3 Financial Integration

Financial Integration

Recent developments in Asian financial markets show financial integration continues to increase gradually in the region; but still lags far behind the level of trade integration. Quantity indicators show the level of intraregional cross-border asset holdings and liabilities have remained relatively low since 2001, although the pace of intraregional financial integration is gradually increasing. Intraregional cross-border asset holdings are concentrated in a few Asian economies, though with increasing participation of other economies in the region. Asia's financial links with the rest of the world remain stronger than those within the region.

Compared with 2014, total outward portfolio investment from Asia in 2015 increased by $303.6 billion. Outward portfolio investment to the United States (US) increased significantly—by $178.6 billion—coinciding with a drastic $108.1 billion drop in investment to the European Union (EU). Price indicators reveal that despite being more globally integrated, Asia's equity markets are increasingly integrated regionally; with bond market integration lagging behind equity markets. Volatility across all types of financial flows has declined since the 2008/09 global financial crisis (GFC) compared with pre-crisis levels.

Quantity Indicators

Asian investors increased cross-border asset holdings between 2010 and 2014.

In 2014, Asia's cross-border asset holdings totaled $14.1 trillion—14.5% of total global cross-border asset holdings—an increase of $2.7 trillion compared with 2010.[14] Bank claims overseas accounted for the largest share of Asia's total cross-border assets, at $4.0 trillion or 28.4% of the region's total cross-border asset holdings, followed by the stock of outward foreign direct investment (FDI), which accounted for $3.5 trillion or 25.1%. Cross-border portfolio debt assets accounted for 25.1% at $3.5 trillion and cross-border portfolio equity assets for the smallest share at 21.5%.

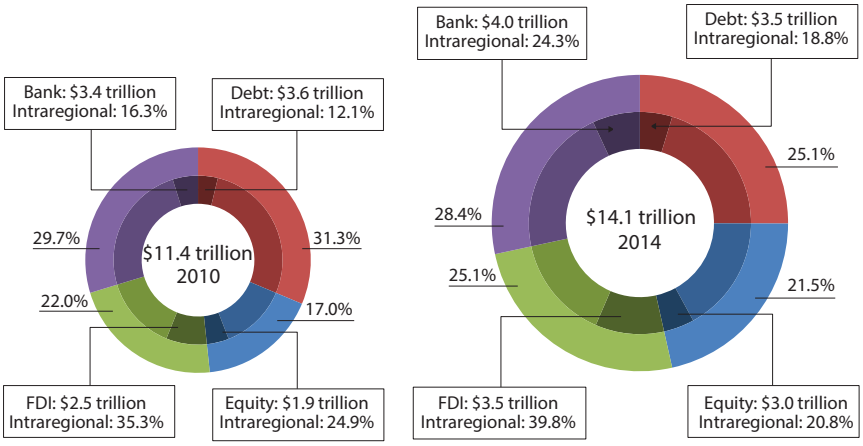
An analysis of Asia's cross-border asset and liability holdings finds that Asia's financial links with the rest of the world remain stronger than those within the region.

Intraregional asset holdings—the share of Asian financial assets in Asia's total cross-border holdings—were 26.1% (or $3.7 trillion in value) in 2014 (Figure 3.1). The intraregional share increased compared with 2010 (20.6%) indicating the gradual regional financial integration; but it remained relatively low, suggesting greater room for improvement.

The intraregional share in Asia's total cross-border asset holdings has increased since 2010 for all asset classes except for portfolio equities. Although Asia's total cross-border portfolio equity assets increased from $1.9 trillion in 2010 to $3.0 trillion in 2014, the share of intraregional equity holdings declined from 24.9% to 20.8%. This suggests that the majority of recent cross-border equity investment was directed to the rest of the world. The intraregional share of Asia's cross-border debt asset holdings increased from 12.1% to 18.8%, but this remained lowest among all asset categories in 2014. The intraregional share of Asia's cross-border bank claims

[14] Throughout this chapter, Asia's cross-border asset holdings refer to the stock of outbound portfolio debt, portfolio equity, and FDI, as well as cross-border bank claims. FDI stock data available only for 2009-2014.

Figure 3.1: Cross-border Assets—Asia



FDI = foreign direct investment.
Notes: FDI assets refer to FDI outward holdings. Bank assets refer to bank claims data. FDI stock data available for 2009–2014. Asia includes all the 48 regional ADB members for which data are available.
Sources: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016); International Monetary Fund. Coordinated Direct Investment Survey. http://cdis.imf.org (accessed April 2016); and Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

increased to 24.3% in 2014 from 16.3% in 2010, the biggest increase relative to other asset classes during the period. The intraregional share of Asia's outward FDI in stock also increased from 35.3% in 2010 to 39.8% in 2014.

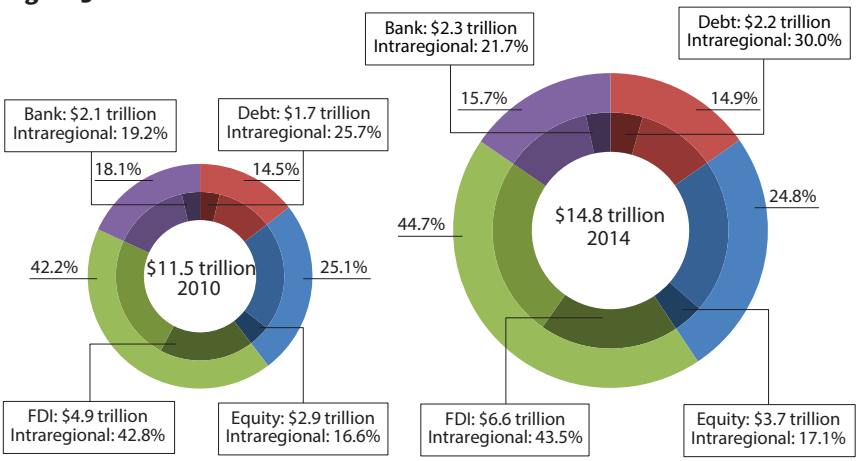
Asia's gross cross-border liabilities exceed its gross cross-border assets, highlighting the region's attractiveness as an investment destination.

In 2014, Asia's total cross-border liabilities—inward investment—reached $14.8 trillion, an increase of $3.3 trillion compared with 2010 (Figure 3.2). Asia's total cross-border liabilities are larger than its cross-border asset holdings. Asia's cross-border liabilities were significantly skewed toward inward FDI, which accounted for 44.7% of Asia's total cross-border liabilities in 2014. The cross-border portfolio equity liabilities, bank liabilities, and portfolio debt liabilities accounted for 24.8%, 15.7%, and 14.9% of the region's total cross-border liabilities, respectively.

Asia's intraregional liabilities amounted to $4.7 trillion or 31.6% of its total cross-border liabilities in 2014, up from $3.4 trillion or 29.5% in 2010. As in the case of intraregional asset holdings, Asia's financial linkages on liabilities were also stronger with the rest of the world than within the region. Still, the intraregional share of total cross-border liabilities increased compared with 2010, suggesting a gradual increase in the level of regional financial integration for Asia's cross-border liability holdings.

The intraregional share of Asia's total cross-border liabilities is 43.5% for the stock of inward FDI, followed by 30.0% for portfolio debt liabilities, 21.7% for bank liabilities and 17.1% for portfolio equity liabilities. The intraregional shares of cross-border liabilities increased for all asset classes compared with 2010, confirming the trend toward more regionally integrated financial markets in Asia.

Figure 3.2: Cross-border Liabilities—Asia



FDI = foreign direct investment.
Notes: FDI liabilities refer to FDI inward holdings. FDI stock data available only for 2009–2014.
Asia includes all the 48 regional ADB members for which data are available.
Sources: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016); International Monetary Fund. Coordinated Direct Investment Survey. http://cdis.imf.org (accessed April 2016); and Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Portfolio Debt Holdings

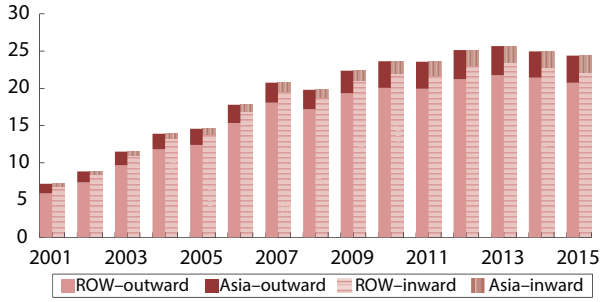
In 2015, Asia recorded net outward portfolio debt investment, as its outward debt investment exceeded inward debt investment.

The main destinations for Asia's outward portfolio debt investment remained the EU and the US, whereas the top destinations for intraregional portfolio debt investment were the People's Republic of China (PRC), Australia, and the Republic of Korea, respectively. Hong Kong, China was the largest regional source of debt investment in Asia.

Global outward portfolio debt investment increased from $7.2 trillion in 2001 to $24.4 trillion in 2015 (Figure 3.3). In 2015, the largest investors for global outward portfolio debt investment were the EU (44.8%), Asia (14.9%), and North America (12.1%). Latin America, the Middle East, and Africa had a combined contribution of only 1.2%, even though it has grown rapidly.[15]

Asia's contribution to global outward portfolio debt investment in 2015 indicated a slight recovery compared

Figure 3.3: Portfolio Debt Investment—World ($ trillion)



ROW = rest of the world.
Note: Asia includes all the 48 regional ADB members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

with its 13.2% share during the GFC. But its share remained lower than the peak of 15.6% during the surge in capital outflows in 2012. North America's share increased to 12.1% from 8.3% during the GFC, even surpassing its 10.0% share in 2001. The EU remained the largest contributor, but outward portfolio debt investment declined to 44.8% in 2015, its lowest share since 2001.

The EU (46.9%), North America (29.0%), and Asia (9.1%) still attracted the most of global inward portfolio debt

[15] The remaining 26.9% was contributed by economies outside these regions.

investment. Latin America, the Middle East, and Africa had a combined contribution of only 3.0%. Similar to outward portfolio investment, they have grown rapidly from a small base.

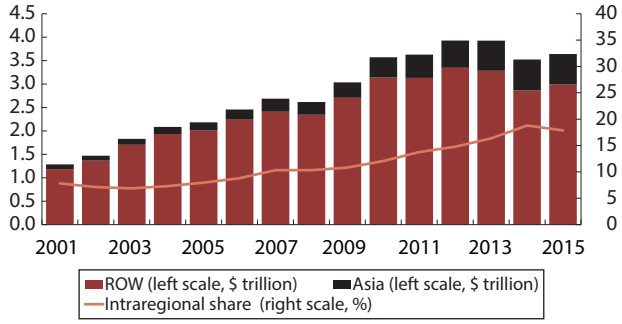
Asia's share of total inward portfolio debt investment has substantially increased from 5.5% share in 2008, as has North America, from its GFC low of 24.6%. However, the EU's 46.9% share in 2015 was below its 56.0% GFC level.

Asia's outward portfolio debt investment remains substantially skewed toward the rest of the world, but the bias toward non-Asian economies appeared to be weakening.

Asia's outward portfolio debt investment increased from $1.3 trillion in 2001 to $3.6 trillion in 2015 (Figure 3.4). But Asia's outward portfolio debt investment to Asia—intraregional portfolio debt investment—was only $650 billion, or 17.9% of the 2015 total. While the intraregional share fell slightly from 18.8% in 2014, it has increased significantly since its 7.8% share in 2001 and 10.3% share in 2008.[16]

While Asia's intraregional share of its total outward portfolio debt investment in 2015 (17.9%) remained well

Figure 3.4: Outward Portfolio Debt Investment—Asia



ROW = rest of the world.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

below the EU's (65.5%)—a region characterized by mainly two currencies (the euro and British pound sterling)—it remained comparable to the intraregional shares of the Middle East (21.3%), and North America (19.2%), and was significantly above the shares in Africa (7.2%), and Latin America (9.2%).

In fact, Asia's intraregional portfolio investment declined $11.9 billion between 2014 and 2015, with Japan and New Zealand accounting for $6.9 billion of the decline.[17] Its outward portfolio debt investment to the rest of the world—excluding the EU and the US—increased $70.5 billion in 2015 compared with 2014.[18]

Ongoing yield differences between the EU and the US prompted a shift in Asia's outward investment portfolio for debt securities.

Asia's outward portfolio debt investment to the EU declined in 2015 by $89.7 billion, but less than its 2014 decline of $163.1 billion (Figure 3.5).[19] This coincided with a sharp increase in Asia's outward portfolio debt investment to the US by $149.0 billion, up further from its $50.1 billion rise in 2014.[20] This trend in outward portfolio debt adjustments was not unique to Asia. Global outward portfolio debt investment to the US also rose $430.9 billion in 2015, while global outward portfolio debt investment to the EU dropped a dramatic

16 This excludes data for the PRC in 2015. If the PRC data were included, Asia's total portfolio debt outward investment in 2015 would be $3.7 trillion, and intraregional portfolio debt outward investment would be $685 billion, or 18.3% of Asia's total portfolio debt outward investment. No data for the PRC are available for 2001–2014.

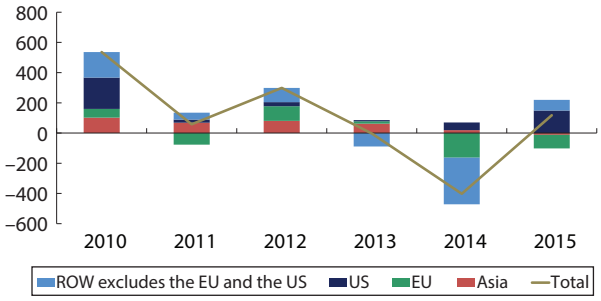
17 This excludes data for the PRC in 2015. If the PRC data were included, the change in Asia's intraregional portfolio debt outward investment in 2015 would have increased by $23.1 billion. No data for the PRC are available for 2001–2014.

18 This excludes data for the PRC in 2015. If the PRC data were included, the change in Asia's portfolio debt investment to the rest of the world excluding the EU and the US and the EU in 2015 would have increased by $89.1 billion. No PRC data are available for 2001–2014.

19 This excludes data for Australia's investment to the United Kingdom, as data for 2015 was recorded as 'confidential' by the data source. This also excludes data for the PRC in 2015. If both were included, the decline in Asia's portfolio debt outward investment to the EU in 2014 would have been $167.7 billion, and the decline in Asia's portfolio debt outward investment to the EU in 2015 would have been $96.6 billion. No data for the PRC are available for 2001–2014.

20 This excludes data for the PRC in 2015. If the PRC data were included, the change in Asia's portfolio debt outward investment to the US in 2015 would have increased by $198.5 billion. No PRC data are available for 2001–2014.

Figure 3.5: Change in Outward Portfolio Debt Investment—Asia ($ billion)



EU = European Union, ROW = rest of the world, US = United States.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

$980.0 billion.[21] Yield-seeking investors may have shifted from EU portfolio debt assets to the US portfolio, with negative interest rates in the euro area since June 2014 and the expected interest rate rise in the US.

The European Central Bank (ECB) has pushed interest rates down further after launching its large-scale quantitative easing asset purchase program in March 2015. Weak European macroeconomic fundamentals, combined with an intensifying crisis in Greece, further pressured the euro. In contrast, with the US economy performing better and US Federal Reserve raising its key policy rate in December 2015 (for the first time since the GFC), Asian investors flocked to the US. The gap between the US and the EU 10-year government bond yields began to rise during the November 2011 euro crisis, peaking in March 2015 at the start of the ECB's massive quantitative easing. With the improving US economy, investors had already rebalanced their portfolios even before the US policy-rate increase in December 2015. The decline of $89.7 billion in Asia's outward portfolio debt investment in the EU came primarily from Australia ($22.2 billion) and Japan ($73.9 billion). The increase of $149 billion in Asia's outward portfolio debt investment to the US was primarily from Japan ($105.0 billion), as well as the region's two financial hubs, Hong Kong, China ($24.7 billion) and Singapore ($19.3 billion).

Asia's outward portfolio debt investment continued to go mostly to the US and the EU in 2015, although the more attractive destination between the two has changed from the EU in 2010 to the US in 2015 (Table 3.1). Asia's outward portfolio debt investment was limited to a few economies, whether within or outside the region. In 2010, much of Asia's intraregional portfolio debt investment went to Australia, the PRC, and the Republic of Korea, comprising 8.0% of its total global cross-border debt asset holdings and 67.9% of its intraregional debt asset holdings. These were the same top destinations in 2015, with share to total global and intraregional holdings at 11.0% and 61.7%, respectively. Hong Kong, China, meanwhile, held 95.6% of the PRC's debt securities in 2010 and 73.3% in 2015.

By subregion, the source of Asia's intraregional portfolio debt investment is primarily East Asia. However, its share to total intraregional investment declined from 70.6% in 2001 to 66.7% in 2015 (Figure 3.6). Southeast Asia, another primary source, increased its share from 24.9% in 2001 to 28.6% in 2015. This indicates that while financial integration remained concentrated in just a few economies, it is nonetheless broadening.

By economy, top sources of Asia's intraregional portfolio debt investment in 2015 were Hong Kong, China; Japan; and Singapore. Their combined share increased to 25.5% in 2015 from 23.5% in 2010. Outside Asia, the EU and the US continue to be the top sources for inward portfolio debt investment to the region. Along with international organizations, which invest heavily in Japan's and Republic of Korea's cross-border debt, the combined share of the EU, the US, and international organizations totaled 60.7% of Asia's inward portfolio debt investment. This again shows nonregional economies were the primary source of inward portfolio investment in the region, although their relative share declined between 2010 and 2015 (Table 3.2).

The share of intraregional inward portfolio debt investment increased from 25.7% in 2010 to 29.2% in 2015 (see Table 3.2), accompanied by an increase in Asia's inward portfolio debt investment from $1.7 trillion in 2010 to $2.2 trillion in 2015 (Figure 3.7). While the

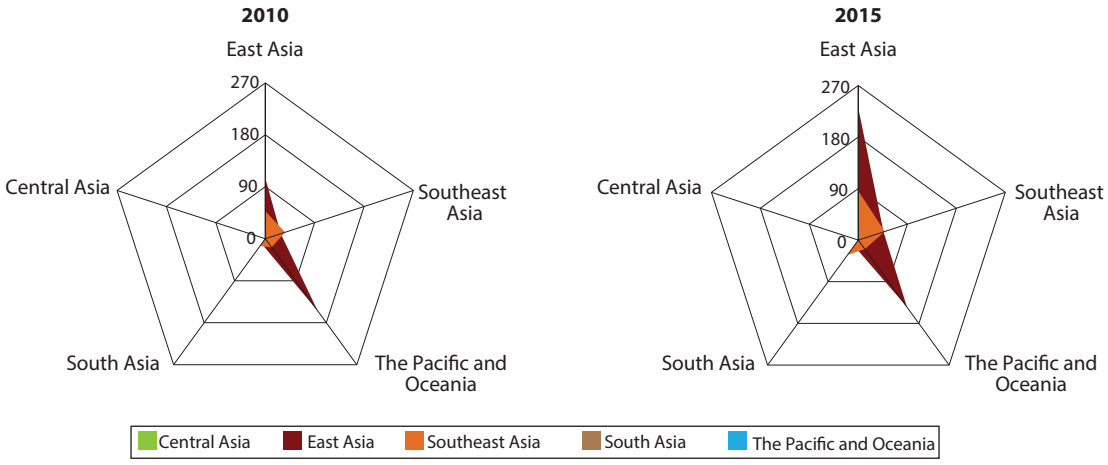
[21] These exclude data for the PRC, as there is no PRC data for 2001–2015. These also exclude data for the Bahamas, Ireland, and Isle of Man, as data for 2015 is unavailable. And they exclude Australia's investment to the United Kingdom, as data for 2015 was recorded as "confidential" by the data source.

Table 3.1: Destinations of Asia's Outward Portfolio Debt Investment ($ billion)

	2015		2010		% Change
Asia					
People's Republic of China	185	(5.1%)	53	(1.5%)	▲
Australia	157	(4.3%)	169	(4.7%)	▼
Republic of Korea	59	(1.6%)	64	(1.8%)	▼
Other Asia	249	(6.8%)	145	(4.0%)	▲
Asia's outward portfolio debt investment to Asia	650	(17.9%)	430	(12.1%)	▲
Non-Asia					
United States	1,370	(37.7%)	1,116	(31.2%)	▲
European Union	925	(25.4%)	1,142	(32.0%)	▼
Not specified (including confidential)	199	(5.5%)	45	(1.3%)	▲
Other non-Asia	514	(14.1%)	837	(23.4%)	▼
Asia's outward portfolio debt investment to non-Asia	2,990	(82.1%)	3,140	(87.9%)	▼
Asia's total outward portfolio debt investment	**3,640**	**(100.0%)**	**3,570**	**(100.0%)**	

Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Figure 3.6: Asia's Intraregional Portfolio Debt Investment by Subregion ($ billion)



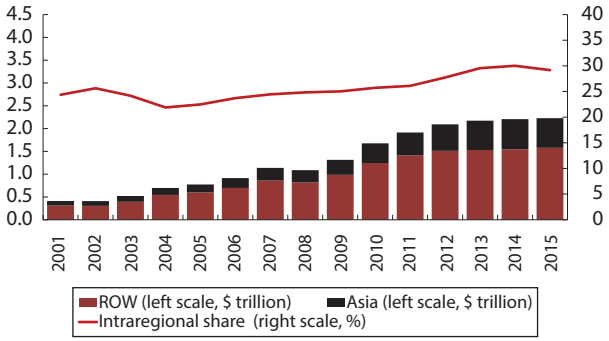
Note: Subregions in legend refer to the source. Subregions on the chart axis refer to the destination.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Table 3.2: Sources of Asia's Inward Portfolio Debt Investment ($ billion)

	2015		2010		% Change
Asia					
Hong Kong, China	239	(10.7%)	146	(8.7%)	▲
Japan	178	(8.0%)	150	(9.0%)	▼
Singapore	151	(6.8%)	96	(5.8%)	▲
Other Asia	82	(3.7%)	38	(2.3%)	▲
Asia's inward portfolio debt investment from Asia	650	(29.2%)	430	(25.7%)	▲
Non-Asia					
European Union	605	(27.1%)	520	(31.0%)	▼
United States	419	(18.8%)	320	(19.1%)	▼
International Organizations	330	(14.8%)	290	(17.3%)	▼
Other non-Asia	225	(10.1%)	113	(16.8%)	▲
Asia's inward portfolio debt investment from non-Asia	1,579	(70.8%)	1,244.	(74.3%)	▼
Asia's total inward portfolio debt investment	**2,229**	**(100.0%)**	**1,674**	**(100.0%)**	

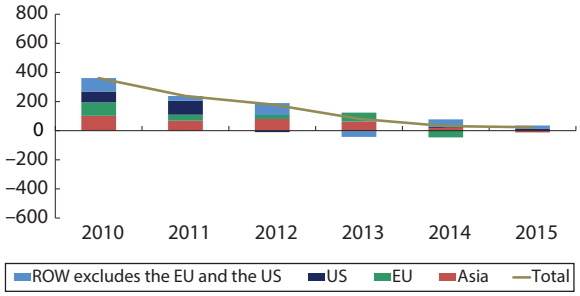
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Figure 3.7: Inward Portfolio Debt Investment—Asia



ROW = rest of the world.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Figure 3.8: Change in Inward Portfolio Debt Investment—Asia ($ billion)



EU = European Union, ROW = rest of the world, US = United States.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

amount in 2015 was more than 5 times what it was in 2001, Asia's inward portfolio debt investment remained lower than outward portfolio debt investment by $1.4 trillion.

Asia's inward portfolio debt investment increased by $23.8 billion in 2015 from the previous year, albeit at a moderating pace of increase over 2010–2015 (Figure 3.8). The decline in Asia's intraregional inward investment ($11.9 billion), primarily due to Hong Kong, China-PRC investment (a $38.4 billion decline), was offset by an increase in investment from the rest of the world, excluding the US and the EU ($23.3 billion).

Portfolio Equity Holdings

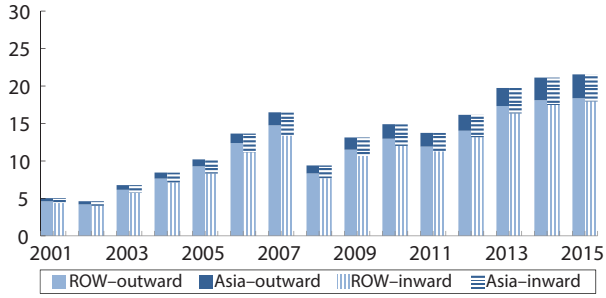
Asia's cross-border equity investment remained concentrated in a few large economies outside the region.

According to 2015 data, the main destinations of Asia's outward portfolio equity investment were the US (25.8%), Cayman Islands (25.0%), and the EU (14.6%). The intraregional share for outward portfolio equity investment fell to 19.8% in 2015 from 24.9% in 2010, while the share for inward investment rose to 17.5% in 2015 from 16.6% in 2010. The top destinations for intraregional outward portfolio equity investment were the PRC (8.8%), Japan (2.0%), and Hong Kong, China (1.4%) while Singapore was the largest regional source of equity investment (5.9%) in Asia in 2015.

Asia's gross inward equity investment exceeded its gross outward investment, making the region a net recipient in cross-border portfolio equity investment.

Global outward portfolio equity investment increased from $5.0 trillion to $21.6 trillion between 2001 and 2015 (Figure 3.9). In 2015, similar to the trend in outward portfolio debt investment, the EU (38.3%), North America (35.7%), and Asia (14.9%) were the three biggest contributors to global outward portfolio equity investment. Latin America, Middle East, and Africa had a combined share 2.5%.

Figure 3.9: Portfolio Equity Investment—World
($ trillion)



ROW = rest of the world.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Asia's share in global outward equity investment has recovered from its 11.4% level during the GFC in 2008, reaching 14.9% in 2015. North America marginally increased its share to 35.7% of global outward portfolio investment in 2015, from its 33.1% share during the GFC. The EU, however, while still the largest contributor to global portfolio equity investment, saw its share decline from 43.7% in 2008 to 38.3% in 2015. On the other hand, the EU (41.4%), North America (19.8%), and Asia (16.8%) attracted the most global inward equity investment.

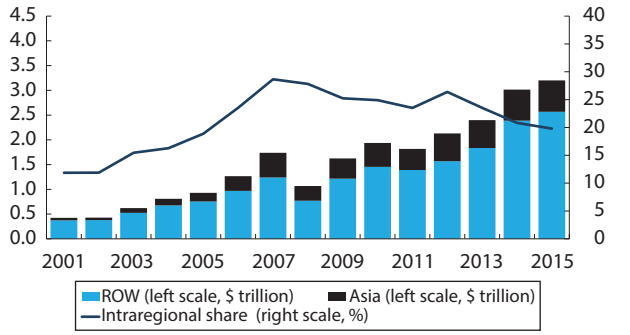
Unlike portfolio debt investment, Asia was a net receiving region in cross-border portfolio equity investment. While its share of inward equity investment to the global total in 2015 (16.8%) declined from the capital flow surge in 2012 (18.5%), it still increased from its 2001 share (12.9%). The EU's inward portfolio equity investment declined to 41.4% in 2015 from 50.8% in 2001. It reached a low of 39.6% in 2011 during the European debt crisis. North America's share to global total also declined to 19.8% in 2015 from 21.3% in 2001. It had reached a low of 16.7% in 2007, just before the onset of the GFC.

Asia's outward portfolio equity investment was destined more outside than inside the region.

Asia's total outward portfolio equity investment increased from $424 billion in 2001 to $3.2 trillion in 2015 (Figure 3.10).[22] However, intraregional equity investment was only $633.9 billion, 19.8% of Asia's total cross-border equity holdings. The share of intraregional equity holdings in 2001 was 11.9%. Intraregional equity asset holdings peaked at 28.7% in 2007. While Asia's intraregional share in 2015 was lower than the EU's (55.7%), it is significantly higher than other regions that do not share a common currency—Africa (1.9%), Latin America (2.2%), the Middle East (8. 3%) and North America (11.5%).

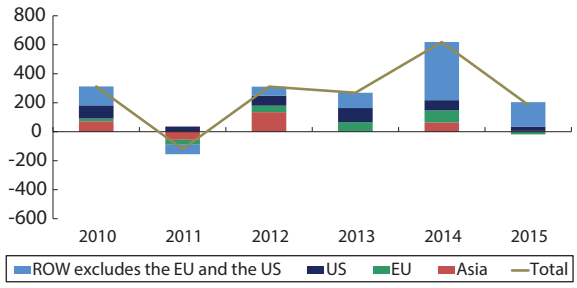
[22] This excludes data for the PRC in 2015. If the PRC data were included, Asia's total portfolio equity outward investment in 2015 would have been$3.4 trillion, and intraregional portfolio equity outward investment $685 billion, or 20.3% of Asia's total outward portfolio equity investment. No data for the PRC are available for 2001–2014.

Figure 3.10: Outward Portfolio Equity Investment—Asia



ROW = rest of the world.
Note: Asia includes all the ADB 48 regional members, for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Figure 3.11: Change in Outward Portfolio Equity Investment—Asia ($ billion)



EU = European Union, ROW = rest of the world, US = United States.
Note: Asia includes all the ADB 48 regional members, for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Between 2014 and 2015, Asia's outward portfolio equity investment rose $185.8 billion, with its destinations broadened and diversified (Figure 3.11). While Asia's investment in EU portfolio equity assets dropped $18.3 billion, its investment in other regions increased.[23] Asia's investment to the rest of the world excluding the EU and the US increased $168.5 billion in 2015.[24] Asia's intraregional investment and Asia's investment in the US equity assets increased $5.9 billion and $29.6 billion, respectively.[25] Asia's outward portfolio equity investment to the EU fell perhaps due to downward pressure on the euro against the US dollar, associated with the intensifying crisis in Greece. In contrast, the increased outward portfolio equity investment to the US was mainly from Japan ($30.8 billion) and New Zealand ($12.2 billion). The improved US economic outlook could have made its equity market more attractive than that of the EU.

The intraregional shares of both outward and inward portfolio equity investment suggest significantly higher regional integration in cross-border equity investment than in debt.

The US remained the most popular destination for Asia's outward portfolio equity investment in 2015, while Cayman Islands replaced the EU as the second most popular destination (Table 3.3). The EU dropped to third. Similar to the region's outward portfolio debt investment, Asia's outward portfolio equity investment was more destined to the rest of the world than to the region. Unlike the region's outward portfolio debt investment, its outward portfolio equity investment in non-Asian economies increased between 2010 and 2015.

The primary regional destinations for Asia's outward portfolio equity investment are the PRC; Hong Kong, China; and Japan. These economies received 62.0% of intraregional equity investment in 2015, up from 60.3% in 2010, indicating more concentration in intraregional equity investment (see Table 3.3).

By subregion, the source of Asia's portfolio equity investment was also primarily East Asia (Figure 3.12). Half of Asia's intraregional outward portfolio equity investment came from East Asia. East Asia's intra-subregional share of 80.5% has driven much of intraregional equity market integration, with its remaining outward portfolio equity investment going to the Pacific and Oceania (8.4%), and Southeast Asia (8.2%). Southeast Asia contributed 38.2%

[23] This excludes data for Australia's investment to the United Kingdom, as data for 2015 was recorded as 'confidential' by data source. This also excludes data for the PRC in 2015. If both were included, the decline in Asia's portfolio equity outward investment to the EU in 2015 would have been $28.9 billion. No data for the PRC are available for 2001–2014.

[24] This excludes data for the PRC in 2015. If the PRC data were included, the change in Asia's portfolio equity investment to the rest of the world excluding the US and the EU in 2015 would have increased by $196.0 billion. No data for the PRC are available for 2001–2014.

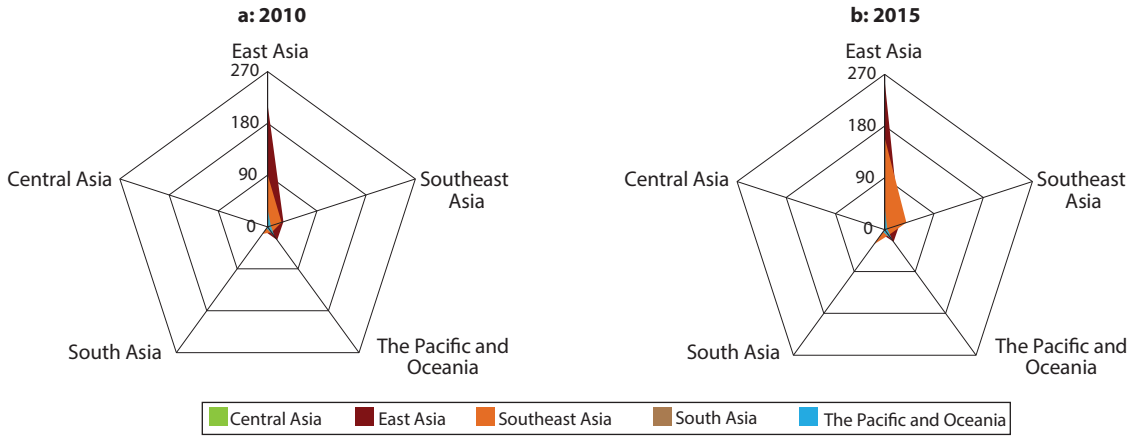
[25] This excludes data for the PRC in 2015. If the PRC data were included, the change intraregional outward portfolio equity investment in 2015 would have increased by $56.5 billion. Asia's outward portfolio equity investment to the US increased by $91.2 billion. No data for the PRC are available for 2001–2014.

Table 3.3: Destinations of Asia's Outward Portfolio Equity Investment ($ billion)

	2015		2010		% Change
Asia					
People's Republic of China	282	(8.8%)	204	(10.5%)	▼
Hong Kong, China	45	(1.4%)	41	(2.1%)	▼
Japan	65	(2.0%)	47	(2.4%)	▼
Other Asia	241	(7.5%)	192	(9.9%)	▼
Asia's outward portfolio equity investment to Asia	634	(19.8%)	483	(24.9%)	▼
Non-Asia					
United States	826	(25.8%)	523	(27.0%)	▼
Cayman Islands	801	(25.0%)	295	(15.2%)	▲
European Union	466	(14.6%)	328	(16.9%)	▼
Other non-Asia	475	(14.8%)	309	(15.9%)	▼
Asia's outward portfolio equity investment to non-Asia	2,568	(80.2%)	1,455	(75.1%)	▲
Asia's total outward portfolio equity investment	**3,202**	**(100.0%)**	**1,938**	**(100.0%)**	

Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Figure 3.12: Asia's Intraregional Portfolio Equity Investment by Subregion ($ billion)



Note: Subregions in legend refer to the source. Subregions on the chart axis refer to the destination.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

to intraregional outward portfolio equity investment, which primarily went to East Asia (65.8%), its own subregion (16.4%), and South Asia (13.0%). The Pacific and Oceania also contributed 11.0% to intraregional portfolio investment, with half of their contribution going to East Asia.

Asia's top sources of inward portfolio equity investment in 2010 were Hong Kong, China; Singapore; and Japan (Table 3.4). By 2015, the order changed to Singapore; Hong Kong, China; and Japan. The intraregional share of Asia's total inward portfolio equity investment edged up to 17.5% in 2015 from 16.6% in 2010. At the same time, its top source, the US, increased its investment to Asia from 44.3% in 2010 to 45.0% in 2015. The EU remained Asia's second top source of investment despite a decline in its relative share from 27.5% in 2010 to 24.3% in 2015. Canada contributed 3.6% of Asia's total inward portfolio investment in 2015.

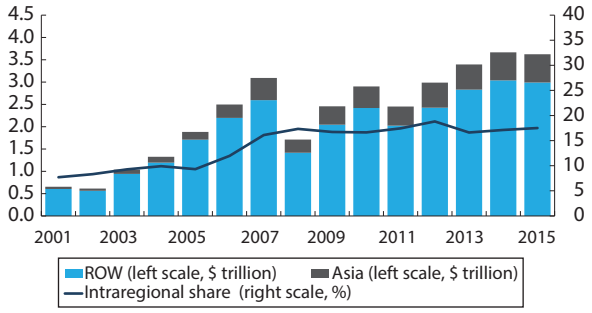
Inward portfolio equity investment to Asia rose from $653.4 billion in 2001 to $3.6 trillion in 2015, with the intraregional share also increasing from 7.7% in 2001 to 17.5% in 2015 (Figure 3.13).

Table 3.4: Sources of Asia's Inward Portfolio Equity Investment ($ billion)

	2015		2010		% Change
Asia					
Singapore	214	(5.9%)	128	(4.4%)	▲
Hong Kong, China	207	(5.7%)	166	(5.7%)	▲
Japan	83	(2.3%)	84	(2.9%)	▼
Other Asia	131	(3.6%)	105	(3.6%)	▲
Asia's inward portfolio equity investment from Asia	634	(17.5%)	483	(16.6%)	▲
Non-Asia					
United States	1630	(45.0%)	1285	(44.3%)	▲
European Union	880	(24.3%)	798	(27.5%)	▼
Canada	129	(3.6%)	93	(3.2%)	▲
Other non-Asia	351	(9.7%)	242	(8.3%)	▲
Asia's inward portfolio equity investment from non-Asia	2,989	(82.5%)	2,418	(83.4%)	▼
Asia's total inward portfolio equity investment	**3,623**	**(100.0%)**	**2,901**	**(100.0%)**	

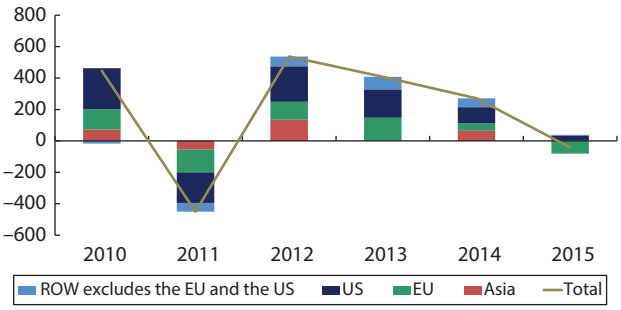
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Figure 3.13: Inward Portfolio Equity Investment—Asia



ROW = rest of the world.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

Figure 3.14: Change in Inward Portfolio Equity Investment—Asia ($ billion)



EU = European Union, ROW = rest of the world, US = United States.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from International Monetary Fund. Coordinated Portfolio Investment Survey. http://cpis.imf.org (accessed September 2016).

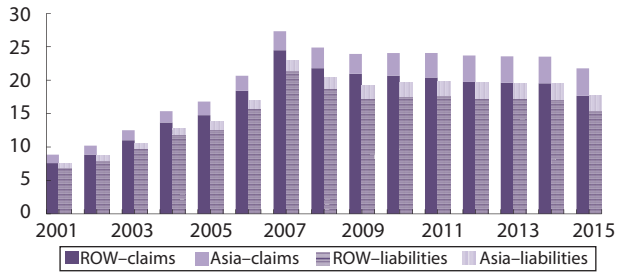
Portfolio equity investment going to Asia fell $42.0 billion between 2014 and 2015, largely due the decline of $80.8 billion in inward investment from the EU (Figure 3.14). Much of the decline was in investments going to Hong Kong, China ($14.8 billion) and the PRC ($14.1 billion). This coincided with the depreciation of the PRC yuan in August 2015, followed by the PRC stock market slump.

Bank Holdings

Asia's cross-border bank claims and liabilities are mainly directed outside the region, with the EU and US holding the major shares.

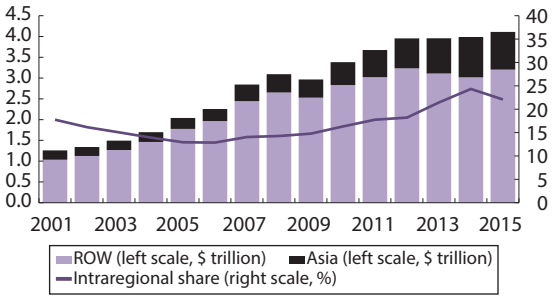
Asia's cross-border bank claims were destined mostly outside the region—29.4% to the US and 27.2% to the EU. Its cross-border bank liabilities were also primarily

Figure 3.15: Cross-border Bank Holdings—World ($ trillion)



ROW = rest of the world.
Note: Asia reporters include Australia; Japan; the Republic of Korea; and Taipei,China.
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Figure 3.16: Cross-border Bank Claims—Asia



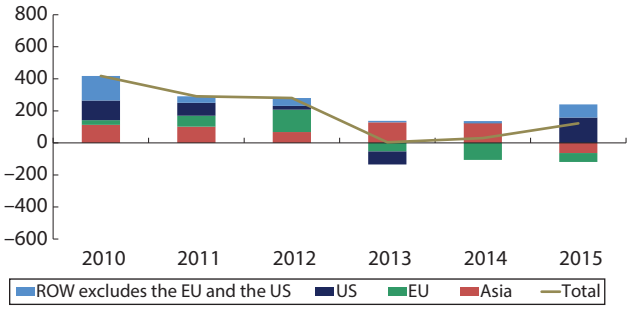
ROW = rest of the world.
Note: Asia includes all the 48 regional members of ADB for which data are available.
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

concentrated in the EU (36.9%) and the US (32.9%). While Asian banks' claims and liabilities remained more linked to the rest of the world, their intraregional shares rose significantly over 2010–2015—from 16.3% to 22.1% for bank claims and 19.2% to 23.1% for bank liabilities, respectively.[26] As for the region's source economies for cross-border bank claims, Japan held the largest share in 2015 (76.6%)—down from 91.8% in 2001—while Australia and the Republic of Korea increased their shares considerably.

Global cross-border bank claims increased from $8.4 trillion in 2001 to $21.8 trillion in 2015 (Figure 3.15). However, this remained below its 2007 peak of $27.3 trillion. In 2015, the EU continued to hold the biggest share (58.3%), followed by Asia (18.9%) and North America (16.0%). Africa and Latin America's combined share was 0.7%.[27] In global cross-border bank liabilities, the EU (51.1%), North America (23.0%), and Asia (12.9%) accounted for the three largest shares in 2015. Latin America and Africa had a combined 1.3% share of the total.

Asia's cross-border bank claims increased from $1.3 trillion in 2001 to $4.3 trillion in 2015. While the intraregional share of cross-border bank claims increased from 17.8% to 22.1%, this is below its 24.3% peak in 2014 (Figure 3.16).

Figure 3.17: Change in Bank Claims—Asia ($ billion)



EU = European Union, ROW = rest of the world, US = United States.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Asia's bank claims have continued to increase since 2010, although the pace of increase slowed in recent years. Cross-border bank claims increased to $121.9 billion in 2015, with the largest share going to the US ($158.3 billion). This was primarily due to an exceptional rise in Japanese bank claims ($121.8 billion), in particular from its official sector.[28] Asia's bank claims on the EU declined by $55.3 billion in 2015 (Figure 3.17). Yield-seeking investors likely rebalanced their bank claims as the gap between the US and the EU primary rates widened.

[26] Asia's reporting economies of locational banking statistics–statistics that comprise bilateral bank claims–are Australia; Japan; the Republic of Korea; and Taipei,China.

[27] There were only 29 economies that reported bilateral bank claims as of end-2015. None are from the Middle East. The remaining 6.1% was contributed by Guernsey; the Isle of Man; Jersey; Macau, China; and Switzerland.

[28] The official sector comprises the general government sector, the central bank sector, and international organizations.

Box 3.1: The Recent Rise in Nonperforming Loans in Asia and Policy Considerations

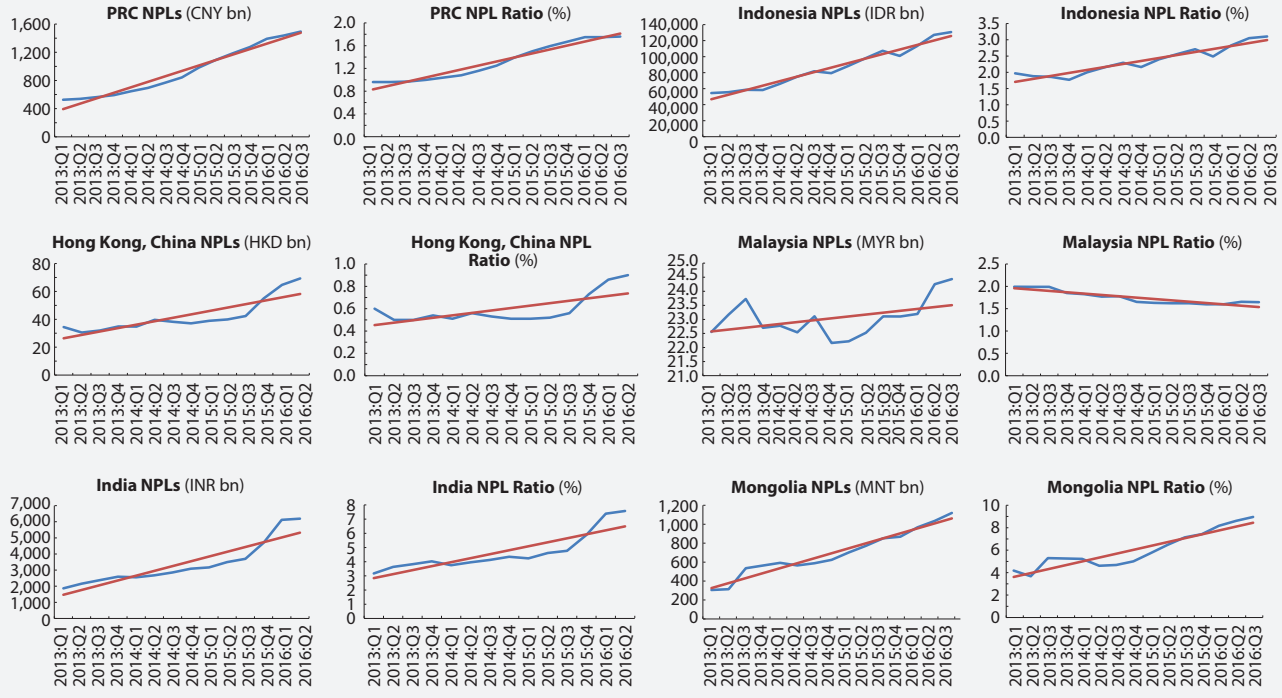
Asia needs to monitor both the type of financial assets flowing into the region to minimize volatility and the quality of financial assets held in the region to ensure stability. Increased regional integration in banking claims—and its closer financial links globally than regionally—are raising concerns over nonperforming loans (NPLs).

NPLs are generally defined as past due loans—unpaid past their due date. The 1997/98 Asian financial crisis (AFC)—characterized by currency and maturity mismatches—caused many loans to go bad and created an NPL crisis. The asset quality of banks since then has grown much better because of regulatory safeguards and strengthened supervision, the design and use of asset management companies (AMCs) in resolving NPLs, growth in nominal income, and increased financial inclusion.

However, since 2013, NPLs have been rising in many economies in Asia—Bangladesh and India (in South Asia); the People's Republic of China (PRC); Hong Kong, China; and Mongolia (East Asia); and in Cambodia, Indonesia, Malaysia, and Thailand (Southeast Asia). As percentage of total loans, NPLs averaged 4.8% in 2015 (box figure). Those with NPLs between 4.8% and 10.0% include Armenia, Azerbaijan, Bangladesh, India, Kazakhstan, the Kyrgyz Republic, and Samoa. Asian banking systems with NPL ratios above 10% include Afghanistan, Bhutan, the Maldives, Pakistan, and Tajikistan (box table).

The ongoing economic slowdown combined with intensified global risk aversion and tighter financing conditions might have contributed to rising NPLs and heightened credit risks. Empirical estimates generally confirm that lower output growth is associated with rising NPLs. With slower economic growth, creditors' debt servicing capacity weakens, causing NPLs to surge. Economic literature also suggests the existence of moral hazard (Klein, 2013; and Keeton and Morris, 1987). Estimates indicate a negative relationship between equity-to-asset ratios and NPLs—that is, poorly capitalized banks tend to have allowed lending to riskier clients. The risk-taking behavior is also shown through the direct relationship between loan-to-deposit ratios and NPLs. While past

NPLs and NPL Ratios of Selected Asian Economies



CNY = PRC yuan; HKD = Hong Kong, China dollars; IDR = Indonesian rupiah; INR = Indian rupee; MNT = Mongolian tögrög; MYR = Malaysian ringgit; NPLs = Nonperforming Loans; PRC = People's Republic of China.
Sources: ADB calculations using data from CEIC; and Haver Analytics.

excessive lending as measured by lagged loan growth is positively related to NPLs, profitability (measured by return on equity) is negatively related to NPLs (Makri et al 2013 and Klein 2013). Profitable banks have less incentive to get into high-risk activities. Past episodes of financial crisis offer strong lessons that rising NPLs must be addressed quickly. Early "clean-up" of NPLs from bank balance sheets is essential to ensure quality and productive loans. can continue.

NPL Ratios of Selected Asian Economies

Economy	NPL Ratio (%)	Year
Below 5%		
Turkmenistan	0.01	2014
Brunei Darussalam	0.4	2015
Uzbekistan	0.4	2015
Republic of Korea	0.6	2014
New Zealand	0.6	2015
Hong Kong, China	0.7	2015
Singapore	0.9	2015
Australia	1.0	2015
People's Republic of China	1.5	2015
Cambodia	1.6	2015
Japan	1.6	2015
Malaysia	1.6	2015
Fiji	1.8	2015
Philippines	1.9	2015
Georgia	2.7	2015
Thailand	2.7	2015
Viet Nam	2.9	2014
5% to below 10%		
Samoa	5.3	2015
Kyrgyz Republic	7.1	2015
Armenia	7.9	2015
Kazakhstan	8.0	2015
Bangladesh	9.3	2015
Above 10%		
Pakistan	11.4	2015
Bhutan	11.9	2015
Afghanistan	12.3	2015
Maldives	14.1	2015
Tajikistan	19.1	2015

Sources: World Bank. World Development Indicators. http://data.worldbank.org/data-catalog/world-development-indicators (accessed September 2016).

Intraregional bank claims also decreased $63.3 billion in 2015 from 2014, driven largely by the PRC's $49.9 billion contribution. This was most likely underpinned by the PRC economic slowdown coupled with a rise in PRC non-performing loans (NPLs) (Box 3.1). Nonetheless, the PRC remained one of the top destinations of Asia's intraregional bank claims.

In 2015, Hong Kong, China; Singapore; and the PRC ranked as top regional destinations for Asia's cross-border bank claims with Australia following closely (Table 3.5). Their combined share of Asia's intraregional bank claims was 63.3%, whereas their share of Asia's total cross-border bank claims was 14.1%. Although regional banking market integration appears to be making gradual progress, Asian banking markets remained more linked to the rest of the world than to the region. The US remained the top destination of Asia's bank claims, although its relative share declined from 30.3% in 2010 to 29.4% in 2015. The EU's share of Asia's total bank claims also declined, but remained the second top destination in 2015. There has been a significant increase in Asia's bank claims on the Cayman Islands—$543 billion in 2015, with 96.1% ($522 billion) coming from Japan.

Data on Asia's cross-border bank claims by reporter were derived from four economies—Australia, Japan, the Republic of Korea, and Taipei,China. Among them, Japan held the largest share in 2015, at 76.6%, down from 91.8% in 2001 (Figure 3.18). As Japan's relative contribution declined, the other economies increased their share—in 2015, Australia held 10.7%, the Republic of Korea 4.3%, and Taipei,China 8.5%.[29]

Asia's cross-border bank liabilities also increased from $655 billion in 2001 to $2.3 trillion in 2015 (Figure 3.19). While absolute levels increased between 2001 and 2015, the intraregional share of cross-border bank liabilities fell from 35.4% in 2001 two 23.1% in 2015, indicating that Asia borrowed increasingly more from economies outside the region than within the region over the period. The intraregional share recovered modestly from its 19.2%

[29] Hong Kong, China began reporting in December 2014. This is not shown in Figure 14 as it shows a dramatic increase, beginning that month, distorting the analysis. The Republic of Korea began reporting in December 2005. India, Indonesia, Malaysia, and Singapore also report total bank claims, but do not provide a bilateral breakdown.

lowest point in 2010 despite the overall decline over 2001–2015.

Asia's cross-border bank liabilities have been falling since 2013, with its largest contraction of $70.5 billion in 2013 (Figure 3.20). Liabilities fell by $19.7 billion in 2014 and again by $29.7 billion in 2015. This drop was driven by the EU's decline by $49.0 billion in 2014 and by $100.9 billion in 2015. The rising intraregional change in bank liabilities in 2015 was mainly driven by an increase in Hong Kong, China ($18.3 billion) and the PRC ($15.3 billion). The economic slowdown accompanied by the rise in NPLs in the PRC could have prompted domestic investors to borrow elsewhere in the region.

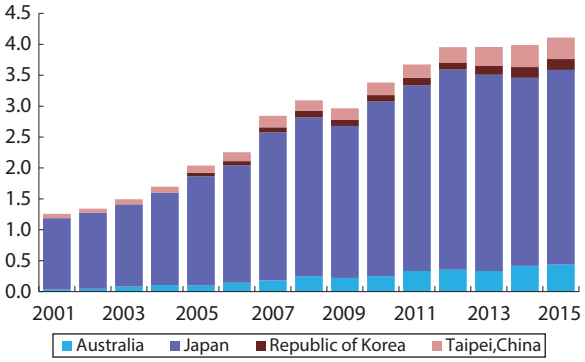
In 2015, Hong Kong, China; Singapore; and the PRC were Asia's top three borrowers from the region's banks (Table 3.6). Japan ranked fourth. Their combined

Table 3.5: Destination of Asia's Bank Claims ($ billion)

	2015		2010		% Change
Asia					
Hong Kong, China	204	(5.0%)	117	(3.5%)	▲
Singapore	187	(4.6%)	138	(4.1%)	▲
People's Republic of China	184	(4.5%)	48	(1.4%)	▲
Other Asia	333	(8.1%)	248	(7.3%)	▲
Asia Bank Claims, Asia	907	(22.1%)	551	(16.3%)	▲
Non-Asia					
United States	1,210	(29.4%)	1,025	(30.3%)	▼
European Union	1,118	(27.2%)	1,124	(33.2%)	▼
Cayman Islands	543	(13.2%)	322	(9.5%)	▲
Other non-Asia	332	(8.1%)	360	(10.6%)	▼
Non-Asia Bank Claims, Asia	3,203	(77.9%)	2831	(83.7%)	▼
Total Cross-border Bank Claims, Asia	**4,110**	**(100.0%)**	**3,383**	**(100.0%)**	

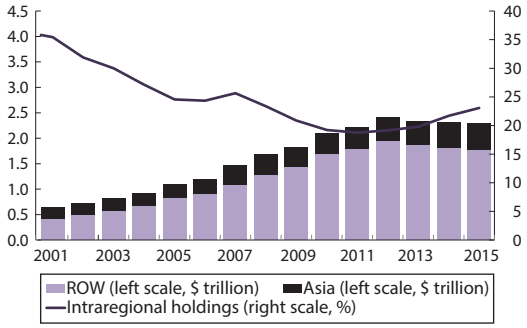
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Figure 3.18: Cross-border Bank Claims—Asia by Reporter ($ trillion)



Note: Asia partners include all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Figure 3.19: Cross-border Bank Liabilities—Asia

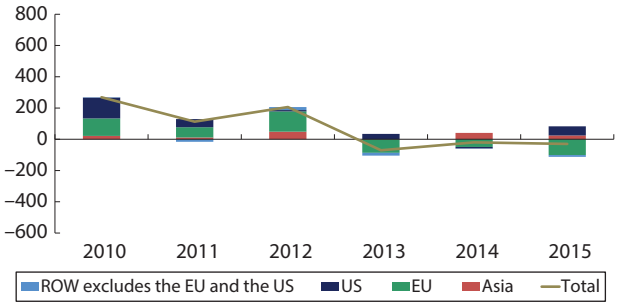


ROW = rest of the world.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

share of Asia's intraregional bank liabilities was 74.1%, equivalent to just 17.1% of Asia's total. In 2010, Asia's top three borrowers were Hong Kong, China; Singapore; and Japan with the PRC ranked fourth. Similar to the trend in portfolio investment, Asia's banks borrow more from the rest of the world than within the region. But Asia's bank borrowing from non-Asian economies has decreased, primarily due to the large decline in Asia's bank borrowing from the EU as well as from the Cayman Islands. Its borrowing from the US, however, increased in both absolute and relative terms.

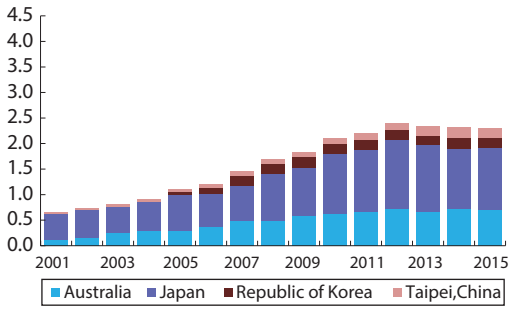
Similar to Asia's cross-border bank claims by reporter, data on Asia's cross-border bank liabilities by reporter comprise the same four economies—Australia; Japan; the Republic of Korea; and Taipei,China. Japan explains more than half of Asia's cross-border bank liabilities (52.5%) in 2015 (Figure 3.21). Australia; the Republic of Korea; and Taipei,China accounted for 30.9%, 8.7%, and 7.9%, respectively. Australia's share rose from 17.9% in 2001 to 30.9% in 2015; the Republic of Korea's from 5.2% to 8.7%; and Taipei,China's from 4.3% to 7.9%.

Figure 3.20: Change in Bank Liabilities—Asia ($ billion)



EU = European Union, ROW = rest of the world,US = United States.
Note: Asia includes all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Figure 3.21: Sources of Bank Liabilities ($ trillion)



Note: Asia partners include all the ADB 48 regional members for which data are available.
Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Table 3.6: Sources of Asia's Bank Liabilities ($ billion)

	2015		2010		% Change
Asia					
Hong Kong, China	207	(9.0%)	141	(6.7%)	▲
Singapore	126	(5.5%)	132	(6.3%)	▼
People's Republic of China	59	(2.6%)	16	(0.8%)	▲
Other Asia	137	(6.0%)	114	(5.4%)	▲
Asia Bank Liabilities, Asia	529	(23.1%)	402	(19.2%)	▲
Non-Asia					
European Union	846	(36.9%)	887	(42.4%)	▼
United States	754	(32.9%)	613	(29.3%)	▲
Cayman Islands	44	(1.9%)	81	(3.9%)	▼
Other non-Asia Liabilities	119	(5.2%)	110	(15.2%)	■
Non-Asia Bank Liabilities, Asia	1,763	(76.9%)	1,691	(80.8%)	▼
Total Cross-border Bank Liabilities, Asia	**2,292**	**(100.0%)**	**2,093**	**(100.0%)**	

Source: ADB calculations using data from Bank for International Settlements. Banking Statistics. https://www.bis.org/statistics/bankstats.htm (accessed September 2016).

Price Indicators

Despite being more integrated globally, Asia's equity markets are increasingly integrated regionally.

Although the correlation of Asian intraregional equity returns has increased since the GFC, it remains below its correlation with global equity returns. Asian bond markets remain much less integrated than their equity market counterparts—both regionally and globally. While deepening financial integration is a welcome development for better resource allocation regionally, it may also increase vulnerability to financial contagion, capital flow reversals, and greater output volatility.

Equity

Price-based indicators for equity market integration suggest that Asia's equity markets are increasingly integrated both regionally and globally.

Weekly data on equity returns from January 1999 to September 2016 show that return comovements between Asia and Asia as well as between Asia and world equity markets have increased (Table 3.7). The average simple correlation of Asian equity returns with the region increased from 0.28 before the GFC to 0.36 afterward—a trend shared by all subregions. The simple correlation of Asian equity returns with the world also increased from 0.32 to 0.43.[30]

Particularly notable is the increased correlation of Central Asian equity markets with the region after the GFC, while there was hardly any correlation before the crisis. Central Asia's increased correlation with world equity markets is also significant because, again, it was barely correlated with the global markets before the GFC. Both regional and global correlation of Asian equity returns peaked during the crisis. Equity market correlations tend to spike during crises, likely caused by increased spillover effects (Hinojales and Park 2010).

Equity return correlations between Asia and the PRC have increased noticeably from a very low base before the GFC, a trend shared among all subregions (Table 3.8). Equity return correlations between Asia and Japan also increased, though from a higher base than the pre-GFC Asia–PRC correlation. With increased equity market comovements, the economic slowdown and stock market

Table 3.7: Average Simple Correlation of Stock Price Index Weekly Returns—Asia with Asia and World

	Asia			World		
Region	Pre-GFC Q1 1999–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016	Pre-GFC Q1 1999–3Q2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016
Central Asia	0.09	0.15	0.19	0.02	0.14	0.24
East Asia	0.35	0.61	0.48	0.42	0.57	0.57
Southeast Asia	0.33	0.72	0.43	0.34	0.64	0.48
South Asia	0.14	0.32	0.15	0.15	0.31	0.18
Oceania	0.38	0.74	0.55	0.57	0.77	0.70
Asia	0.28	0.53	0.36	0.32	0.50	0.43

GFC = global financial crisis.
Central Asia includes Georgia, Kazakhstan, and the Kyrgyz Republic. East Asia includes the People's Republic of China; Hong Kong, China; Japan; the Republic of Korea; Mongolia; and Taipei,China. Southeast Asia includes Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. South Asia includes Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Oceania includes Australia and New Zealand. Asia includes all economies from each subregion.
Notes: Values refer to the average of pair-wise correlations. Weekly returns are computed as the natural logarithm difference between weekly average of daily stock price index for the current week, and the weekly average of the daily stock price index from the previous week.
Sources: ADB calculations using data from Bloomberg; CEIC; Stooq. http://stooq.com/q/d/?s=^sti (accessed August 2016); and World Bank. World Development Indicators http://data.worldbank.org/data-catalog/world-development-indicators (accessed September 2016).

[30] The "Asia index" of each economy is created using the weighted sum of the index of individual economies, excluding the economy of interest. The current GDP in US dollar terms serves as weights for the Asia indexes. This methodology is based on Park and Lee (2011).

Table 3.8: Average Simple Correlation of Stock Price Index Weekly Returns—Asia with the PRC and Japan

Region	PRC			Japan		
	Pre-GFC Q1 1999–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016	Pre-GFC Q1 1999–3Q2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016
Central Asia	0.00	0.07	0.11	0.15	0.15	0.17
East Asia	0.08	0.33	0.30	0.31	0.52	0.39
Southeast Asia	0.09	0.37	0.21	0.29	0.67	0.34
South Asia	0.06	0.17	0.10	0.13	0.30	0.14
Oceania	0.06	0.32	0.25	0.41	0.76	0.56
Asia	0.07	0.27	0.20	0.26	0.49	0.30

GFC = global financial crisis, PRC = People's Republic of China.
Central Asia includes Georgia, Kazakhstan, and the Kyrgyz Republic. East Asia includes the PRC; Hong Kong, China; Japan; the Republic of Korea; Mongolia; and Taipei,China. Southeast Asia includes Indonesia, Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. South Asia includes Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Oceania includes Australia and New Zealand. Asia includes all economies from each subregion.
Notes: Values refer to the average of pair-wise correlations. Weekly returns are computed as the natural logarithm difference between weekly average of daily stock price index for the current week, and the weekly average of the daily stock price index from the previous week.
Sources: ADB calculations using data from Bloomberg; CEIC and Stooq. http://stooq.com/q/d/?s=^sti (accessed August 2016).

Table 3.9: Average Simple Correlation of Stock Price Index Weekly Returns—Asia with the EU and the US

Region	EU			US		
	Pre-GFC Q1 1999–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016	Pre-GFC Q1 1999–3Q2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016
Central Asia	–0.01	0.17	0.15	-0.03	0.10	0.21
East Asia	0.38	0.55	0.50	0.34	0.49	0.52
Southeast Asia	0.29	0.64	0.40	0.28	0.54	0.44
South Asia	0.11	0.34	0.14	0.10	0.28	0.17
Oceania	0.53	0.79	0.65	0.51	0.72	0.66
Asia	0.27	0.51	0.36	0.25	0.43	0.39

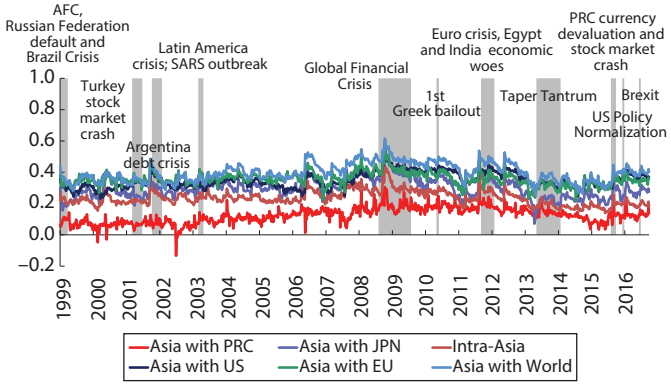
GFC = global financial crisis; EU = European Union; US = United States.
Central Asia includes Georgia, Kazakhstan, and the Kyrgyz Republic. East Asia includes the People's Republic of China; Hong Kong, China; Japan; the Republic of Korea; Mongolia; and Taipei,China. Southeast Asia includes Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. South Asia includes Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Oceania includes Australia and New Zealand. Asia includes all economies from each subregion.
Notes: Values refer to the average of pair-wise correlations. Weekly returns are computed as the natural logarithm difference between weekly average of daily stock price index for the current week, and the weekly average of the daily stock price index from the previous week.
Sources: ADB calculations using data from Bloomberg; CEIC and Stooq. http://stooq.com/q/d/?s=^sti (accessed August 2016).

slump in the PRC may present a risk to the region's equity markets.

The return correlation of Asia's equity markets with the EU increased from 0.27 before the GFC to 0.36 afterward (Table 3.9). The return correlation of Asia's equity markets with the US also increased after the crisis, from 0.25 to 0.39. These increased global linkages suggest potential vulnerability of Asian equity markets to increased market volatility in the EU—for example through Brexit—or in the US during its monetary tightening cycle.

As seen in the correlation table over different sample periods, the simple correlations can be subject to large variation during the crisis. To correct for the shortcomings of measuring integration using average simple correlation, a dynamic conditional correlation (DCC) model can be used (Hinojales and Park 2010). This model, proposed by Engle (2002), incorporates time-varying volatilities instead of simple correlations. A higher time-varying correlation indicates larger comovement between equity

Figure 3.22. Conditional Correlations of Equity Markets—Asia with Select Economies and Regions



AFC = Asian financial crisis; PRC = People's Republic of China; JPN = Japan; EU = European Union; US = United States; SARS = Severe Acute Respiratory Syndrome.
Note: Asia includes Australia; Bangladesh; the PRC; Georgia; Hong Kong, China; India; Indonesia; Japan; Kazakhstan; the Kyrgyz Republic; the Republic of Korea; the Lao People's Democratic Republic; Malaysia; Mongolia; Nepal; New Zealand; Pakistan; the Philippines; Singapore; Sri Lanka; Taipei,China; Thailand; and Viet Nam.
Sources: ADB calculations using data from Bloomberg; CEIC; Stooq. http://stooq.com/q/d/?s=^sti (accessed August 2016); and methodology by Hinojales and Park (2010).

markets at a point in time.[31] Consistent with the results from simple correlation, these results indicate that Asia's DCCs with the region and world are increasing (Figure 3.22). Also in line with the results from simple correlation, Asia's equity markets remain more integrated with world markets than the region's. Similar to the results from simple correlation, Asia's equity markets are more correlated with the world than those of the EU and the US. Almost all correlations of Asia's equity markets with Japan remain higher than those with the region. Their correlation with the PRC remains the lowest—though it increased after the GFC.

Having decreased since the GFC, conditional correlations of Asian equity markets with global and regional markets have picked up recently. The most noticeable recent increase has been with the PRC market since 2015, although the Asia-PRC correlation is yet to recover to its GFC level.

Debt

Price-based indicators for bond market integration suggest that Asia's local currency bond market integration is gaining momentum.

Data on weekly bond returns from January 2005 to September 2016 show that, post-GFC, Asia's bond market is more correlated with the region's bond markets than with the world's (Table 3.10). Increased regional correlations are mainly due to the increased regional correlations of India, Indonesia, the Republic of Korea, Malaysia, Singapore, and Thailand.[32] While regional correlations increased noticeably, the correlation of Asian economies with the world remained unchanged post-GFC. Especially, the PRC's correlation with the region's bond market increased from 0.01 pre-GFC to 0.28 post-GFC, whereas its pre- and post-GFC correlation with world bond market remained unchanged.

The simple correlations of Asian bond markets with the PRC and Japan also increased following the GFC (Table 3.11). Particularly noteworthy is the increased correlation of individual Asian economies with the PRC—from 0.00 pre-GFC to 0.18 post-GFC. The correlations of India, Indonesia, the Republic of Korea, and Singapore with the PRC turn positive after the crisis from negative beforehand. Australia, Malaysia, and Thailand's correlations with the PRC also increased noticeably after the crisis.

Asia's correlation with Japan marginally increased, from 0.19 before the crisis to 0.20 afterward. The region's more

[31] Estimates of the conditional correlations use the GARCH (1,1)-DCC model in which a two-step estimation procedure is applied. First, equity return residuals of individual economies are estimated using a univariate GARCH model. These residuals are subsequently used to get the conditional correlation of each economy's equity returns with that of another economy. The correlation estimator is defined as

$$\rho_{i,j,t} = \frac{q_{i,j,t}}{\sqrt{q_{i,i,t}\ q_{j,j,t}}}$$

where $\rho_{i,j,t}$ is the conditional correlation between the equity asset returns of economies i and j at time t, and $q_{i,j,t}$ is the off-diagonal elements of the variance–covariance matrix.

The GARCH(1,1) process followed by the qs is as follows:

$$q_{i,j,t} = \overline{\rho_{i,j}} + \alpha\left(\varepsilon_{i,t-1}\varepsilon_{j,t-1} - \overline{\rho_{i,j}}\right) + \gamma\left(q_{i,t-1}q_{j,t-1} - \overline{\rho_{i,j}}\right)$$

where $\rho_{i,j,t}$ is the unconditional expectation of the cross product $\varepsilon_{i,t-1}\varepsilon_{i,t-1}$.

[32] The regional bond market is computed using the same methodology as the regional equity market.

Table 3.10: Average Simple Correlation of Weekly Bond Return Index—Asia with Asia and World

	Asia			World		
Economies	Pre-GFC Q1 2005–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016	Pre-GFC Q1 2005–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016
Australia	0.38	0.37	0.32	0.41	0.34	0.38
PRC	0.01	0.24	0.28	0.04	0.09	0.04
Japan	0.08	0.31	0.06	0.23	0.28	–0.04
Indonesia	–0.15	–0.06	0.16	0.02	0.24	0.25
India	0.28	0.33	0.17	0.29	0.52	0.41
Republic of Korea	0.15	0.36	0.32	0.37	0.23	0.26
Malaysia	0.22	0.31	0.29	0.13	0.27	0.13
Philippines		0.30	0.21		0.14	0.15
Singapore	0.29	0.41	0.42	0.27	0.31	0.46
Thailand	0.20	0.53	0.30	0.29	0.32	0.24
Asia	0.16	0.31	0.26	0.23	0.27	0.23

GFC = global financial crisis; PRC = People's Republic of China.
Notes: Values refer to the average of pair-wise correlations. Weekly returns are computed as the natural logarithm difference between weekly average of daily bond return index for the current week, and the weekly average of the daily bond return index from the previous week. All bond return indexes are comprised by local currency government-issued bonds.
Sources: ADB calculations using data from Bloomberg; and World Bank. World Development Indicators http://data.worldbank.org/data-catalog/world-development-indicators (accessed September 2016).

Table 3.11: Average Simple Correlation of Weekly Bond Return Index—Asia with the PRC and Japan

	PRC			Japan		
Economies	Pre-GFC Q1 2005–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016	Pre-GFC Q1 2005–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016
Australia	0.06	0.11	0.26	0.59	0.56	0.42
PRC	0.00	0.00	0.00	0.07	–0.05	0.11
Japan	–0.09	0.47	0.22	0.06	0.18	–0.03
Indonesia	–0.12	0.06	0.13	–0.25	–0.06	0.11
India	0.07	–0.05	0.11	0.00	0.00	0.00
Republic of Korea	–0.06	0.29	0.24	0.16	0.18	0.35
Malaysia	0.10	0.25	0.22	0.21	0.07	0.09
Philippines		0.17	0.03		0.24	0.10
Singapore	–0.09	0.08	0.15	0.32	0.40	0.38
Thailand	0.11	0.28	0.21	0.37	0.28	0.22
Asia	0.00	0.19	0.18	0.19	0.20	0.20

GFC = global financial crisis; PRC = People's Republic of China.
Notes: Values refer to the average of pair-wise correlations. Weekly returns are computed as the natural logarithm difference between weekly average of daily bond index for the current week, and the weekly average of the daily bond index from the previous week. All bond indexes are comprised by local currency government-issued bonds.
Source: ADB calculations using data from Bloomberg.

Table 3.12: Average Simple Correlation of Weekly Bond Return Index—Asia with the EU and the US

Economies	EU			US		
	Pre-GFC Q1 2005–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016	Pre-GFC Q1 2005–Q3 2007	GFC Q4 2007–Q2 2009	Post-GFC Q3 2009–Q3 2016
Australia	0.75	0.68	0.38	0.75	0.69	0.73
PRC	0.13	0.02	0.14	0.05	0.09	0.17
Japan	0.26	0.28	0.17	0.21	0.38	0.09
Indonesia	–0.23	–0.14	0.18	–0.18	0.00	0.09
India	0.62	0.60	0.28	0.52	0.56	0.49
Republic of Korea	0.26	0.17	0.33	0.29	0.21	0.46
Malaysia	0.18	0.22	0.20	0.16	0.25	0.19
Philippines		0.01	0.20		0.21	0.15
Singapore	0.32	0.50	0.40	0.35	0.55	0.63
Thailand	0.34	0.45	0.27	0.33	0.44	0.35
Asia	0.29	0.28	0.26	0.28	0.34	0.33

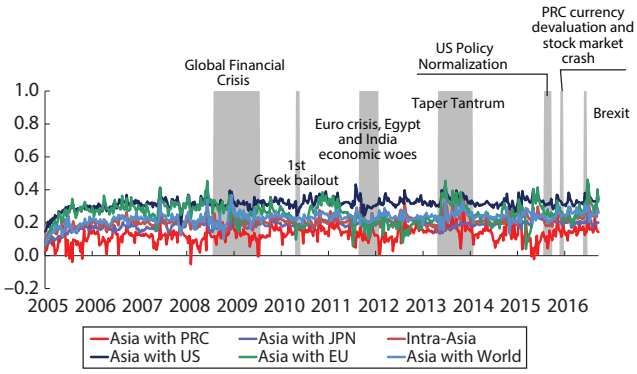
EU = European Union; GFC = global financial crisis; PRC = People's Republic of China; US = United States
Notes: Values refer to the average of pair-wise correlations. Weekly returns are computed as the natural logarithm difference between weekly average of daily bond index for the current week, and the weekly average of the daily bond index from the previous week. All bond indexes are comprised by local currency government-issued bonds.
Source: ADB calculations using data from Bloomberg.

advanced economies (including Australia, the Republic of Korea, and Singapore) are relatively more positively correlated with Japan than other regional economies.

While the correlation of Asian economies with the world bond market remain unchanged pre- and post-GFC, its correlation with the US increased and its correlation with the EU decreased (Table 3.12). The heightened correlation with the US post-GFC is attributed to the increased correlation between the US and the Republic of Korea, as well as between the US and Singapore. The drop in correlation with the EU is due to a decline in correlation between the EU and Australia, and between the EU and India, and between the EU and Japan.

Estimating Asia's bond market DCC shows that its correlation with the region and selected economies is below Asia's equity market correlation with the region and corresponding selected economies (Figure 3.23). This suggests that Asia's equity markets are more integrated both regionally and globally than Asia's bond markets. The correlation of the EU and the US bond markets with Asia's is highest among the selected economies, except during 2011–2013. During this period, the EU's bond market correlation with Asia dipped, but recovered during the onset of the "taper tantrum" in 2013–2014. Similar to the equity market, Asia's bond market correlation with the PRC's bond market remains lowest among the select economies, but exhibits an upwards trend.

Figure 3.23: Conditional Correlations of Bond Markets—Asia with Select Economies and Regions



PRC = People's Republic of China; JPN = Japan; EU = European Union; US = United States.
Asia includes Australia, the PRC, India, Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Singapore, and Thailand.
Sources: ADB calculations using data from Bloomberg and methodology by Hinojales and Park (2010).

More importantly, the DCC of Asia's bond markets shows sharp rises for specific economies during crises. During the European sovereign debt crisis and Brexit, for instance, Asia's bond market correlation with the EU bond market increased sharply. Immediately before the PRC currency devaluation, its correlation with selected global bond markets again increased. Its correlation with the PRC bond market was in stark contrast—a pronounced negative correlation.

Financial Spillovers

Equity

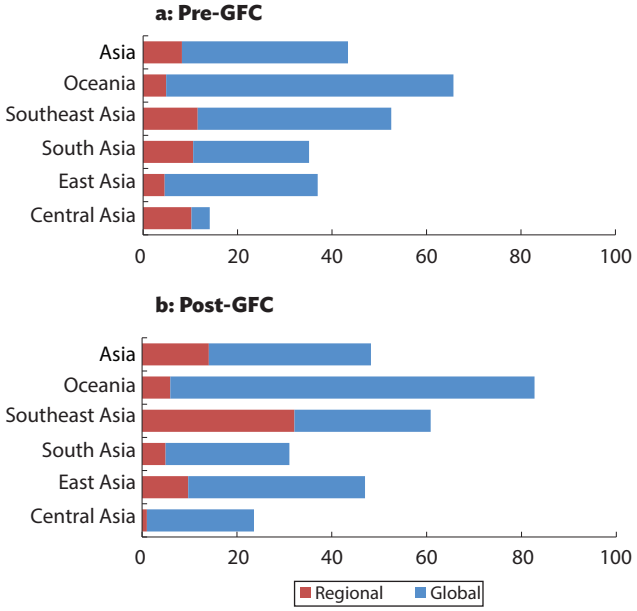
Asia's equity markets are more vulnerable to global equity market volatility than regional volatility.

The correlations between Asia's equity markets with the region, the world, and other selected markets provide a glimpse of Asia's global and regional linkages. However, they do not provide sufficient information on risk spillovers originating from any specific region. The increased correlation of equity markets with the region and the world can also increase the contagion of booms and busts in the region. The variance decomposition of Asia's equity returns shows Asia's integration with both the region and the world has increased from pre- to post-GFC periods (Figures 3.24a and 3.24b).[33]

The results indicate that Asia's equity markets are more vulnerable to volatility from the global equity market than to volatility from regional equity markets. Figures 3.24a and 3.24b shows global shocks explain a dominant share of variance in Asia's local equity returns both pre- and post-GFC. The variance of Asian equity returns are increasingly subject more to global market volatility than to regional volatility, confirming Asian equity markets' greater global than regional integration—as indicated in the earlier quantity analysis as well as simple correlation and DCC analysis.

However, compared with the pre-GFC period, the combined share of variance explained by global and regional shocks substantially increased. Although the share of global shock in local equity return variance is still much greater post-GFC, the share of regional shocks in the equity return variance also increased, suggesting gradual progress in Asian equity market integration.

Figure 3.24: Share of Variance in Local Equity Returns Explained by Global and Regional Shocks (%)



GFC = global financial crisis.
Notes: Pre-GFC = January 1999 to September 2007. Post-GFC = July 2009 to September 2016.
Central Asia includes Georgia, Kazakhstan, and the Kyrgyz Republic. East Asia includes the People's Republic of China; Hong Kong, China; Japan; the Republic of Korea; Mongolia; and Taipei,China. Southeast Asia includes Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. South Asia includes Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Oceania includes Australia and New Zealand. Asia includes Central Asia, East Asia, South Asia, Southeast Asia and Oceania.
Sources: ADB calculations using data from Bloomberg; World Bank. World Development Indicators http://data.worldbank.org/data-catalog/world-development-indicators (accessed September 2016); and methodology by Lee and Park (2011).

[33] The formula to arrive at the regional and the global variance decomposition are as follows:

$$VR^{G}_{c,t} = \frac{(\beta^{G}_{c,t})^2 \sigma^2_{G,t}}{\sigma^2_{c,t}} \qquad VR^{EA}_{c,t} = \frac{(\beta^{EA}_{c,t})^2 \sigma^2_{EA,t}}{\sigma^2_{c,t}}$$

where $VR^{EA}_{c,t}$, and $VR^{G}_{c,t}$ are the regional and global variance of economy c, at time t, respectively. $\beta^{EA}_{c,t}$ and $\beta^{G}_{c,t}$ are the economy-specific sensitivity to the regional and global beta at time t, respectively. These were obtained from the following equation –

$$\varepsilon_{c,t} = \alpha_{c,t} + \beta^{EA}_{c,t}\varepsilon_{EA,t} + \beta^{G}_{c,t}\varepsilon_{G,t}$$

The formula was applied on a rolling basis, with 78 weekly data points. and are the regional conditional variance and global conditional variance, estimated from the above equation. They are assumed to follow a standard asymmetric GARCH (1, 1) process. $\varepsilon_{c,t}$, $\varepsilon_{EA,t}$, $\varepsilon_{G,t}$ are the unexpected components of the equity market returns, which are proxied by the error terms obtained from the regression equation –

$$r_{c,t} = \delta_{0\,c,t} + \delta_{1\,c,t} r_{c,t-1} + \varepsilon_{c,t}$$

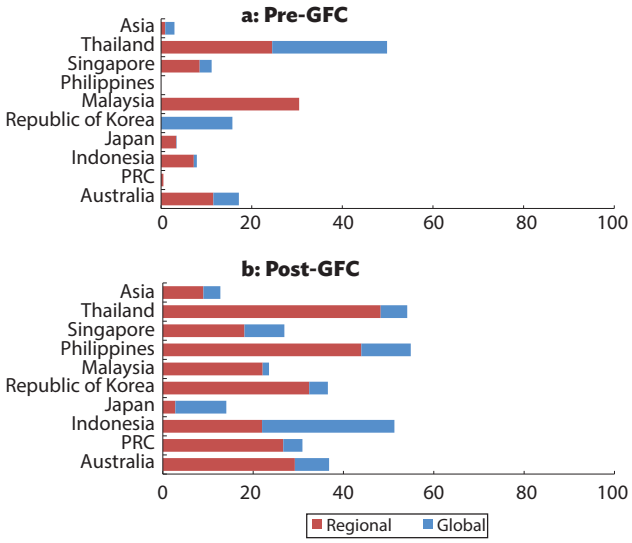
where $r_{c,t}$ is the weekly equity returns of each individual economy.

Debt

Unlike Asia's equity markets, its bond markets are more vulnerable to volatility in regional bond markets than global bond market volatility.

Following the same methodology as the variance decomposition of equity markets, the results indicate that variance of Asia's bond market returns, unlike Asia's equity returns, are more subject to regional than global risks (Figures 3.25a, 3.25b). This suggests the rise of Asian local currency bonds as an emerging market asset class. While foreign investors account for a significant share of many Asian local currency bonds, their investment interest for these local currency bonds might be similar across Asian economies. If global investors treat Asian local currency bonds as one emerging market asset class in their global portfolio management, their investment decisions for this asset class will be driven largely by common regional risk factors, making local bond returns most subject to regional market volatility.

Figure 3.25: Share of Variance in Local Bond Returns Explained by Global and Regional Shocks (%)



GFC = global financial crisis. PRC = People's Republic of China.
Notes: Pre-GFC = January 1999 to September 2007. Post-GFC = July 2009 to September 2016.
Sources: ADB calculations using data from Bloomberg; World Bank. World Development Indicators http://data.worldbank.org/data-catalog/world-development-indicators (accessed September 2016); and methodology by Lee and Park (2011).

Compared with the pre-GFC period, the combined share of variance explained by global and regional shocks also increased, suggesting greater global and regional integration, similar to equity markets. However, the share of regional shocks in local currency bond return variance is generally much greater than the share of global shocks.

Asian local currency bond markets have expanded dramatically since governments took steps to end the currency and maturity mismatches that savaged borrowers in the AFC nearly 20 years ago. Encouraged in part by regional cooperation programs including the Asian Bond Markets Initiative (ABMI), the value of local currency government and corporate bond sales expanded fourfold in the past decade, helping fund much-needed infrastructure development and protect business from global financial shocks (Box 3.2). Growing foreign participation also helped facilitate local currency bond market development—today global investors view Asian local currency bonds as an important asset class. This could have further promoted regional bond market integration post-GFC.

The cross-border dispersion of 10-year local currency government bond yields shows a yield convergence trend in regional bond markets between 2009 and 2014.

The cross-border dispersion of 10-year local currency government bond yields is estimated using σ-convergence of regional local currency government bond yields with 10-year maturity.[34] A noticeable spike was noted during the GFC for Asia and developing Asia, reflecting higher dispersion in Southeast Asia. While the dispersion narrowed after the GFC, Asia's σ-convergence displays a gradual increase between 2014 and 2015 (Figure 3.26a).

34 To compute for the dispersion or σ-convergence, each pairwise dispersion of bond yields r between economies i and j was obtained using –

$$\sigma_{ijy} = \left[\frac{1}{n-1}\sum_{\forall t}^{n}\left(r_{it} - r_{jt}\right)^2\right]^{1/2}$$

The formula was applied on a rolling basis, with 52 weekly data points. Each economy's σ-convergence is the simple mean of all its pairwise dispersions. The subregional and Asia σ-convergence is the unweighted mean of each included economy's σ-convergence.

Box 3.2: Asia's Financial Integration Initiatives—Then and Now

In the aftermath of the 1997/98 Asian financial crisis (AFC), the precursors of current financial integration initiatives were formed with financial stability and crisis management as urgent objectives. Once resolved, many became permanent features of the financial integration landscape within the region. Several regional groups are working to increase intraregional financial integration through these evolving initiatives.

The Association of Southeast Asian Nations (ASEAN)

i. In 1998, the terms of understanding for the ASEAN Surveillance Process (ASP) was endorsed and finalized. In 1999, it began as a mechanism for peer review and exchange of views among senior officials and finance ministers on ASEAN economic developments and policy issues. Since then, the ASP has reviewed global, regional, and individual country developments; and monitored exchange rate and macroeconomic aggregates as well as sectoral and social policies (ADBa, Anas and Atje 2005).

ii. In 2003, the Roadmap for the Integration (RIA) of ASEAN was endorsed at the 7th Asian Finance Ministers Meeting—and adopted at the 9th ASEAN Summit. A key component of the RIA covers Financial and Monetary Integration (RIA-FIN), which monitors and articulates objectives in four areas: (i) capital market development; (ii) financial services liberalization (FSL); (iii) capital account liberalization; and (iv) ASEAN currency cooperation. The goal was to meet the objectives of the ASEAN Economic Community Blueprint 2015. Several activities are under way (ASEAN 2016).

iii. In 2004, the ASEAN Capital Markets Forum (ACMF) was established to "develop a deep, liquid, and integrated regional capital market." Initiatives under the ACMF include harmonizing and mutually recognizing frameworks, establishing exchange linkages, building ASEAN as an asset class, strengthening bond markets, and aligning capital market development. The ACMF is focused on achieving its ACMF Vision 2025 (ACMF 2016).

iv. An ASEAN exchanges website was launched in 2011 to promote members' blue chip companies. This was followed by the creation of the ASEAN trading link (ATL) in September 2012, which electronically connects stock exchanges in Malaysia, Singapore, and Thailand. The ATL aims to promote intra-ASEAN cross-border equity trading by allowing investors to trade across these connected markets. This lowers funding costs for listed companies, trading costs for investors; increases investment flows and harnesses synergies in promoting ASEAN as a single asset class to regional and global investors (ASEAN Exchanges 2012).

v. The ASEAN Framework for Cross-Border Offering of Collective Investment Schemes (CIS) began operations in Malaysia, Singapore, and Thailand in August 2014 following the signing of a memorandum of understanding (MOU) in October 2013 (ACMF 2014). The framework allows fund managers operating in a member jurisdiction to offer CIS, such as unit trust funds, constituted and authorized in that jurisdiction, to retail investors in other member jurisdictions under a streamlined authorization process. The signatories also signed a separate MOU to provide mutual assistance and exchange of information for cross-border offerings of ASEAN CIS to nonretail investors (Securities Commission of Malaysia 2013). As of 29 February 2016, 13 funds have been authorized as Qualifying CIS Securities (ASEAN 2016).

vi. In April 2011, ASEAN central bank governors endorsed the ASEAN Financial Integration Framework (AFIF), which is hinged on the FSL objective of RIA-FIN. The AFIF views a semi-financially integrated region by 2020, and entails the harmonization of regulations and further capital flow liberalization (ADB 2013). The ASEAN central bank governors also endorsed the creation of the Task Force on the ASEAN Banking Integration Framework (ABIF), which aims to achieve ASEAN-wide banking sector liberalization by 2020. The Working Committee on Financial Service Liberalization focuses on further liberalization of the banking and insurance sectors (ASEAN 2016).

vii. In December 2014, ASEAN central bank governors finalized the ABIF, which was implemented by the ASEAN Finance Ministers' Meeting in March 2015. This means qualified ASEAN banks can be treated as local banks in ASEAN member economies if they set up operations, and it will allow small banks to expand activities in other ASEAN economies and for these banks to grow faster (ASEAN 2015a).

ASEAN+3

The Joint Statement on East Asia Cooperation, drafted and approved in November 1999, is the main document that details the establishment of the ASEAN+3 Finance Ministers Process (ASEAN a). The process aims to strengthen policy dialogue, coordination, and collaboration on common financial, monetary, and fiscal issues through its four components: (i) the Economic Review and Policy Dialogue, (ii) the Chiang Mai Initiative (CMI), (III) the Asian Bond Markets Initiative (ABMI), and (iv) the ASEAN+3 Research Group (ASEANb).

Box 3.2 continued

i. Formed in May 2000, the Economic Review and Policy Dialogue (ERPD) established the annual ASEAN+3 Finance Ministers Meeting and semiannual ASEAN+3 deputies meeting, which serve as venues to discuss economic and policy issues, among others. The ERPD contributes to the prevention of financial crises through swift implementation of remedial policies (Kawai and Houser 2007).

ii. The Chiang Mai Initiative (CMI), also formed in May 2000, was the first regional currency swap arrangement. It comprised a network of bilateral swap agreements among ASEAN+3 economies, and the expanded ASEAN swap arrangements to include all ASEAN members. This was replaced on 24 March 2010 by the Chiang Mai Initiative Multilateralization (CMIM), which aims to enhance the effectiveness of the CMI as a form of liquidity support in the region. The initial size of the CMIM Arrangement was $120 billion, which was increased to $240 billion at the 15th ASEAN+3 Finance Ministers and Central Bank Governors Meeting in 2011 (BSP 2016). The CMIM also established an independent regional surveillance mechanism unit, the ASEAN+3 Macroeconomic Research Office (AMRO). Since 2016, this office functions as a formal international organization (AMRO 2016).

iii. Launched in August 2003, the ABMI aims to develop efficient and liquid bond markets to enable the better use of Asian savings for Asian investments. It also aims to contribute to mitigating financial currency and maturity mismatches (Park 2016). Six voluntary working groups were established to focus on crucial areas for bond market development: (i) new securitized debt instruments; (ii) credit guarantee mechanisms; (iii) foreign exchange transactions and settlement issues; (iv) issuance of bonds denominated in local currency by multilateral development banks, foreign government agencies, and Asian multinational corporations; (v) local and regional rating agencies; and (vi) technical assistance coordination (ADB 2005).

ABMI paved way for the creation of the *AsianBondsOnline* (ABO) website in 2004. ABO "is a one-stop clearinghouse of information on sovereign and corporate bonds." It is funded by Japan's Ministry of Finance, through the Investment Climate Facilitation Fund (AsianBondsOnline).

A new ABMI roadmap was signed in May 2008 with four task forces created to (i) promote the issuance of local currency-denominated bonds, co-chaired by the People's Republic of China and Thailand, (ii) facilitate the demand of local currency-denominated bonds, co-chaired by Japan and Singapore, (iii) improve regulatory frameworks, co-chaired by Japan and Malaysia, and (iv) improve bond market infrastructure to encourage domestic issuance and increase secondary market liquidity, co-chaired by the Republic of Korea and the Philippines (AsianBondsOnline 2008).

Under Task Force I and together with ADB, the Credit Guarantee and Investment Facility (CGIF) was created in November 2010. ADB's Board of Directors approved in April 2010 the establishment of a CGIF trust fund with an initial capital of $700 million (ADB 2010 and ADBb).

Under Task Force III, the ASEAN+3 Bond Market Forum (ABMF)—a working group of experts—was established. Through two subforums, the ABMF proposed the establishment of the ASEAN+3 Multi-currency Banking Integration Framework (AMBIF). One of AMBIF's main goals is to standardize processes in note and bond issuance, as well as investment (ADB 2015a). In September 2015, Japan's Mizuho Bank issued Thai baht-denominated bonds worth THB3 billion, the first under AMBIF (ADB 2015b).

iv. ASEAN+3 finance ministers established a voluntary research group in August 2003 to explore ways to further strengthen regional financial cooperation and support the process. The first ASEAN+3 Research Group meeting was held in March 2004. In May 2005, the ASEAN+3 finance ministers endorsed three research areas for 2005 to 2006: (i) capital flow liberalization and institutional arrangements; (ii) capital market development, including the asset management industry; and (iii) policy coordination (ASEANb).

Executives' Meeting of East Asia Pacific (EMEAP) Central Banks

EMEAP is a forum of central banks and monetary authorities in the East Asia and Pacific region established in 1991. It aims to strengthen cooperation among its 11 members. EMEAP includes central banks from Australia; the PRC; Hong Kong, China; Indonesia; Japan; the Republic of Korea; Malaysia; New Zealand; the Philippines; Singapore; and Thailand (EMEAP).

i. EMEAP launched the first phase of the Asian Bond Fund (ABF1) in June 2003. The initiative facilitates channeling Asian economies' official reserves to investments in domestic bonds. Hence, it serves as an alternative investment for central banks, which allows diversifying investments. With an initial size of about $1 billion, managed passively by the Bank for International Settlements, ABF1 is fully invested in a basket of US dollar-denominated bonds issued by the government

from EMEAP economies (except Australia, Japan, and New Zealand) (EMEAP and ADBc).

ii. Building on the success of the ABF1, EMEAP launched the second phase of the Asian Bond Fund (ABF2) initiative in December 2004, 8 months after its announcement in April 2004 (ADBb). In contrast to ABF1, ABF2 invests in local currency governement bonds issued by eight EMEAP members. worth $2 billion. Half of the investment is directed to the ABF Pan-Asian-Bond Index Fund, a single bond fund investing in local currency government bonds issued in eight EMEAP markets. The remaining billion is invested in eight single-market funds each investing in local currency government funds, within EMEAP markets. The ABF2 began implementation in May 2005, with the completion of the $2-billion funding, the appointment of fund managers, a master custodian, and index provider for ABF2. The International Index Company constructed the iBoxx ABF index family, the benchmark for ABF2 funds. On 1 July 2006, EMEAP agreed to reinvest in ABF2 (Park 2016 and ADBc).

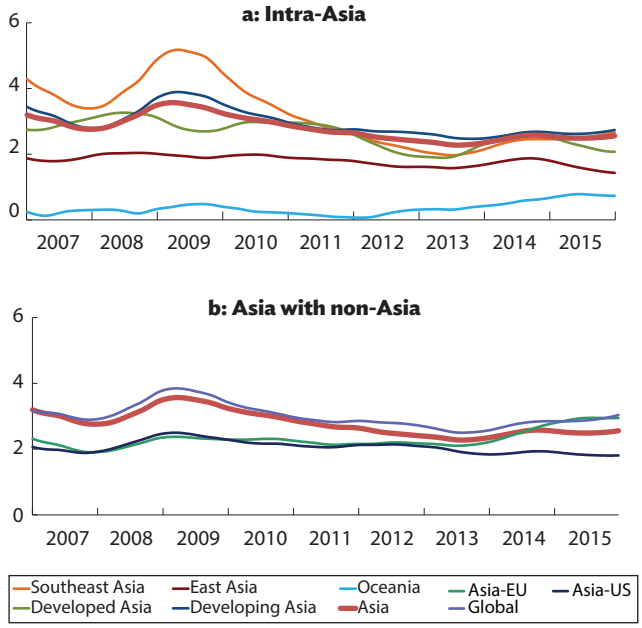
SAARCFINANCE

SAARCFINANCE is a Network of Central Bank Governors and Finance Secretaries of the South Asian Association for Regional Cooperation (SAARC), comprising Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. It was established on 9 September 1998 as a regional network of the SAARC Central Bank Governors and Finance Secretaries. It is a permanent body, which was formally recognized by SAARC at the 11th SAARC Summit (SAARCFINANCE).

i. The SAARCFINANCE Network objective is to share experiences on macroeconomic policy issues among members. The broad objectives include, among others, regional surveillance, promotion of cooperation among central banks, harmonization of regulations, and working toward a more efficient payment mechanism infrastructure (SAARCFINANCE).

ii. Following the decision of SAARC finance ministers at the SAARC Ministerial Meeting on GFC in 2009, the Reserve Bank of India offered the SAARC swap facility to all SAARC member economies. The SAARC Currency Swap Arrangement is available to all member countries with a floor of $100 million and ceiling of $400 million within an overall limit of $2 billion (RBI 2012). It was initially valid until 14 November 2015, but was extended by Reserve Bank of India to 14 November 2017 to enhance cooperation and strengthen financial stability in the region (RBI 2016).

Figure 3.26: σ-Convergence of 10-Year Government Bond Yields—Asia



EU = European Union, US = United States.
Notes: Values refer to the unweighted mean of individual economy's σ-convergence, included in the subregion. Each economy's ó-convergence is the simple mean of all its pairwise standard deviation. Data are filtered using Hodrick-Prescott method. East Asia includes People's Republic of China (PRC); Hong Kong, China (HKG); Japan (JPN); the Republic of Korea (KOR); and Taipei,China (TAP). Southeast Asia includes Indonesia, Malaysia, the Philippines, Thailand, and Singapore. Oceania includes Australia and New Zealand. Developed Asia includes JPN, and Oceania. Developing Asia includes Southeast Asia, the PRC, HKG, KOR, and TAP. Asia includes Developed Asia and Developing Asia. Global includes Asia, Colombia, the EU, Mexico, and the US.
Sources: ADB calculations using data from Bloomberg; CEIC; and methodology by Espinoza et al (2010), and Park (2013).

By subregion, East Asia's bond yield dispersion has been declining between mid-2014 and 2015. The decline in the PRC's σ-convergence might have contributed to this. What is driving the increased dispersion in the region is Southeast Asia. In particular, dispersion in Indonesian, Philippine, and Thai bond yields have been rising since end-2013—the latter part of the taper tantrum. Between the taper tantrum and policy normalization, these economies' bond yields have diverged from other Asian yields reflecting their sensitivity to swings in investor sentiment. These emerging market government bond prices fell sharply during the market turmoil due to flight to safety; for example, many investors fled to developed Asia and newly industrialized economy bonds.[35]

[35] Newly industrialized economies include Hong Kong, China; the Republic of Korea; Singapore; and Taipei,China.

However, Asia's local currency bond yields remain more linked to US bond yields (Figure 3.26b). While the Asia-US dispersion marginally increased during the taper tantrum, the trend afterward indicates that it has already declined, and remained below Asia's intraregional dispersion. Figure 3.26b also shows the effect of the eurozone crisis on Asia-EU yield convergence. At the onset of the crisis, Asia's bond yields started to diverge from the EU's. The Asia-EU yield dispersion was nearly as narrow as the Asia-US until mid-2014, but by May 2014, it was even higher than Asia's intraregional dispersion.

The AFC highlighted the need for greater regional financial cooperation and integration. Since then, Asian policy makers have enhanced regional financial cooperation and integration through initiatives like the Chiang Mai Initiative Multilateralization (CMIM), the ASEAN+3 Macroeconomic Research Office (AMRO) and the ABMI, among others. Likewise, the current ASEAN Economic Community (AEC) Blueprint 2025 cites financial integration as a strategic objective for the region.

The increasing linkages of Asia with both the region and the world are a result of greater financial openness. Increased regional financial integration yields numerous benefits for the regions' economies, such as more efficient allocation of excess savings toward more productive investment. Baele et al (2004) discuss three interrelated benefits of financial integration: (i) risk sharing, (ii) improved capital allocation, and (iii) economic growth. Lee and Park (2011) echo risk-sharing and more efficient capital allocation as derived benefits from financial integration. At the same time, a higher degree of financial interconnectedness increases the region's potential financial vulnerabilities, for example through financial contagion and spillover. Coupled with the amplification of shock propagation due to the increased synchronicity in financial cycles, greater financial interconnectedness can exacerbate volatility in the region (Ananchotikul et al 2015). As a result, it is also important to monitor the risk of financial contagion and spillovers, while facilitating regional financial integration.

Capital Flow Volatility

Financial inflows have become more stable after the GFC.

Capital flow volatility across all types of financial flows—equity, debt, FDI, and other investment flows—declined after the GFC compared with before the crisis. This general pattern may be the result of various regional various initiatives. FDI remains the least volatile form of financial flows, whereas debt flows represent the most volatile. Following the crisis, volatility in FDI net flows to Asia declined. Surprisingly, portfolio equity flows are less volatile than debt flows.

The composition of sources of funds in the region matters. Financial flows exhibiting unstable patterns can exacerbate uncertainty. Using data from the International Monetary Fund's International Financial Statistics from the first quarter of 1999 to the fourth quarter of 2015, the capital flow volatility has been measured by the standard deviation of net inflows to Asia, normalized by the economy's GDP. The results reveal that FDI is Asia's least volatile form of net flows, with the exception of Oceania, where portfolio flows were less volatile than FDI flows before the GFC (Table 3.13). Between the two types of portfolio flows, equity is surprisingly the more stable one during the sample period. Except in South Asia, where net debt flows are the least volatile asset class among portfolio flows, equity flows are more stable in all other subregions. A comparison of financial net flows to Asia before and after the GFC indicates that FDI net flows have been less volatile since the crisis. For the individual subregions, volatility of FDI net flows declined, except for South Asia.

South Asia's portfolio net inflows became more volatile after the GFC. In particular, the standard deviation of net portfolio debt flows increased to 0.85 (from 0.00 pre-crisis), while the volatility of net portfolio equity flows increased to 1.04 (from 0.90 pre-crisis). Net portfolio flows to East Asia, Southeast Asia, and Oceania have been more stable than in South Asia; the volatility of net debt flows to Central Asia remained unchanged when comparing flows before and after the GFC.

Table 3.13: Capital Flow Volatility—Asia (standard deviation of capital net flow levels as % of GDP)

Region	Portfolio (Debt)			Portfolio (Equity)		
	Pre-GFC Q1 1999–Q3 2007	Post-GFC Q3 2009–Q4 2015	Direction	Pre-GFC Q1 1999–Q3 2007	Post-GFC Q3 2009–Q4 2015	Direction
Central Asia	4.22	4.38	▲	1.97	1.03	▼
East Asia	1.99	1.42	▼	2.04	1.24	▼
South Asia	0.00	0.85	▲	0.90	1.04	▲
Southeast Asia	1.11	0.83	▼	1.05	0.70	▼
Oceania	3.34	2.85	▼	3.54	1.97	▼
Asia	1.46	0.97	▼	1.64	0.95	▼

Region	FDI			Financial Derivatives and Other Investments		
	Pre-GFC Q1 1999–Q3 2007	Post-GFC Q3 2009–Q4 2015	Direction	Pre-GFC Q1 1999–Q3 2007	Post-GFC Q3 2009–Q4 2015	Direction
Central Asia	4.20	2.69	▼	4.25	6.61	▲
East Asia	0.71	0.60	▼	3.51	1.91	▼
South Asia	0.29	0.55	▲	1.65	1.33	▼
Southeast Asia	1.77	1.06	▼	3.02	2.80	▼
Oceania	3.55	1.52	▼	2.89	1.90	▼
Asia	0.68	0.45	▼	2.56	1.43	▼

FDI = foreign direct investment, GDP = gross domestic product, GFC = global financial crisis.
Notes: Central Asia includes Armenia, Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, and Tajikistan. East Asia includes the People's Republic of China; Hong Kong, China; Japan; the Republic of Korea; and Mongolia. South Asia includes India and Sri Lanka. Southeast Asia includes Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. Oceania includes Australia and New Zealand. Asia includes Central Asia, East Asia, South Asia, Southeast Asia and Oceania.
Sources: ADB calculations using data from CEIC; and International Monetary Fund. Balance of Payments and International Investment Position Statistics. http://www.imf.org/external/np/sta/bop/bop.htm (accessed September 2016).

The drop in volatility may be due to recent policy initiatives, particularly macroprudential and capital flow management measures aimed at strengthening financial stability and deepening the regions' capital markets especially local currency bond markets. Another contributing factor could be strengthened capital and liquidity standards, enhanced supervision, and the improved quality of financial market infrastructure (Box 3.3). In addition, the region's capital market development should be geared toward broadening the investor base and promoting long-term investment to deter speculation. Developing long-term securities could help reduce an economy's vulnerability to sharp swings in investor sentiment and speculative attacks.

Box 3.3: Asia's Financial Market Infrastructure Development and Its Role in Financial Integration

Financial market infrastructure (FMI) plays a pivotal role in developing financial markets and fostering financial integration. An FMI is defined as a multilateral system among participating institutions—including the operator of the system, used for the purposes of clearing, settling, or recording payments, securities, derivatives or other financial transactions.[1] Examples of FMIs include a payment system that provides an efficient and convenient way of sending and receiving payments between economic agents, or a securities settlement system that offers a platform that facilitates the transfer of securities. An illustrative description of an FMI is a "highway for financial transactions." The better the street quality connecting cities A and B, the less it costs to get from A to B, which in turn better links the two cities, leading to more economic and financial integration. While domestic FMIs promote more efficient (financial) resource allocation within an economy, FMIs operating cross-border connect different financial markets. They become the backbone of regional financial integration and the smooth functioning of the financial system as a whole.

The institutional quality of FMIs substantially differs across regions. In Europe, for example, the real-time gross settlement system (RTGS) TARGET2—operated by the Eurosystem—settles large-value payments in central bank money across the European Union (EU). In 2015, the Eurosystem harmonized its post-trading platforms by launching a single pan-European settlement platform TARGET2 Securities (T2S) for all European central security depositories (CSDs). Hence, the Eurosystem provides an FMI-environment that helps achieve a single European financial market. Parallels can be drawn between Europe and the United States (US), where the Federal Reserve System operates both a RTGS system (Fedwire Funds) and a securities settlement system (Fedwire Securities). In the Association of Southeast Asian Nations (ASEAN), however, FMI landscapes differ substantially across members. In some, modern FMIs exist, but others lack even the domestic payments and settlement system prerequisite to establishing regional cross-border linkages.

Regional initiatives work to enhance the FMI environment within ASEAN. Policy makers recognize the importance of improving FMI institutional quality to create an environment conducive to regional financial integration. For example, the ASEAN Economic Community (AEC) prioritizes payment and settlement systems as a cross-cutting area within financial integration, financial inclusion, and financial stability in its *Blueprint 2025* (ASEAN 2015b). The goal is to develop new FMI platforms and improve existing infrastructures for enhancing cross-border trade, remittances, retail payment systems, and capital markets. Standardizing and harmonizing FMIs to international standards is one priority. The launch of a pilot platform for cross-border clearing and settlement of debt securities in Hong Kong, China and Malaysia is a good example of regional efforts to strengthen post-trading infrastructure and promoting standardization and dissemination of corporate announcements across Asia's emerging markets.

Helping expand local currency bond markets through regional FMI development is a strong element of the Asian Bond Markets Initiative (ABMI) (Park 2016), for example. The 1997/98 Asian financial crisis and the growing need for long-term infrastructure finance underscored the importance of developing Asia's local currency bond markets—leading ASEAN+3 policymakers in 2003 to establish the ABMI, which is supported and facilitated by ADB. It aims to improve the allocation of excess savings within Asia through efficient and liquid local currency bond markets. Well-functioning, deep regional capital markets will attract investment within the region rather than limit investor options to place excess savings abroad.

Numerous ABMI projects and programs are under way that directly and indirectly relate to FMI development in the region. One important milestone was the establishment of the Cross-border Settlement Infrastructure Forum (CSIF) in 2013, which aims to connect regional FMIs by 2020, linking real-time gross settlements and central securities deposits (ADB 2016c).

Lessons learned from Europe show that financial liberalization and integration must be accompanied by macroprudential policies and a region-wide regulatory and supervisory framework (Volz 2016). It is important to take a prudent path toward fully financially integrated markets. In Europe, it took a sovereign debt crisis—amplified by fully integrated financial markets—before a region-wide banking supervision authority was established and for more emphasis to be put on macroprudential policies. Schoenmaker (2011) refers to this as a "financial trilemma"—financial stability, financial integration, and national financial policies are incompatible. The more vulnerable European periphery countries suffered most from capital flow reversals and volatility during the 2008/09 global financial crisis. Prudent policies are needed to mitigate these risks—and important to be kept in mind when further connecting ASEAN members clearly at different stages of financial development.

It is essential to follow an FMI development strategy that is both tailored to the AEC and draws from global best practices. There is no one-size-fits-all approach for regional FMI development. While Europe primarily chose a top-down approach to financial market integration, this is not necessarily right for the AEC. Thus, existing multilateral initiatives should be intensified to provide a policy environment that is both enabling and prudent for the public and private sector to foster a balanced regional FMI development path.

[1] Definition according to the Bank for International Settlements (BIS).

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