The coefficients are robust all through the five estimation scenarios. The share of bank financing has a robust negative correlation with bond home bias, which implies that less diversified financial markets prompt more local investors to access the foreign markets for portfolio diversification than the foreign investors to enter.

Regulatory quality is significantly negative correlated with bond investment home bias. The estimate appears robust under three estimations and is consistent with the researches by Bekaert and Wang (2009) and Jochem and Volz (2011), which have documented the negative relationship between the regulatory quality and equity investment home bias. Better regulatory quality help enhance market transparency and decrease the information asymmetry between domestic and foreign investors. On one hand, domestic investors may obtain more information on foreign bond markets and diversify their portfolio with foreign bonds. One the other hand,

more foreign investors are eager to enter their domestic bond market, which therefore lowers home bias in bond investment.

Finally, the analysis observes the opposite effect of financial openness on bond investment home bias, which is consistent with research by Chan, Covrig and Ng (2005). Higher financial openness lowers bond investment home bias in East Asia. Greater capital controls discourage the foreign investors from participating in the local bond markets and meanwhile prevent the domestic investor from diversifying their portfolio in the international markets. The analysis suggests that the exchange rate volatility plays virtually no role in the bond investment home bias phenomenon in East Asia.

## 6. CONCLUSION

The home bias phenomenon remains a puzzle in international finance, since it is opposite to what International Capital Asset Pricing Model (I-CAPM) predicts. Substantial studies have been conducted to investigate its cause and consequences. Different from the earlier literature, this research examines the bond investment home bias puzzle in East Asia from a regional perspective and discovers the driving factors behind this phenomenon. As the East Asian regional bond market integration has gained popularity since the 1997 Asian financial crisis and become a central pillar of financial cooperation in the region, this analysis takes the first step to understand the relationship between the bond home bias and bond market integration in East Asia. The findings of this study may guide policymakers on the policies dealing with bond investment home bias. Moreover, the study on the link between bond market integration and bond investment home bias reveals the role of bond market integration in efficient allocation of funds and portfolio diversification. The findings of this analysis are summarized as follows:

Although the intra-regional bond investment has expanded a lot during the last decades, East Asian investors still considerably underweight the regional bonds. The actual foreign holdings are far lower than the optimal bond

holdings. Most of East Asian economies exhibit strong home bias in bond investment, except for Hong Kong and Singapore. Furthermore, this study does not figure out an evident downward trend in the bond home bias of most East Asian economies. As for the determining factors of the bond investment home bias phenomenon in East Asia, the undergoing East Asian bond market integration is found to lower home bias in bond investment. Factors that significantly decrease bond investment home bias are regional bond market integration, regulatory quality, bank financing and financial openness. Interestingly, bond market capitalization has a significantly positive relationship with bond home bias in East Asia.

The findings of the analysis provide several policy implications. First, regional bond market integration plays a crucial role in lowering the bond investment home bias phenomenon in East Asia. On one hand, with less capital controls, minimum transaction costs and coordinating financial regulations, integrated regional bond market may encourage more domestic investors enter the foreign bond markets and meanwhile attract more foreign participation. It promotes the efficient allocation of regional capital and portfolio diversification. On the other hand, more intra-regional bond investment resulted from lower home bias may promote the bond market integration, creating a virtuous cycle. In this regard, bond market integration should continuously be a priority for regional financial corporation in East Asia.

Second, the negative correlation between financial openness and bond home bias highlights the importance of liberal investment environment in lowering the home bias. Since the 2008 world financial crisis, ASEAN-5 countries have started to recover some capital controls to withdraw the negative outside shocks. Seven years has passed since the 2008 world crisis, policymakers may consider to remove capital controls gradually again on the premise of maintaining the stability of national financial system.

Third, even though the results illustrate that large bond market capitalization boosts bond home bias against regional bonds, more government-directed policies can be adopted to maintain the growth of

regional bond market and meanwhile reduce bond investment home bias. For example, four stock exchanges in Southeast Asia (Malaysia, the Philippines, Singapore and Thailand) have launched a cross-border trading platform to encourage cross-border equity trading and reduce equity investment home bias. Another example is the Shanghai-Hong Kong Stock Connect, through which Hong Kong and international investors can purchase eligible shares in Shanghai Stock Exchange through their local brokers and meanwhile Chinese investors are able to purchase eligible Hong Kong-listed Stocks through their own local brokers as well. Policymakers may borrow such experiences in equity markets to maintain the growth of East Asian bond markets and meanwhile reduce the home bias phenomenon in bond investment.

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