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Financial Integration in Emerging Asia: Challenges and Prospects

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ADB Working Paper Series on Regional Economic Integration



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Cyn-Young Park and Jong-Wha Lee
No. 79 | May 2011

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Cyn-Young Park⁺ and Jong-Wha Lee⁺⁺

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Asian Development Bank

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Abstract

Using both quantity- and price-based measures of financial integration, this paper shows an increasing degree of financial openness and integration in emerging Asian markets. This paper also assesses the impact of a regional shock relative to a global shock on local equity and bond markets. The findings of this paper suggest that the region's equity markets are integrated more globally than regionally, although the degrees of both regional and global integration have increased significantly since the 1997/98 Asian financial crisis. However, emerging Asia's local currency bond markets remain generally segmented, being neither regionally nor globally integrated. A case can be made for the benefits of increased regional integration of financial markets. Financial integration at the regional level allows for the region's economies to benefit from allocation efficiency and risk diversification. The findings of this paper suggest that policymakers in the region must strike the right balance between maximizing the net benefits from regional and global financial openness, and minimizing the potential costs of financial contagion and crisis.

Keywords: emerging Asia, financial integration, cross-border financial flows, cross-border asset holdings, and convergence of asset returns

JEL Classification: F30, F36, G15, F41

1. Introduction

The 1997/98 Asian financial crisis motivated the drive toward regional financial integration in Asia. The rationale behind the drive was based on the region's shared understanding that the absence of regional capital markets and largely underdeveloped domestic financial systems were the major hurdle to channeling the region's savings into investments within emerging Asia. Meanwhile, excessive reliance on external funding seems to have exposed Asian financial systems to the vagaries of global investors and external financial shocks.

Unlike many other developing regions, emerging Asia is not short of savings. In fact, the region's aggregate savings tend to exceed its aggregate investment, judging by its persistent current account surplus. Ironically, the region's savings are invested outside the region, especially in more advanced economies. Recognizing the fundamental weaknesses behind this irony, Asian policymakers have undertaken various reforms to develop more efficient and stable financial systems since the 1997/98 crisis. They have also started a number of collective initiatives to strengthen regional financial markets and promote integration. These important initiatives include regional economic surveillance processes in the Association of Southeast Asian Nations (ASEAN) and ASEAN Plus Three (ASEAN+3), the Chiang Mai Initiative (CMI), the Asian Bond Markets Initiatives (ABMI), and the Asian Bond Fund Initiative.

Financial integration, in theory, offers many benefits, such as better consumption smoothing through international risk sharing, more efficient allocation of capital for investment, and enhanced macroeconomic and financial discipline. However, tighter financial linkages also generate a higher risk of cross-border financial contagion in practice.

Financial crises understandably raise caution against the risks of financial integration. The experience of the Asian economies during the global financial crisis of 2008/09 again highlighted that their financial markets were vulnerable to global financial turmoil. Although the extent of spillovers from the global crisis into Asian financial markets has been limited, reflecting the region's limited direct exposure to United States (US) subprime mortgages and other problem assets, the progress of financial sector development in the region suggests the next crisis will be different. As such, the recent global financial crisis presents a timely opportunity for the region to reassess its progress in financial sector development and to reconsider a next step for regional financial integration in emerging Asia.

A case can be made for the benefits of increased regional integration of financial markets. Financial integration at the regional level allows for the region's economies to benefit from allocation efficiency and risk diversification. These benefits may increase further if the integration is global. Global markets are deeper, more liquid, and more diversified. However, the limited degree of regional integration, when compared with global integration, may also help contain the risk of unfettered financial flows. Investors may be more familiar with regional financial assets, given similar economic structures and cultures, and find it easier to assess the related risks. At the same time, the

availability of regional financial products and services—for example through long-term local currency bond markets—could help improve the region's financial resilience to external shocks by channeling the region's own savings to meet its vast need for investment. Finally, regional integration and cooperation could facilitate deeper trade integration among geographically close economies, improve information sharing, and add peer pressure to promote financial development and stability. Empirical evidence, however, suggests that the region's financial integration lags substantially behind its trade and real economic integration (See Jang 2011, for a literature survey on financial integration in East Asia).

Integration of regional financial markets may not necessarily substitute for global integration. Rather, investing regionally can offer potentially different opportunities for higher risk-adjusted returns from investing globally. However, several studies suggest that the intraregional link among Asian financial markets is still low compared with global links (ADB 2008; Kim, Lee, and Shin 2006).

Assessing and monitoring the progress of financial market integration is important, as the degree of financial integration has implications for financial stability and an economy's capacity to absorb shocks. In this regard, it is important to understand the patterns of cross-border financial flows and the forces that have determined the degree of financial integration.

The purpose of this paper is to assess the progress of financial integration in Asia since the 1997/98 financial crisis, including during the 2008/09 global financial crisis, and to investigate the implications of recent developments in the regional and global financial landscape to Asian financial integration. Section 2 assesses financial integration trends in emerging Asia using both quantity- and price-based measures. The section will provide a comparative analysis of regional and global integration by the region's subgroupings to shed light on varying degrees of progress toward integration within the region. Section 3 analyzes the degree of financial integration and estimates the potential contagion effects from regional and global shocks in both regional equity and bond markets. Conclusions and policy implications follow in Section 4.

2. Financial Integration Trends in Asia

In this section, we assess the progress of financial integration in Asia since the 1990s. Both price and quantity measures can be used to assess the degree of financial integration. Typically, increased international financial flows, cross-border asset holdings, and convergence in asset prices suggest a higher degree of financial integration. Here we estimate the degrees of financial integration of Asian economies at both the regional and global levels.

2.1 The Pattern of Financial Flows

The wave of financial deregulation and capital account liberalization since the 1990s has led to a surge in capital flows to emerging market economies,¹ driven primarily by private capital from a variety of sources. Asia has been at the forefront of this trend, attracting more than 60% of total financial inflows to emerging market economies in the period leading up to the 1997/98 financial crisis. Although this share fell to 47% between 1997 and 1999, reflecting the crisis effect, it recovered quickly to surpass pre-crisis levels, reaching 62% between 2003 and 2007.

Figure 1 shows gross and net financial flows in and out of emerging market economies in Asia. Although many Asian economies still maintain (or have recently adopted) various types of controls on cross-border capital flows, their capital accounts now appear fairly open, as suggested by the high (and increasing) amount of financial flows in and out of emerging market economies in Asia.

Recent studies suggest that the composition of capital flows matters significantly in terms of financial volatility. Empirical evidence suggests short-term capital flows such as bank lending and portfolio investments tend to be more volatile than long-term flows such as foreign direct investment (FDI). Wei and Wu (2001), Wei and Ju (2006), Levchenko and Mauro (2007), and Tong and Wei (2009) also find that the economy is more vulnerable to a financial crisis if the composition of capital flows is skewed toward short-term flows that are more likely to be reversed than FDI in times of financial stress.

Emerging Asia has been able to attract relatively stable FDI inflows. Figures 2a, 2b, and 2c show that emerging Asian economies account for more than half of total FDI flows to emerging market economies. Portfolio investment flows to the region also increased sharply in the 2000s, taking up a lion's share of 79% of total portfolio investment flows to emerging market economies. Compared with other developing regions in the world, emerging Asia has reduced its reliance on other investment flows, reflecting the tighter prudential oversight on cross-border banking flows since the 1997/98 crisis.

However, the region-wide picture masks significant differences across individual economies. Figures 3a, 3b, and 3c illustrate the geographic distribution of financial flows in the form of FDI, portfolio investment, and other investment flows in emerging Asia. In line with the previous literature, FDI flows appear to be more resilient to financial stress compared with short-term flows. But the figure shows that the People's Republic of China (PRC) has been the dominant recipient of FDI flows in the region, receiving about 44% of the region's FDI flows in 2007–09. Newly industrialized economies (NIEs) also attract a substantial share of FDI flows to emerging Asia. Meanwhile, ASEAN-5's share

¹ Emerging market economies refers to emerging economies from Asia, Europe, and Latin America. Emerging Asia includes the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia, the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. Emerging Europe includes Belarus; Bulgaria; Czech Republic; Estonia; Hungary; Latvia; Lithuania; Moldova; Poland; Romania; Russian Federation; Slovak Republic; and Ukraine. Emerging Latin America includes Argentina; Brazil; Chile; Colombia; Dominican Republic; Ecuador; Guatemala; Mexico; Peru; and Venezuela.

of FDI flows lags behind, although a slight increase in the mid-2000s was detected.² The emergence of India as a recipient of FDI flows is also noticeable in recent years.

Portfolio investment flows are a source of volatility in emerging Asia, given the risk of a sudden stop and withdrawal. Portfolio investment inflows substantially increased from 2003 to 2007, averaging 2.1% of the region's gross domestic product (GDP) over this period, compared with 1.2% from 1995 to 2002. NIEs dominate the portfolio investment flows in and out of the region, reflecting the openness of their markets and their role as globalized financial centers.

Other investment flows, which consist mainly of short-term banking flows, have been persistently more volatile and tend to be more susceptible to external shocks and currency instability compared with FDI and portfolio investment flows. These short-term flows tend to reverse sharply in the wake of a crisis. During the recent global financial crisis, large outflows in other investment once again instigated currency and financial market instability in the region. Both the 1997/98 and 2008/09 crisis periods saw a sharp increase in other investment outflows, turning the net flows significantly negative. Meanwhile, NIEs comprised the majority of other investment flows in both directions.

2.2 The Pattern of Cross-Border Financial Asset Holdings

In line with increased international capital mobility, the share of international portfolio assets and liabilities held by Asian economies is increasing over time. The International Monetary Fund's (IMF) Coordinated Portfolio Investment Survey (CPIS) reports data on international portfolio asset holdings by providing a breakdown of a country's stock of portfolio investment assets by the issuer's country of residency.³ First conducted in 1998 with data from 1997, the CPIS have been available annually since 2001.

Using the CPIS, Figures 4 and 5 show the trend of the cross-border portfolio asset holdings of eight emerging Asian economies by region since 2001 in terms of US dollar value and percent of GDP, respectively.⁴ The value of emerging Asian economies' foreign portfolio asset holdings surged from \$324.8 billion in 2001 (2.6% of world total foreign portfolio assets) to \$1.3 trillion (3.6%) in 2009. When the value is scaled by GDP, the size of emerging Asia's foreign asset holdings increased from 19.2% of GDP in 2001 to 36.5% in 2009.

Hong Kong, China; the Republic of Korea; and Singapore are the three largest investors among these eight emerging Asian economies. Hong Kong, China held international portfolio assets of approximately \$810 billion, or 2.2% of world total international portfolio assets in 2009. Singapore held \$347 billion and the Republic of Korea held \$102 billion. On average, however, the eight emerging Asian economies held foreign portfolio assets

² ASEAN-5 comprises Indonesia, Malaysia, Philippines, Thailand, and Viet Nam.

³ Refer to the IMF website at <http://www.imf.org/external/np/sta/pi/cpis.htm> for details.

⁴ Data for the PRC; Taipei, China; and Viet Nam were not available.

worth \$165 billion in 2009, which is much lower than the \$1.0 trillion average for European economies.⁵

Figure 4 suggests that emerging Asia's foreign portfolio asset holdings became more balanced in terms of geographic distribution between 2001 and 2009. First, although advanced economies still account for a major share of emerging Asia's foreign portfolio assets, the share of advanced economies as a percentage of emerging Asia's total foreign assets has dropped significantly, pointing to improved diversification of foreign asset holdings. Second, emerging Asia's foreign portfolio assets are increasingly being invested in the region, with intraregional asset holdings rising from 15.0% of the region's total foreign asset holdings in 2001 to 27.6% in 2009. Third, the share of the rest of the world remained relatively stable in terms of investment destination—32.7% in 2001 and 32.1% in 2009.

Advanced economies, though still major destinations for emerging Asian portfolio investment, accounted for a much lower share of their foreign portfolio assets. The combined share of the US and Europe in eight emerging Asian economies' total foreign portfolio assets stood at 36.9% in 2009 compared with 46.2% in 2001.

If Asian financial markets have become more regionally integrated, then a higher share of financial assets should be traded within the region and held by regional investors. In fact, intraregional asset holdings of the eight emerging Asian economies have increased significantly since 2001.

If Japan is included, however, the picture is different. Japan holds very few Asian assets (2.4% of its total foreign assets in 2009) and invests heavily in the US (32.3% in 2009). Including Japan, Asian economies still hold a sizeable share of foreign assets in the form of US assets. However, only 10.4% of Asian foreign assets were held within the region in 2009, which is actually up from a mere 4.4% in 2001.

In terms of asset classification, the foreign portfolio investments of emerging Asian economies are increasingly skewed towards equities (Figure 5). In 2001, foreign debt securities exceeded foreign equities in emerging Asia's holdings of foreign portfolio assets. Over time, the growth rate of emerging Asia's foreign equity investments has accelerated, while investment in foreign debt securities made a relatively steady increase. In 2009, emerging Asia's foreign equity holdings were 33.3% more than their foreign debt security holdings.

Figure 6 shows the amount of foreign equities held by emerging Asia. The value of emerging Asian foreign equity holdings reached \$755.1 billion in 2009, up from \$128.8 billion in 2001. The share of equities in the region's foreign portfolio asset holdings has also been steadily on the rise, except for a rather sharp drop in 2008, reflecting the impact of the global financial crisis. Equities accounted for 57.1% of emerging Asia's total foreign portfolio assets in 2009, up from 39.6% in 2001.

⁵ The European economies reviewed include the 17 members of the euro zone plus the United Kingdom.

Emerging Asia's foreign equity holdings have also become more geographically dispersed. The share of the advanced economies (the US and Europe) in emerging Asia's foreign equity holdings fell sharply from 40.7% of the region's total foreign equity holdings in 2001 to 24.7% in 2009, while those of the region and the rest of the world have increased. In fact, emerging Asia's share of foreign equity holdings within the region rose to 33.0% in 2009 from 20.0% in 2001.

When including Japan, the situation is once again different. Japan's holding of Asian equities amounted to 8.1% of its total foreign assets in 2009, yet this share is much lower than the share of US equities in Japan's holding of foreign equities at 38.8%. Including Japan, Asian equities held within the region rose from 9.6% in 2001 to 22.0% in 2009.

As the region's foreign portfolio assets are increasingly held more in the form of equities rather than debt securities, the share of the region's foreign debt securities in total foreign portfolio assets has been on the decline. Nonetheless, the value of emerging Asian foreign debt securities reached \$566.6 billion in 2009, up from \$196.1 billion in 2001. Similar to the pattern of increased regional holdings in equities, emerging Asian holdings of regional debt securities have also increased significantly from 11.6% of their total foreign debt securities in 2001 to 20.5% in 2009 (Figure 7). However, debt securities of advanced economies (particularly the US and Europe) have maintained a fairly steady share of the region's foreign debt security holdings—from 49.8% of the region's total foreign equity holdings in 2001 to 53.2% in 2009. This reflects the fact that demand for safe assets continues to support demand for debt securities of advanced economies rather than emerging markets' debt securities.

The sharp increases in emerging Asia's international portfolio asset holdings suggest a greater degree of financial openness and integration—both regionally and globally. However, the pace of financial integration in emerging Asia still lags behind that in Europe. The international portfolio asset holdings of an average emerging Asian economy in 2009 amounted to 54.6% of its GDP, while the comparable figure for an average European country was 120.9%. Moreover, the share of emerging Asian portfolio assets (both equities and debt securities) in the total international portfolio asset holdings of emerging Asia in 2009 was much lower (27.6%) than that of European asset holdings of European economies (63.2%).

2.3 The Convergence of Equity Premia and Bond Returns

If financial markets are fully integrated, assets with similar risk characteristics should be priced similarly (after adjusting for risks). In other words, greater financial integration should be accompanied by the closer co-movement of prices.

The data used to measure the degree of co-movement of financial asset returns comprise benchmark stock price and bond total return indexes, both sourced from Bloomberg LP. Ten economies in emerging Asia are included: the PRC; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand. In addition, the US, Japan, and Europe are included as

advanced economies. For stock market returns, we calculate the weekly log differences of benchmark stock price indexes to get the continuously compounded weekly total returns from January 1993 to December 2010. For bond returns, the total return indexes of HSBC Asian local currency bond indexes are used. Bond returns, estimated by the weekly log differences of the total return indexes, are also continuously compounded. We used the weekly data for the returns (sampled on Wednesdays each week) covering the period from January 2001 to December 2010. Using weekly—as opposed to daily—data can help avoid the potential problem of nonsynchronous data.⁶

Table 1 reports simple averages of cross-country stock return correlations among different groups of regional and global economies over four different time periods. The results suggest Asian equity markets are becoming more integrated both regionally and globally, as the correlations of Asian equity markets within and beyond regional markets have increased. Intraregional correlations have generally increased more than the correlations of Asian markets with global markets such as the US and Europe. Especially noticeable is the regional markets' correlations with Japan. Regional integration with the Japanese market seems to have accelerated during the sample period from a very low level, while the correlations of emerging Asian markets with global markets have gradually increased from a relatively higher level.

The results also point to different patterns of integration among emerging Asian economies, arguably depending on the degree of their financial openness. First, ASEAN equity markets appear to be more correlated with regional markets than with the US and European markets. Second, more open economies such as Hong Kong, China; the Republic of Korea; and Singapore show greater stock market correlations with the US and European markets in 1996–2005 than with other regional equity markets. Third, the PRC market is by far the least correlated with other markets in the sample, although its correlations with both regional and global markets have increased significantly in 2006–2010. The PRC market is also more correlated with the regional markets than with the US and European markets. Fourth, the Indian market's correlations with both regional and global markets have also increased sharply. India's correlations with both regional and global markets started at very low levels in the early 1990s, but increased sharply until reaching levels in 2006–2010 that are similar or even higher than the regional and global correlations of other regional economies.

A substantial body of literature has documented that correlations among international stock returns are time-varying, with evidence pointing to an increase in correlations across international stock markets at times of stress and market downturns (King and Wadhwani 1990, Longin and Solnik 1995, Karolyi and Stulz 1996, and Forbes and Rigobon 2002). In our sample, two sub-periods (1996–2000 and 2006–2010) include one financial crisis each. There is a concern that the different extent of crisis effects on the co-movement of cross-border asset prices may influence the cross-country correlations upward. Indeed, the global crisis of 2008/09 appears to have exerted strong influence on both regional and global correlations of emerging Asian markets.

⁶ Burns, Engle, and Mezrich (1998), and Lo and MacKinlay (1990) study the effects of nonsynchronous trading across international markets in different time zones.

Notwithstanding the potentially upward biases of the correlations, the consistent increases in both regional and global correlations over the four sub-periods and across different groupings of regional and global economies suggest regional and global stock market integration.

Table 2 reports the cross-country correlations of local currency bond returns in 2001–2010. Correlations of Asian local currency bond returns increased over this decade, albeit from very low levels. The upward trend is somewhat similar to the one illustrated in the stock market correlations, suggesting the progress of regional bond market integration. The results also point to different patterns of integration across subgroups of emerging Asian economies similar to the case of stock market integration by subgroups of the regional economies. First, ASEAN bond markets show limited degrees of integration with the global markets. Second, the relatively more open and developed bond markets of NIEs such as Hong Kong, China; the Republic of Korea; and Singapore have greater bond market correlations with global markets than with other regional bond markets. Third, the PRC, India, and Philippine markets are the least correlated with other markets in the sample. Finally, the 2008/09 financial crisis seems to have boosted the correlations of ASEAN bond markets both regionally and globally.

Overall, the degree and pace of regional bond market integration lags behind the region's stock market integration both globally and regionally. However, the bond market correlations of Hong Kong, China and Singapore with the US bond market are noticeably higher than those of other bond markets in the region. This may reflect the close co-movement in their respective yield curves with the US' due to fact that these economies have anchored their currencies to the US dollar and therefore import US monetary policy.

Figures 8, 9, and 10 show the trend of convergence in cross-country stock and bond returns among different groupings of regional economies, as well as convergence among regional groupings for 10-year government bond yield spreads over US Treasury bond yields of the same tenor. For various subgroups of regional economies, the cross-market dispersions of weekly equity returns have become smaller over time, suggesting increasing regional market integration (Figure 8). The cross-market dispersion of weekly equity returns also declines when we include the global markets. For bond markets, the cross-market dispersions of weekly returns have narrowed modestly in the years leading up to the recent crisis. But the crisis saw an uptick in the dispersions. Especially when we consider the group including global bond markets, with the dispersion increasing sharply in recent months, perhaps reflecting the increased volatility in European bond markets (Figure 9). Similarly, Asian local currency bond yield spreads have converged (Figure 10). The convergence among emerging Asian bond markets is more visible in the cross-market dispersions of the local currency bond yield spreads. ASEAN bond market integration appears to have accelerated in the 2000s from a relatively low level, given the rapid convergence of bond yields among ASEAN bond markets. Convergence in both bond returns and yield spreads suggests NIE bond markets are generally more integrated among themselves compared with integration among ASEAN markets.

The figures illustrate an uptick in cross-market dispersions during the crisis periods, reflecting the crisis impact on individual markets and volatility. For stock markets, the

cross-market dispersions increased during both the 1997/98 Asian financial crisis and the 2008/2009 global financial crisis. For bond markets, while the data is available only from 2000, the recent global financial crisis also led to a peak.

3. Financial Integration and Risk of Contagion

While freer capital mobility is welfare-enhancing in theory, as it promotes efficient allocation of financial resources, a greater degree of financial integration may also facilitate the cross-border transmission of a financial shock. Past crises serve as testimony for the risk of such financial contagion. More worrisome is that financial instability may have an impact on the real economy as well, resulting in a substantial reduction in economic growth.

Financial integration in emerging Asia, either regionally or globally, may increase the potential for the financial transmission of external shocks. But direct evidence on this point is patchy.

If regional equity and bond markets are fully integrated with global markets and there is no country-specific disturbance, then stock prices and bond yields should only react to news common to all markets. We can then examine the extent of financial integration of individual equity and bond markets in emerging Asia with other markets within and beyond the region by analyzing the reaction of these markets to regional and global shocks.

3.1 Data Description

The data we used in this section is broadly identical to the data used in section 2.3. We used the same national stock price indexes and bond total return indexes to examine the degree of integration of a regional equity or bond market with the rest of the regional markets and the global markets.

For the analysis, we select a sample set of 10 emerging Asian economies for individual markets. MSCI All Country (AC) World Index was used as a proxy for the global stock market and Citigroup World Government Bond Index Returns for the global bond market.

Regional returns are computed as the weighted sum of individual country returns, excluding the country returns for which the analysis is conducted. We used GDP in US dollars as weights. For example, for the analysis of the PRC's integration with the regional market, the regional market is the aggregate of all other emerging Asian markets under review, including Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand.

We use the national stock market indexes to compute equity returns (see section 2.3). For bond markets, we use total return indexes for the benchmark bond index of each economy.

Equity and bond returns are in local currency with weekly frequency (measured by the log difference between the current week's Wednesday closing price and the previous week's Wednesday closing price).⁷

3.2 Empirical Methodology

We assume that an unexpected component of individual stock (bond) market returns can be decomposed into a purely local shock (an intercept or $\alpha_{c,t}$), a reaction to regional shock (proxied by an unexpected component of the regional market returns), and a reaction to global shock (proxied by an unexpected component of the global market returns). If the local stock (bond) markets are integrated regionally or globally, a regional or global shock will dominate in explaining the unexpected component of an individual market return. That is, country-specific sensitivity to a regional ($\beta_{c,t}^{EA}$) or a global shock ($\beta_{c,t}^G$) will increase. On the other hand, the relative importance of local market shocks ($\alpha_{c,t}$) will decrease.

We model that the returns of individual equity (bond) markets have an expected component and an unexpected one, $\varepsilon_{c,t}$. Following the approach taken by Lee and Park (2008), the expected returns are obtained by relating individual market returns to a constant term and to returns in the previous period. The error terms from this regression will constitute the unexpected component of the returns, or innovation.⁸ The unexpected component is then decomposed into a purely local shock ($\alpha_{c,t}$), a reaction to regional news ($\varepsilon_{EA,t}$), and a reaction to global news ($\varepsilon_{G,t}$):

$$\varepsilon_{c,t} = \alpha_{c,t} + \beta_{c,t}^{EA} \varepsilon_{EA,t} + \beta_{c,t}^G \varepsilon_{G,t} \quad (1)$$

where $\beta_{c,t}^{EA}$ and $\beta_{c,t}^G$ represent the country-specific sensitivity to a regional and a global market shock, respectively.

It is assumed that innovation in local returns that is not explained by common regional and global factors is entirely due to local news. If the individual equity (bond) market is fully integrated globally and there is no country- or region-specific disturbance, all innovation will be global. That is, an unexpected component of the returns of any individual market should react exclusively to common global news and, therefore, be

⁷ We used local currency returns here to focus on the asset market factors for integration, rather than the impact of exchange rate variations on the spillovers. Especially for bond markets, the magnitude of changes in weekly returns is generally small compared to the exchange rate fluctuations. While some studies on financial market integration examine the returns in US dollar terms, the impact of exchange rate fluctuations remains a source of debate. Although we do not report here due to space constraints, we conducted similar analysis for stock returns (in US dollar terms) and found the results to be broadly consistent.

⁸ The conditional variance of the error terms is assumed to follow a standard asymmetric GARCH (1,1) process.

reflected by an unexpected component of the global market returns. Hence, under the assumption of complete global integration, α and $\beta_{c,t}^{EA}$ are close to zero, and $\beta_{c,t}^G$ is close to 1.

In order to investigate the development of the country-specific betas over time, time-varying betas of individual markets have been calculated for 1994–2010. The time-varying betas are derived by running the above regression in an 18-month (78 weeks) rolling window. Subsequently, the data window is moved 1 week ahead and the equation is re-estimated until the last observation is reached.

We also calculated the variance ratios for individual market returns to estimate the proportion of total domestic equity (bond) market volatility explained by either regional or global shocks. The conditional variance is estimated by the GARCH (1,1) model for individual country-specific returns.

Two variance ratios were derived for each individual market. First, the regional variance ratio was computed as:

$$VR_{c,t}^{EA} = \frac{(\beta_{c,t}^{EA})^2 \sigma_{EA,t}^2}{\sigma_{c,t}^2} \quad (2)$$

Second, the global variance ratio was calculated as:

$$VR_{c,t}^G = \frac{(\beta_{c,t}^G)^2 \sigma_{G,t}^2}{\sigma_{c,t}^2} \quad (3)$$

The variance ratios are derived under the assumption that local shocks are neither correlated with the regional nor the global market returns, and that the regional and global shocks are uncorrelated. The sum of two variance ratios will be close to one if $\beta_{c,t}^{EA}$ is close to zero and $\beta_{c,t}^G$ is close to 1, and when the volatilities of individual, regional, and global market returns are of a similar magnitude.

3.3 Empirical Findings

The empirical results show that Asian equity markets have become increasingly integrated with global stock markets. But Asian local currency bond markets generally remain segmented from both regional and global bond markets. Evidence points to a strong global influence on Asian equity markets. Tighter global integration translates into increased spillovers from a global shock that impact the returns and volatilities of regional equities. In contrast to equity markets, there is limited impact from global and regional shocks on Asian local currency bond markets.

Figure 11 presents the regional stock market's α and β s—unweighted average of $\alpha_{c,t}$, $\beta_{c,t}^{EA}$, and $\beta_{c,t}^G$ —from individual stock markets. The figure shows fairly consistently higher

$\beta_{c,t}^G$ than $\beta_{c,t}^{EA}$ during the sample period. During the 1997/98 crisis, emerging Asian stock markets' sensitivity to a regional shock rose sharply, suggesting the effects of contagion from the region's financial instability. Asian stock markets have made progress in regional integration since the 1997/98 crisis, as suggested by regional markets' increased sensitivity to a regional shock compared with the pre-crisis period. Nevertheless, their global integration also appears to have accelerated in the mid-2000s, leading up to the global financial crisis of 2008/09. The latest crisis interrupted this trend of global integration, as suggested by a sharp drop in $\beta_{c,t}^G$. Reflecting the relative resilience of the region's equity markets compared with other parts of the world, their sensitivity to a global shock declined during the crisis. Interestingly, during the recent crisis period, $\beta_{c,t}^{EA}$ picks up again, suggesting regional markets' increased sensitivity to a regional shock. This may reflect the fact that during a period of market turbulence international investors with heightened risk aversion become more sensitive to regional news, which may differ from global developments, yet there is still the potential for spillover effects into other regional markets, given the similar risk factors shared by regional economies. However, the regional factor, as opposed to the global factor, seems to have lost its influence on regional equity markets in the past year or so as the financial crisis subsides.

Another important thing to note is that $\alpha_{c,t}$ remains very low, except for the peak just before the 1997/98 Asian financial crisis, suggesting the generally limited influence of purely local news in explaining local stock returns. Overall, the figure confirms the relatively large influence of a global shock on Asian equity markets as well as the increasingly significant spillover effects of a regional shock.

Figure 12 shows the proportion of total domestic equity market volatility explained by global and regional shocks for the period 1994–2010. In most emerging Asian markets, a global shock is a major driver behind domestic equity market volatility. Equity markets in Hong Kong, China; Singapore; and—to a more modest degree—the Republic of Korea are more sensitive to volatility spillovers from global markets than the region's other markets. Regional influence, though still smaller than global influence, is relatively strong in ASEAN stock markets, particularly in Indonesia, Malaysia, the Philippines, and Thailand. The PRC is the only exception where the impact of a regional shock is greater than that of a global shock. Overall, the evidence is supportive of the contention that the region's stock market integration is more global than regional.

Evidence of integration is much more muted for Asian local currency bond markets.

Figure 13 reports the average α and β from estimated individual $\alpha_{c,t}$ and $\beta_{c,t}$ for Asian local government bond returns. The local currency bond returns are considered to be globally integrated if the average $\alpha_{c,t}$ and $\beta_{c,t}^{EA}$ are close to zero, and $\beta_{c,t}^G$ is close to 1.

The relatively low $\beta_{c,t}^G$ suggests no clear sign of global integration for Asian local currency government bond returns in 2001–2010. The average α also remains very low, suggesting the generally limited influence of purely local news in explaining bond returns

that are similar to stock returns. On the other hand, $\beta_{c,t}^{EA}$ has increased significantly since the mid-2000s.

Again, in terms of volatility, global and regional shocks have limited influence on Asian local currency bond returns in individual markets. Figure 14 shows the proportions of the variance of local currency bond returns that can be explained by global and regional volatilities. Global volatility accounts for a relatively small share of total volatility of Asian local currency bond returns. The notable exceptions are Hong Kong, China and Singapore, whose monetary policies are closely tied to the US due to the dollar peg and managed float systems for their exchange rates. The bond markets of the Republic of Korea and Taipei, China show a modest degree of global integration. Regional factors have limited influence on Asian local currency bond returns as well, suggested by the generally small fractions of regional volatility in explaining total volatility across the region. These empirical results are generally consistent with other evidence pointing to local currency bond markets that are relatively segmented from regional and global bond markets.

3.4 Specification Problems

Some important caveats should be kept in mind when interpreting the empirical results. First, the econometric methodology is subject to major specification problems. We consider the simplest possible equations where changes in equity and bond returns are driven only by local, regional, and global news. However, there are many other factors—often fundamental economic and policy changes—that may require a proper structural model to capture causality, interdependence, and spillovers among these variables. The omission of such factors may lead to an overestimation of parameters in these parsimonious equations. Second, the empirical results depend on the selection of the most appropriate benchmark equity and bond returns. Here, we have employed the global indexes as a proxy for global markets. However, the question remains whether and to what extent such indexes can capture global factors. Third, the strong assumption of perfect market integration is unrealistic in that common factors cannot fully explain changes in local equity and bond returns. Earlier financial literature shows evidence of partial segmentation or time-varying integration. It is thus unlikely that reactions to local and global news can be completely separated and uncorrelated. Finally, multiple facets of financial market integration make it difficult for any single measure to provide a comprehensive assessment of market integration. The methodology applied in this paper is just one among many indicators and is unlikely to give a definite picture of market integration. Given the significant specification problems and technical difficulties, the empirical results should be interpreted with caution and taken as only illustrative.

4. Conclusions and Policy Implications

The degree of regional and global financial market integration is an important issue for Asian policymakers. On one hand, it implies the potential benefits of consumption smoothing and risk sharing across borders. On the other hand, it is an important element in assessing the potential costs from financial contagion. In this paper, we contribute to the existing literature on financial market integration in emerging Asia by (i) empirically investigating how the degree of integration has evolved over time in emerging Asian equity markets using both quantity- and price-based measures, and (ii) assessing the impact of a regional shock relative to a global shock on both local equity and bond markets in emerging Asia.

Overall, the empirical findings of this paper suggest that emerging Asian equity markets are increasingly integrated both regionally and globally, while emerging Asian local currency bond markets remain generally segmented from each other and global markets. First, both quantity- and price-based measures of integration suggest an increasing degree of financial openness and integration of emerging Asian markets both regionally and globally. Capital flows in and out of emerging Asia have consistently increased, while asset prices have converged over time. However, despite the progress of regional integration in emerging Asia, the region's equity markets remain more globally integrated than regionally integrated. Second, regional integration in emerging Asia still compares unfavorably with European regional integration, based on cross-border financial asset holdings and correlations of asset returns. While the region's equity markets are increasingly integrated both regionally and globally, the degrees of both regional and global financial integration in emerging Asia are less than in Europe. Finally, emerging Asian investors hold foreign equities increasingly more than foreign debt securities, suggesting relatively more integrated regional and global equity markets. The visible convergence of equity returns, as well as an increase in the cross-country correlations of emerging Asian equity markets, suggests growing regional and global integration of the region's equity markets. However, emerging Asian local currency bond markets generally remain segmented from both regional and global markets.

Consistent with earlier studies on Asian financial integration, global news remains an important driver for Asian equity market returns and volatilities. The findings suggest that the degree of intra-regional integration, though increasing, continues to lag behind that of the region's global integration. The correlations of the region's equity markets with other regional and global markets have increased substantially over time. However, the extent to which an individual country market responds to a regional shock remains rather limited as opposed to its sensitivity to a global shock.

Findings from both the correlations and spillover intensities suggest that the impact of regional and global shocks tend to be higher during times of market distress. Interestingly, the region's sensitivity to a regional shock increases during crisis periods, reflecting international investors' heightened risk aversion to emerging market assets and concerns about the possibility of financial contagion. While normality returns in the aftermath of the crisis, the trend of regional integration can resume, or even accelerate, in the post-crisis period, reflecting renewed policy efforts.

On the other hand, the region's local currency bond markets remain generally unaffected by the returns and volatility movements of either regional or global bond markets. The limited integration of the region's local currency bond markets may reflect their relatively low degree of development. In emerging Asia, where financial systems have been traditionally bank-dominated, the financial infrastructure and legal framework for debt securities have struggled to develop. Auditing and accounting standards remain sub-par in many emerging market economies, with low levels of transparency and weak governance further hampering the development of local currency bond markets. For many emerging Asian economies, local currency bond markets remain much smaller than domestic equity markets. In general, local currency bond markets in emerging Asia lack liquidity and remain largely fragmented.

Earlier studies noted some important hurdles to financial integration. Kim, Lee, and Shin (2006) first noted emerging Asia lacks an anchor country or financial centers that can mediate financial transactions within the region. Although Hong Kong, China and Singapore have acted as two important regional financial centers in East Asia, they have served the clients of major international capital markets rather than local capital markets, helping the region's financial markets to become more globally integrated rather than integrating regionally. Second, Eichengreen and Park (2005), by looking specifically at cross-border bank lending markets in both East Asia and Europe, suggest that a lower level of capital market liberalization and the underdevelopment of financial markets and institutions, particularly in potential lending countries, may have contributed to relatively lower regional integration in East Asia compared with Europe. Third, emerging Asia may need further financial and monetary cooperation with respect to exchange rate stabilization among regional currencies in order to enhance regional market integration. Chelley-Steeley and Steeley (1999) present evidence that the abolition of exchange controls helped equity markets to become more closely integrated in Europe. Danthine et al. (2000) and Fratzscher (2001) also provide evidence that the introduction of the euro has increased the degree of financial integration in the euro zone.

Understanding the degree and dynamics of financial integration in emerging Asia is important for shaping the region's policies, not only for economic growth and development, but also for financial stability. As markets become increasingly integrated regionally and globally, any convulsion in global financial markets and significant developments in major industrial economies will likely influence the region's equity and bond markets. The results also suggest that the degree of market co-movements increase during stressful times.

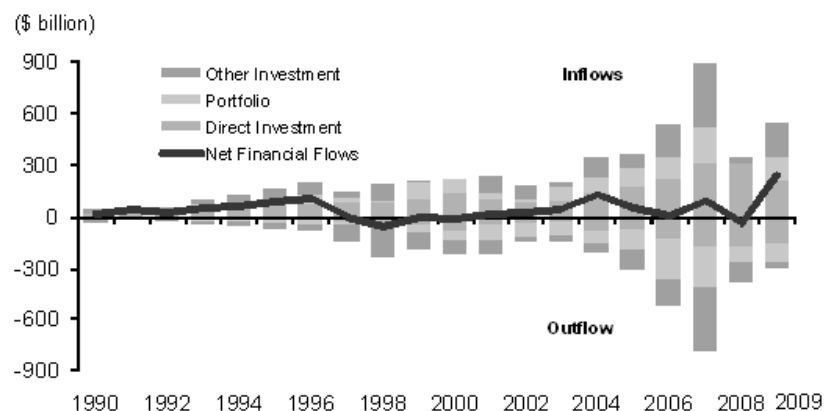
Emerging Asian equity markets, particularly those with tight financial linkages to global markets, have demonstrated vulnerabilities to an abrupt swing in global investor sentiment and a reversal in foreign portfolio investment flows. In order to maintain investor confidence, sound macroeconomic management is a must. Despite the visible improvement in depth and breadth across emerging Asian equity markets, the persistence of major vulnerabilities also suggests that further actions are needed to enhance market resilience. This requires active steps to foster deeper and more liquid domestic capital markets, including broadening the investor base; encouraging development of more diverse local financial products; improving legal, regulatory, and

institutional frameworks; upgrading governance and transparency; and establishing more sound market infrastructure and institutions.

Given the potential cost of financial contagion and crisis, maximizing the net benefits from financial openness and integration is a key agenda item for emerging market economies. Rapid financial liberalization must be accompanied by more effective financial supervisory and regulatory mechanisms. The crisis proved that cooperation is essential in responding to systemic failure. It is similarly requisite to ensure regional and global financial stability.

Emerging Asia must play its part in ensuring that the new financial architecture meets both the challenges of globalized finance and the region's financial development agenda. There are several important areas for regional cooperation in finance. The first is liquidity provisioning, with the expanded ASEAN+3 \$120 billion CMI Multilateralization serving as a good example. It is a regional initiative that evolved out of the 1997/98 Asian financial crisis. Over the past decade, it has grown from a series of bilateral swap arrangements to a more formal institution-like structure with set contributions, voting rights, and drawdown limits. Second, and related, is macroeconomic and financial surveillance. The recent agreement by ASEAN+3 to establish the ASEAN+3 Macroeconomic Research Office in support of the CMI Multilateralization is a visible step forward in this direction.

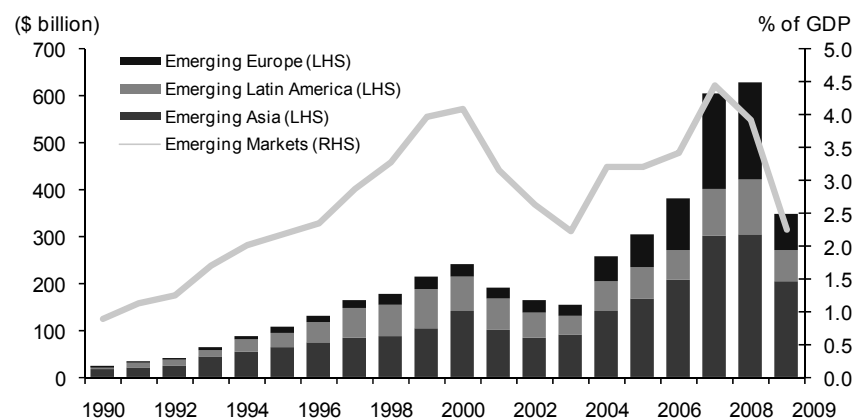
And finally, developing vibrant local currency bond markets is essential to more efficiently channel the region's vast resources. The development of local currency bond markets has the potential to mitigate the global shortage of sound and liquid financial assets; lessen the probability that a currency depreciation will morph into a full blown financial crisis; and reduce the massive inflows into US debt securities and, hence, begin to unwind global imbalances. In addition, in economies with low foreign reserves, developed local currency bond markets can reduce reliance on foreign currency debt and its concomitant currency mismatches.

Figure 1: Financial Account Flows, Emerging Asia

Emerging Asia includes the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam.

Note: Data for Hong Kong, China and Viet Nam start in 1998 and 1996, respectively. Other investments include financial derivatives.

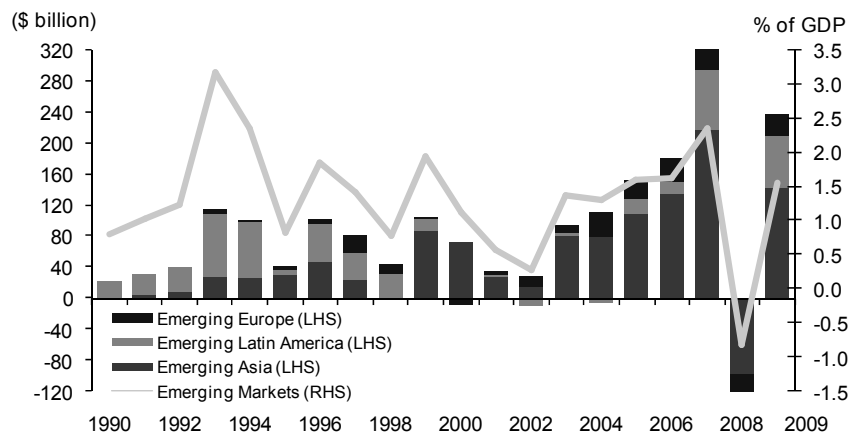
Source: Author's calculations using data from *International Financial Statistics* and *World Economic Outlook Database*, International Monetary Fund.

Figure 2a: Foreign Direct Investment Inflows, Emerging Markets

Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. Emerging Europe = Belarus; Bulgaria; Czech Republic; Estonia; Hungary; Latvia; Lithuania; Moldova; Poland; Romania; Russian Federation; Slovak Republic; and Ukraine. Emerging Latin America = Argentina; Brazil; Chile; Colombia; Dominican Republic; Ecuador; Guatemala; Mexico; Peru; and Venezuela. Emerging Markets = Emerging Asia, Emerging Europe, and Emerging Latin America.

Note: Data refers to foreign direct investment in reporting country.

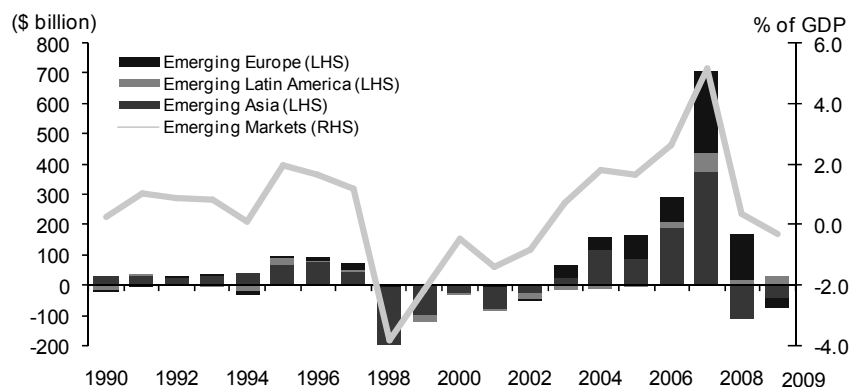
Source: Authors' calculations using data from *International Financial Statistics* and *World Economic Outlook Database*, International Monetary Fund.

Figure 2b: Foreign Portfolio Investment Inflows, Emerging Markets

Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. Emerging Europe = Belarus; Bulgaria; Czech Republic; Estonia; Hungary; Latvia; Lithuania; Moldova; Poland; Romania; Russian Federation; Slovak Republic; and Ukraine. Emerging Latin America = Argentina; Brazil; Chile; Colombia; Dominican Republic; Ecuador; Guatemala; Mexico; Peru; and Venezuela. Emerging Markets = Emerging Asia, Emerging Europe, and Emerging Latin America.

Note: Data refers to foreign portfolio investment liabilities.

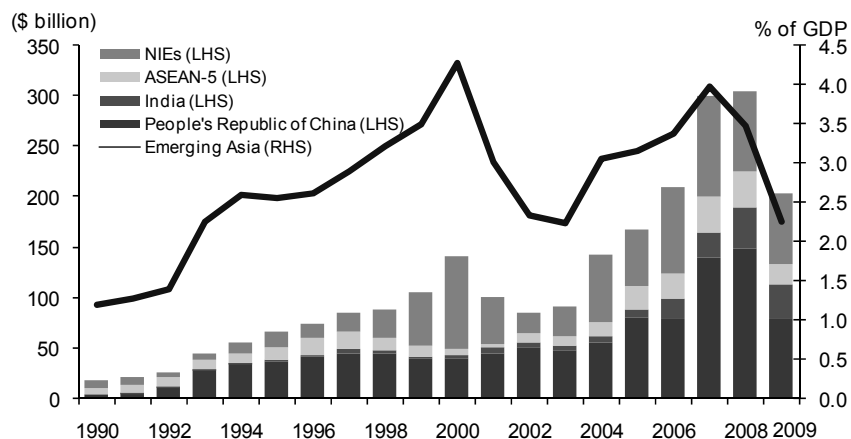
Source: Authors' calculations using data from *International Financial Statistics* and *World Economic Outlook Database*, International Monetary Fund.

Figure 2c: Other Investment Inflows, Emerging Markets

Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. Emerging Europe = Belarus; Bulgaria; Czech Republic; Estonia; Hungary; Latvia; Lithuania; Moldova; Poland; Romania; Russian Federation; Slovak Republic; and Ukraine. Emerging Latin America = Argentina; Brazil; Chile; Colombia; Dominican Republic; Ecuador; Guatemala; Mexico; Peru; and Venezuela. Emerging Markets = Emerging Asia, Emerging Europe, and Emerging Latin America.

Note: Data refers to other investment and financial derivative liabilities.

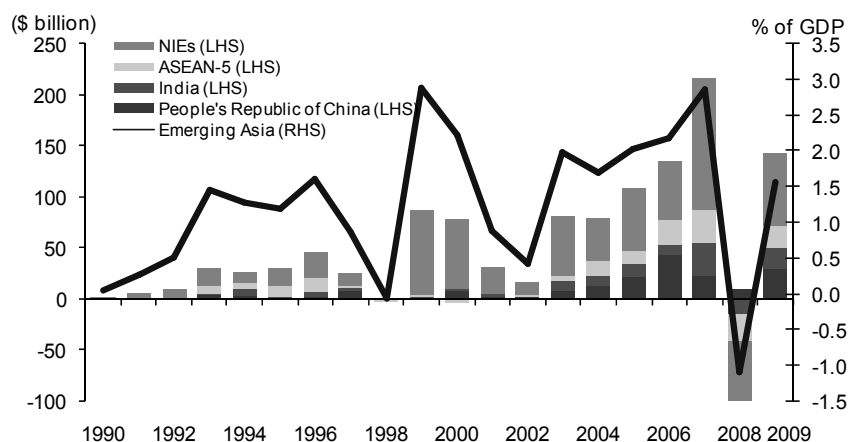
Source: Authors' calculations using data from *International Financial Statistics* and *World Economic Outlook Database*, International Monetary Fund.

Figure 3a: Foreign Direct Investment Inflows, Emerging Asia

ASEAN = Association of South East Asian Nations. ASEAN-5 = Indonesia; Malaysia; the Philippines; Thailand; and Viet Nam. Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. NIEs = newly industrialized economies. It includes Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China.

Note: Data refers to foreign direct investment in reporting country.

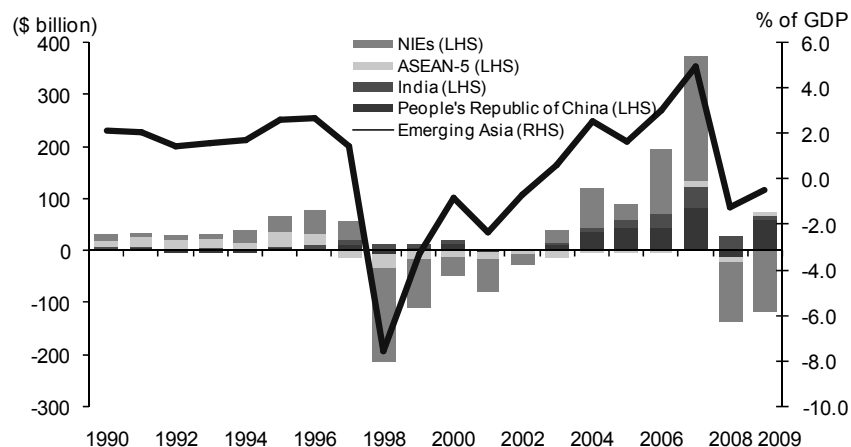
Source: Authors' calculations using data from *International Financial Statistics* and *World Economic Outlook Database*, International Monetary Fund.

Figure 3b: Foreign Portfolio Investment Inflows, Emerging Asia

ASEAN = Association of South East Asian Nations. ASEAN-5 = Indonesia; Malaysia; the Philippines; Thailand; and Viet Nam. Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. NIEs = newly industrialized economies. It includes Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China.

Note: Data refers to foreign portfolio investment liabilities.

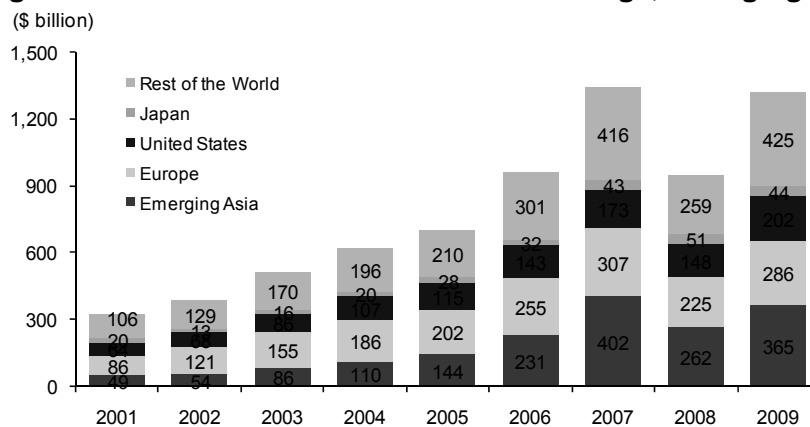
Source: Authors' calculations using data from *International Financial Statistics* and *World Economic Outlook Database*, International Monetary Fund.

Figure 3c: Other Investment Inflows, Emerging Asia

ASEAN = Association of South East Asian Nations. ASEAN-5 = Indonesia; Malaysia; Philippines; Thailand; and Viet Nam. Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. NIEs = newly industrialized economies. It includes Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China.

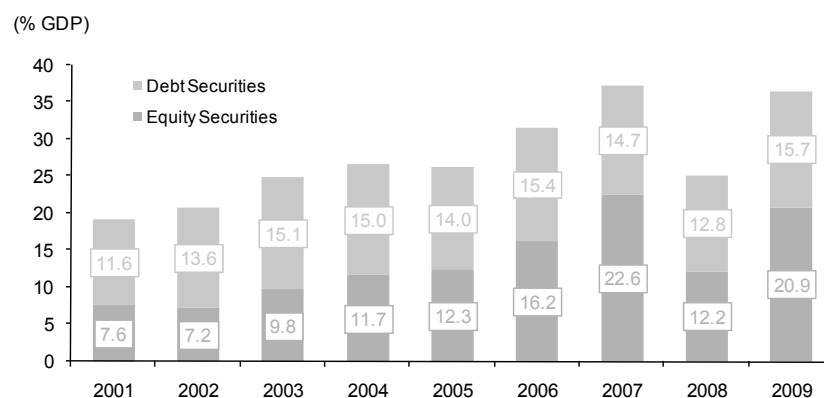
Note: Data refers to other investment and financial derivative liabilities.

Source: Authors' calculations using data from *International Financial Statistics* and *World Economic Outlook Database*, International Monetary Fund.

Figure 4: Cross-Border Portfolio Asset Holdings, Emerging Asia

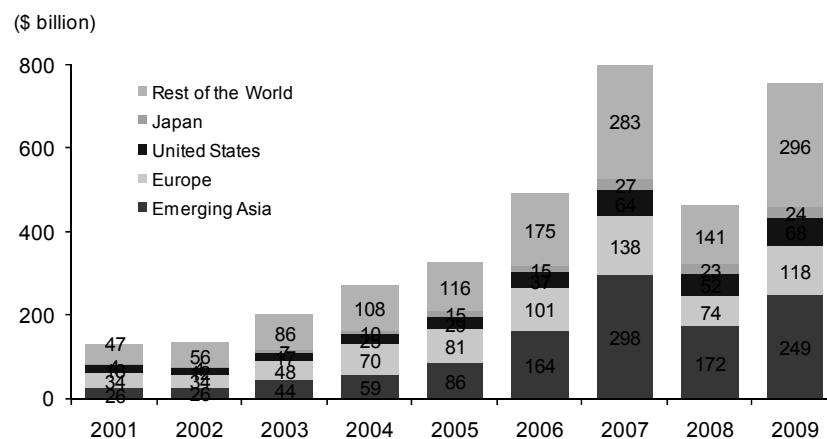
Note: Emerging Asia includes Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; and Thailand. Europe includes 17 economies comprising the eurozone plus the United Kingdom.

Source: Authors' calculation using data from *Coordinated Portfolio Investment Survey*, International Monetary Fund.

Figure 5: Cross-Border Portfolio Asset Holdings, Emerging Asia

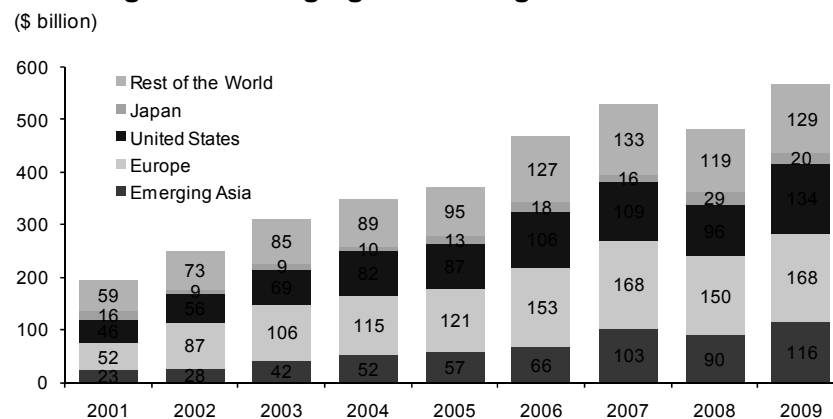
Emerging Asia = Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; and Thailand. GDP = gross domestic product.

Source: Authors' calculation using data from *Coordinated Portfolio Investment Survey* and *World Economic Outlook Database*, International Monetary Fund.

Figure 6: Emerging Asia Foreign Equity Holdings

Note: Emerging Asia includes Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; and Thailand. Europe includes the 17 economies comprising the eurozone plus the United Kingdom.

Source: Authors' calculation using data from *Coordinated Portfolio Investment Survey*, International Monetary Fund.

Figure 7: Emerging Asia Foreign Debt Securities

Note: Emerging Asia includes Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; and Thailand. Europe includes the 17 economies comprising the eurozone plus the United Kingdom.

Source: Authors' calculation using data from *Coordinated Portfolio Investment Survey*, International Monetary Fund.

Table 1: Average Simple Correlation of Stock Price Index Weekly Returns

	Emerging Asia				ASEAN				NIEs				United States				Europe			
	1993-1995	1996-2000	2001-2005	2006-2010	1993-1995	1996-2000	2001-2005	2006-2010	1993-1995	1996-2000	2001-2005	2006-2010	1993-1995	1996-2000	2001-2005	2006-2010	1993-1995	1996-2000	2001-2005	2006-2010
PRC	0.05	0.04	0.08	0.35	0.06	0.03	0.09	0.33	0.03	0.05	0.06	0.36	0.02	-0.09	0.06	0.24	0.04	-0.06	-0.01	0.33
HKG	0.31	0.36	0.38	0.68	0.46	0.40	0.28	0.66	0.30	0.47	0.58	0.78	0.30	0.44	0.52	0.58	0.51	0.56	0.59	0.71
IND	0.08	0.13	0.35	0.61	0.05	0.12	0.32	0.62	0.08	0.17	0.42	0.66	-0.01	0.11	0.24	0.53	0.06	0.11	0.29	0.68
INO	0.33	0.30	0.27	0.65	0.49	0.45	0.37	0.68	0.31	0.31	0.23	0.70	0.24	0.19	0.11	0.43	0.26	0.25	0.19	0.57
KOR	0.13	0.27	0.38	0.63	0.15	0.31	0.31	0.65	0.11	0.33	0.58	0.72	0.02	0.26	0.39	0.42	-0.02	0.33	0.55	0.59
MAL	0.36	0.32	0.33	0.63	0.47	0.42	0.35	0.66	0.43	0.36	0.38	0.66	0.19	0.22	0.26	0.42	0.31	0.23	0.21	0.61
PHI	0.26	0.34	0.27	0.56	0.43	0.45	0.32	0.63	0.27	0.39	0.28	0.56	0.10	0.30	0.17	0.39	0.21	0.32	0.15	0.56
SIN	0.38	0.39	0.42	0.68	0.59	0.50	0.41	0.69	0.33	0.44	0.55	0.76	0.21	0.41	0.43	0.61	0.44	0.43	0.51	0.74
TAP	0.15	0.23	0.33	0.59	0.18	0.25	0.28	0.58	0.19	0.29	0.50	0.69	0.02	0.25	0.39	0.42	0.19	0.29	0.47	0.57
THA	0.34	0.35	0.35	0.60	0.51	0.46	0.36	0.64	0.37	0.40	0.39	0.65	0.21	0.31	0.25	0.46	0.31	0.37	0.30	0.58
Emerging Asia	0.24	0.27	0.32	0.60	0.32	0.33	0.30	0.61	0.24	0.31	0.38	0.65	0.13	0.24	0.28	0.45	0.23	0.28	0.32	0.59
ASEAN	0.32	0.33	0.30	0.61	0.43	0.45	0.35	0.66	0.34	0.36	0.32	0.64	0.18	0.26	0.20	0.42	0.27	0.29	0.21	0.58
NIEs	0.24	0.31	0.38	0.65	0.34	0.36	0.32	0.64	0.23	0.38	0.55	0.74	0.14	0.34	0.43	0.51	0.28	0.40	0.53	0.65
USA	0.13	0.24	0.28	0.45	0.18	0.26	0.20	0.42	0.14	0.34	0.43	0.51	1.00	1.00	1.00	1.00	0.54	0.65	0.76	0.81
JPN	0.08	0.25	0.33	0.62	0.05	0.25	0.24	0.61	0.12	0.33	0.47	0.71	0.20	0.37	0.36	0.60	0.24	0.40	0.51	0.72
Europe	0.23	0.28	0.32	0.59	0.27	0.29	0.21	0.58	0.28	0.40	0.53	0.65	0.54	0.65	0.76	0.81	1.00	1.00	1.00	1.00

ASEAN = Association of South East Asian Nations. It includes Indonesia (INO); Malaysia (MAL); the Philippines (PHI); and Thailand (THA). Emerging Asia = the People's Republic of China (PRC); Hong Kong, China (HKG); India (IND); Indonesia (INO); the Republic of Korea (KOR); Malaysia (MAL); the Philippines (PHI); Singapore (SIN); Taipei, China (TAP); and Thailand (THA). NIEs = newly industrialized economies. It includes Hong Kong, China (HKG); the Republic of Korea (KOR); Singapore (SIN); and Taipei, China (TAP).

Note: Values refer to the average pair-wise correlations. Stock price index for each country is in local currency value. Weekly returns are computed as the natural log difference of a stock price index for Wednesday closing price to the previous week's Wednesday closing value. Data for Europe refers to MSCI Europe index, which includes 16 countries in the European Union.

Source: Authors' calculations using data accessed from Bloomberg LP.

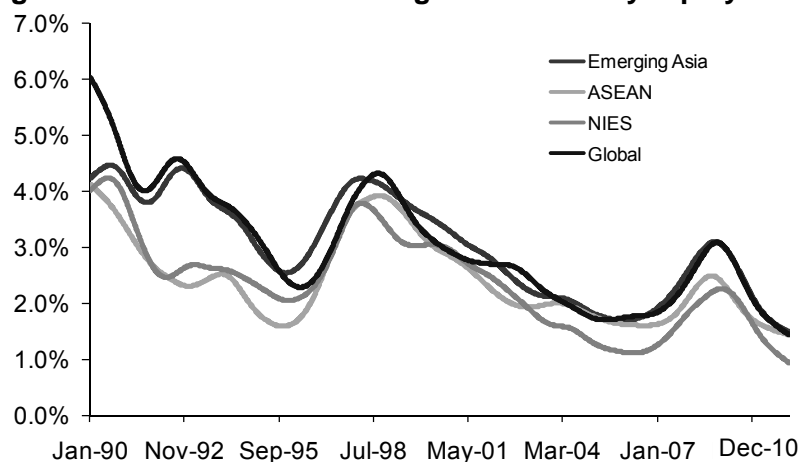
Table 2: Average Simple Correlation of Government Bond Weekly Returns, 2001–2010

	Emerging Asia		ASEAN		NIEs		Global	
	2001-2005	2006-2010	2001-2005	2006-2010	2001-2005	2006-2010	2001-2005	2006-2010
PRC	0.05	0.12	0.04	0.06	0.04	0.16	0.05	0.05
HKG	0.16	0.22	0.08	0.16	0.37	0.34	0.61	0.44
IND	0.01	0.19	-0.02	0.20	0.01	0.16	-0.05	0.10
INO	-0.03	0.09	-0.03	0.29	-0.05	-0.02	-0.03	0.20
KOR	0.11	0.20	0.05	0.22	0.28	0.13	0.31	0.18
MAL	0.07	0.22	0.06	0.22	0.14	0.24	0.14	0.21
PHI	0.04	0.08	0.01	0.15	0.05	0.05	0.03	0.07
SIN	0.19	0.21	0.14	0.18	0.38	0.31	0.47	0.33
TAP	0.14	0.10	0.05	0.02	0.22	0.18	0.24	0.16
THA	0.11	0.28	0.08	0.24	0.18	0.31	0.18	0.29
Emerging Asia	0.09	0.17	0.05	0.17	0.15	0.18	0.19	0.21
ASEAN	0.05	0.17	0.03	0.22	0.08	0.14	0.08	0.17
NIEs	0.15	0.18	0.08	0.14	0.33	0.25	0.38	0.29
Global	0.19	0.21	0.08	0.17	0.38	0.29	1.00	1.00

ASEAN = Association of South East Asian Nations. It includes Indonesia (INO); Malaysia (MAL); the Philippines (PHI); and Thailand (THA). Emerging Asia = the People's Republic of China (PRC); Hong Kong, China (HKG); India (IND); Indonesia (INO); the Republic of Korea (KOR); Malaysia (MAL); the Philippines (PHI); Singapore (SIN); Taipei, China (TAP); and Thailand (THA). NIEs = newly industrialized economies. It includes Hong Kong, China (HKG); the Republic of Korea (KOR); Singapore (SIN); and Taipei, China (TAP). Global = 25 advanced and emerging economies, including those from Asia.

Note: Weekly returns are computed as the week-on-week difference of the natural log values of HSBC Asia Local Bond Index. The HSBC Asia Local Bond Index tracks the total return performance of a bond portfolio which consists of local-currency denominated, government bonds in Asia ex-Japan. Data refers to government bonds. Global bond returns refers to Citigroup World Government Bond Index in local currency.

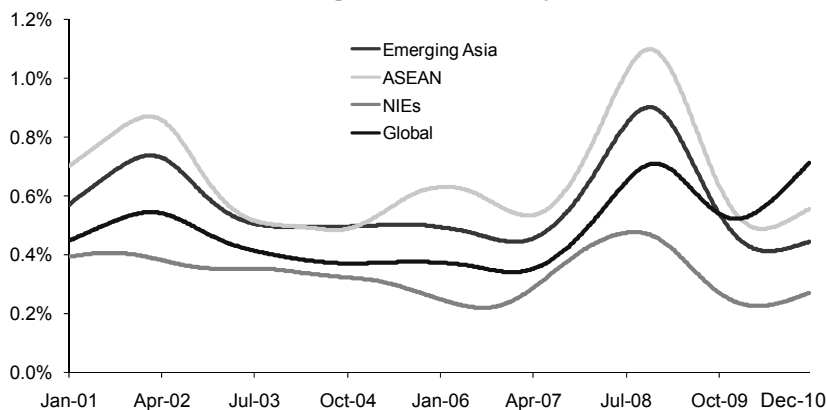
Source: Authors' calculations using HSBC Asia Local Bond Index and Citigroup World Government Bond Index data accessed from Bloomberg LP.

Figure 8: Cross-Market Convergence of Weekly Equity Returns

ASEAN = Association of South East Asian Nations. It includes Indonesia; Malaysia; the Philippines; and Thailand. Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore, Taipei, China; and Thailand. NIES = newly industrialized economies. It includes Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China. Global = 25 advanced and emerging economies including those from Asia.

Note: Stock price index for each country is in local currency units. Values were smoothed using Hodrick-Prescott filter method.

Source: Authors' calculations using data accessed from Bloomberg LP. Accessed January 2011.

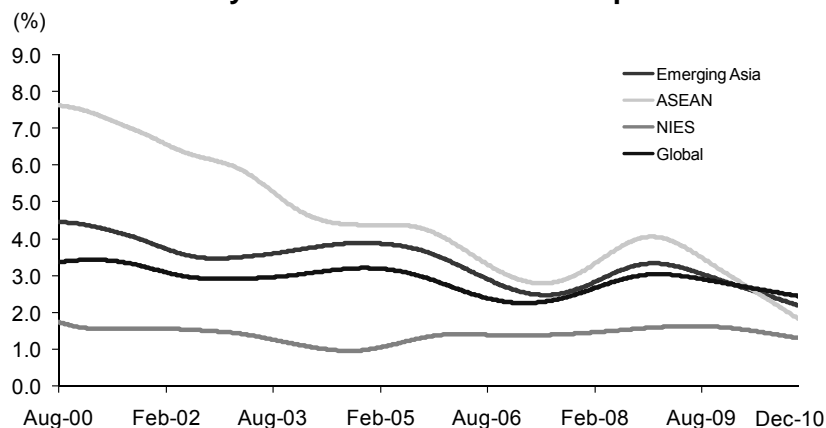
Figure 9: Cross-Market Convergence of Weekly Government Bond Returns

ASEAN = Association of South East Asian Nations. It includes Indonesia; Malaysia; the Philippines; and Thailand. Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand. NIES = newly industrialized economies. It includes Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China. Global = 25 advanced and emerging economies, including those from Asia.

Note: Values are computed as the standard deviation of individual country weekly returns, smoothed using H-P filter. Data for Asia refers to HSBC Asia Local Bond Index which tracks the total return performance of a bond portfolio consisting of local-currency denominated government bonds. Global government bond returns are computed as the standard deviation of weekly returns, smoothed using H-P filter, for 20 advanced and 10 emerging Asian economies. Data for advanced economies refers to Citigroup government bond index total returns in local currency.

Source: Authors' calculations using HSBC and Citigroup data accessed from Bloomberg LP. Accessed February 2011.

Figure 10: Cross-Market Convergence of 10-Year Local Currency Government Bond Yield Spreads

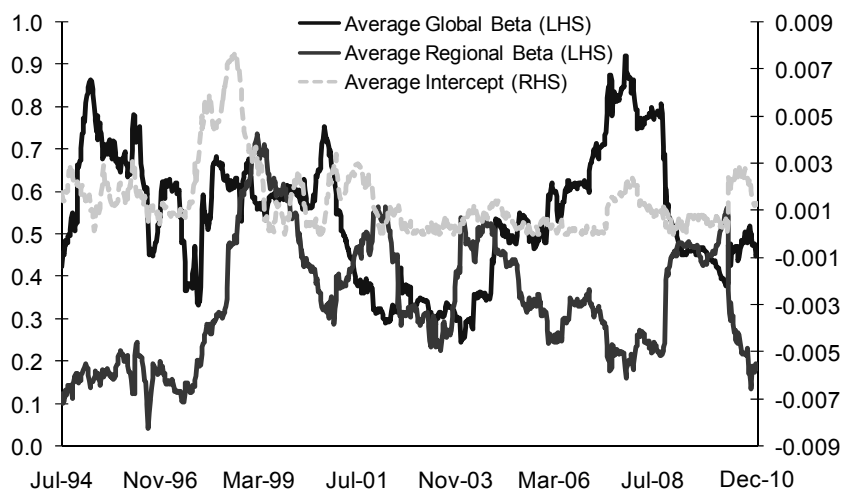


ASEAN = Association of South East Asian Nations. It includes Indonesia; Malaysia; the Philippines; and Thailand. Emerging Asia = the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand. NIES = newly industrialized economies. It includes Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China. Global = 25 advanced and emerging economies, including those from Asia.

Note: Values refer to spread over 10-year US government bond yields. Values are smoothed using Hodrick-Prescot filter method.

Source: Authors' calculations using data accessed from Bloomberg LP. Accessed January 2011.

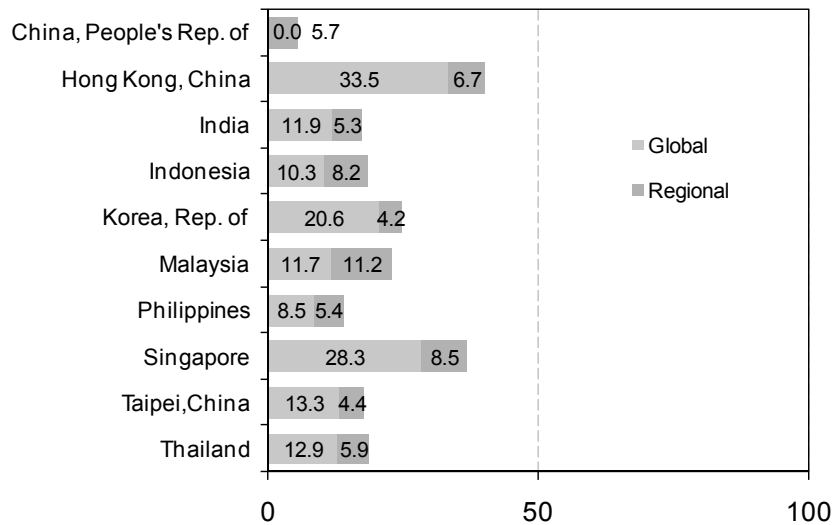
Figure 11: Global and Regional Spillover Intensity in Emerging Asian Equity Markets



Note: Emerging Asia includes the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand.

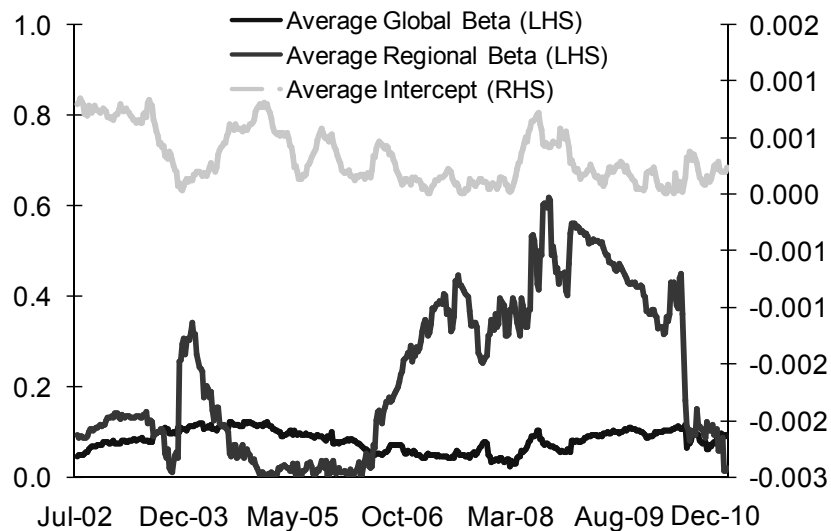
Source: Authors' calculations.

Figure 12: Share of Variance in Local Equity Returns Explained by Global and Regional Shocks, 1994–2010



Source: Authors' calculations.

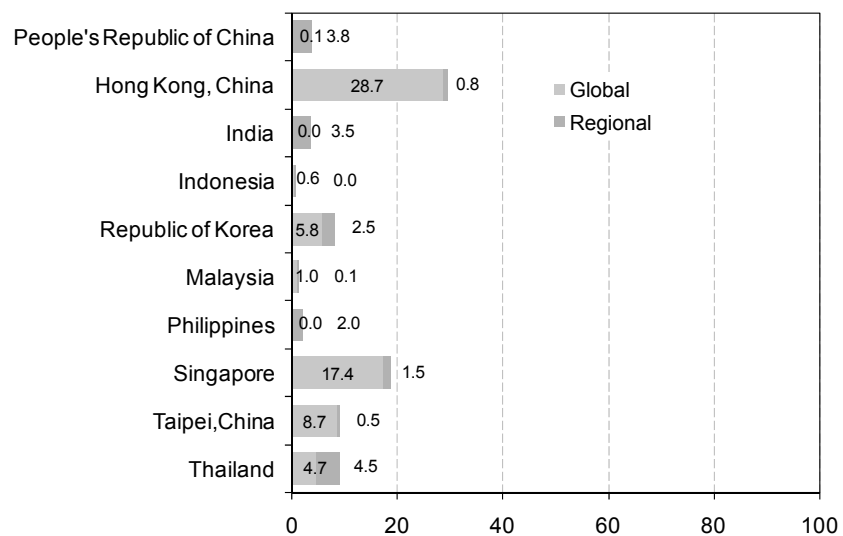
Figure 13: Global and Regional Spillover Intensity in Emerging Asian Bond Returns



Note: Emerging Asia includes the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand.

Source: Authors' calculations.

Figure 14: Share of Variance in Local Bond Returns Explained by Global and Regional Shocks, 2001–2010



Source: Authors' calculations.

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Using both quantity- and price-based measures, this paper shows an increasing degree of financial integration in emerging Asian markets. However, the region's equity markets are integrated more globally than regionally, while its local currency bond markets remain generally segmented. A case can be made for further regional integration of financial markets, as financial integration at the regional level brings benefit from allocation efficiency and risk diversification while containing the risk of financial contagion.

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