# Introduction: Strengthened Global Growth Prospects Push Down Yields in Emerging East Asia

Positive sentiment over global economic growth fueled gains in most asset markets across emerging East Asia.[3] Between 1 March and 15 May, yields for both 2-year and 10-year bonds declined across emerging East Asia, except in the People's Republic of China (PRC) and the Philippines (**Table A**). The yields for both 2-year and 10-year yields rose in the PRC as the authorities raised interest rates on reverse repurchase agreements and lending facilities, and pushed through measures to foster deleveraging. In the Philippines, yields were driven higher by rising inflation and significant retail Treasury bond issuance. Indonesia experienced the largest drop in its 10-year yield, with a decline of 49 basis points (bps), due to positive investor sentiment and an expected credit rating upgrade from Standard & Poor's (S&P) Global Ratings, the only rating agency that had placed Indonesia below investment grade.[4] In the Republic of Korea, where domestic political uncertainties are receding in the aftermath of a presidential election on 9 May that produced a clear-cut winner, the 10-year yield rose but the 2-year yield fell. In Singapore, the 10-year yield fell but the 2-year yield rose marginally. In Thailand, the 2-year yield fell slightly while the 10-year yield rose marginally.

Between 1 March and 15 May, 2-year government bond yields in developed markets rose on the back of the United States (US) Federal Reserve's first interest rate hike of the year on 15 March. On the other hand, 10-year bond yields in developed markets were mostly lower due to slower-than-expected US economic growth in the first quarter (Q1) of 2017 (**Figures A1, A2**).

**Table A: Changes in Global Financial Conditions**

| | 2-Year Government Bond (bps) | 10-Year Government Bond (bps) | 5-Year Credit Default Swap Spread (bps) | Equity Index (%) | FX Rate (%) |
|---|---|---|---|---|---|
| **Major Advanced Economies** | | | | | |
| United States | 1 | (11) | – | 0.3 | – |
| United Kingdom | 2 | (6) | (4) | (0.3) | 4.9 |
| Japan | 8 | (2) | 1 | 1.5 | (0.9) |
| Germany | 15 | 14 | (5) | 6.1 | 4.1 |
| **Emerging East Asia** | | | | | |
| China, People's Rep. of | 65 | 24 | (11) | (4.8) | (0.2) |
| Hong Kong, China | (36) | (39) | – | 6.7 | (0.3) |
| Indonesia | (32) | (49) | 3 | 6.1 | 0.5 |
| Korea, Rep. of | (2) | 15 | 14 | 9.5 | 1.8 |
| Malaysia | (2) | (26) | (3) | 4.8 | 2.8 |
| Philippines | 40 | 65 | (6) | 1.3 | 1.3 |
| Singapore | 1 | (21) | – | 4.5 | 0.8 |
| Thailand | (3) | 1 | 3 | (1.9) | 1.3 |
| Viet Nam | 39 | (11) | (7) | 2.2 | 0.5 |
| **Select European Markets** | | | | | |
| Greece | (148) | (113) | (379) | 19.2 | 4.1 |
| Ireland | (3) | (3) | (23) | 5.2 | 4.1 |
| Italy | (11) | 0.6 | (21) | 12.1 | 4.1 |
| Portugal | (30) | (80) | (71) | 11.4 | 4.1 |
| Spain | (8) | (5) | (6) | 12.4 | 4.1 |

( ) = negative, – = not available, bps = basis points, FX = foreign exchange.
Notes:
1. Data reflect changes between 1 March 2017 and 15 May 2017.
2. A positive (negative) value for the FX rate indicates the appreciation (depreciation) of the local currency against the United States dollar.
Sources: Bloomberg LP and Institute of International Finance.

3 Emerging East Asia comprises the People's Republic of China; Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam.
4 On 19 May, S&P Global Ratings raised Indonesia's sovereign credit rating to investment grade.

**Figure A1: 10-Year Government Bond Yields**

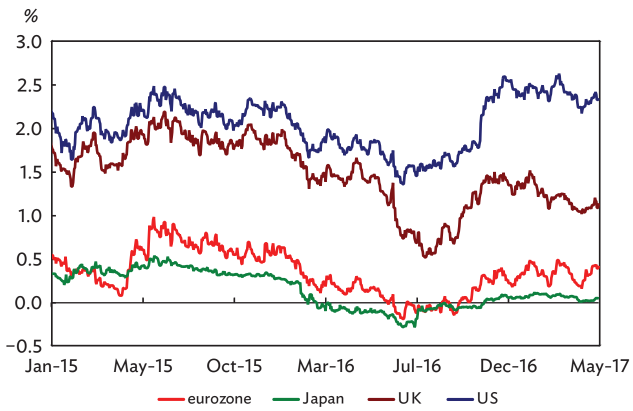
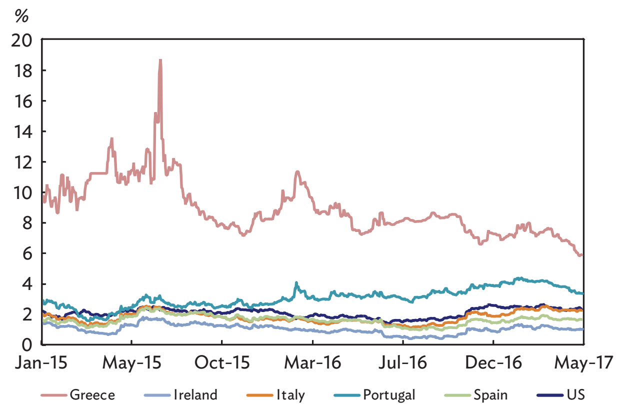



**Figure A2: 10-Year Government Bond Yields**




UK = United Kingdom, US = United States.
Source: Bloomberg LP.

Data releases showed that growth slowed in the US in Q1 2017, with gross domestic product (GDP) expanding at an annual rate of 1.2%, lower than the corresponding figure of 2.1% in the preceding quarter. Nonfarm payrolls added only 50,000 jobs in March, down from 232,000 in February. Uncertainties relating to tensions in the Democratic People's Republic of Korea and presidential elections in France boosted demand for safe-haven assets. Germany was the exception in Q1 2017 due to a rise in inflation, which stood at 2.2% year-on-year (y-o-y) in February, the highest level in 4 years, before falling to 1.5% y-o-y in May. Nonetheless, overall investor sentiment remains positive and markets expect the global economic upturn to gain momentum.

Global and emerging East Asian financial markets are keeping a close eye on the ongoing process of US monetary policy normalization. In the minutes of its monetary policy meeting on 3 May, the Federal Reserve noted that US economic growth has slowed in Q1 2017. Also, the US inflation rate declined to 2.4% y-o-y in March from 2.7% y-o-y in February, and fell further in April to 2.2% y-o-y. Nonfarm payrolls recovered in April, adding 174,000 jobs from 50,000 jobs in March. In May, nonfarm payrolls slowed again, adding only 138,000 jobs. However, the unemployment rate is declining, hitting a 16-year low of 4.3% in May. The Federal Reserve indicated that it believes the weakness in economic growth is temporary, noting that both consumption and business investment remain strong. Overall, markets continue to expect one or two more interest rate hikes by the Federal Reserve this year and, more broadly, a continuation of monetary policy normalization, which may also involve the Federal Reserve reducing the vast amounts of government securities that it acquired during three rounds of quantitative easing. This type of balance sheet normalization would contribute to tighter global liquidity conditions (**Box 1**).

The monetary policies of other advanced economies may also impinge upon global liquidity. The European Central Bank (ECB) has maintained accommodative monetary policy and asset purchases. The reduction in asset purchases from EUR80 billion to EUR60 billion took effect in April and is expected to continue until the end of December 2017. While the ECB noted that monetary policy will need to remain accommodative to meet its economic and inflation targets, it noted that downside risks have abated. In March, the ECB upgraded its 2017 GDP growth forecast from 1.7% to 1.8%. Headline inflation was revised upward from 1.3% to 1.7% for 2017, and from 1.5% to 1.6% for 2018.

The Bank of Japan (BOJ) announced that its monetary policy will need to remain supportive of growth for the time being. The BOJ noted that inflation is inching up but the underlying trend is still not firm enough. The BOJ expects domestic economic growth to be strong and exceed its long-term growth potential in the short term. Japan's GDP growth in Q1 2017 came in at an annualized pace of 1.0%. The Japanese economy appears to be on

## Box 1: Emerging Asia's Financial Stability under Tightening Global Liquidity Conditions

With growth in the major industrialized economies gaining solid traction, the *Asian Development Outlook 2017* has revised its 2017 growth outlook for the eurozone and Japan from 1.4% and 0.8% to 1.6% and 1.0%, respectively. The strongest industrialized economy remains the United States (US), where growth is projected to reach 2.4% in 2017. In the first quarter (Q1) of 2017, the eurozone achieved healthy quarter-on-quarter growth rate of 0.6%.[a] The US economy grew at an annualized rate of 1.2% in Q1 2017, but according to the Federal Reserve, the slowdown is temporary and growth fundamentals remain robust.[b] Employment also point to strong growth momentum in the US. Labor market remained robust with a 16-year low of 4.3% in May.[c] Meanwhile, global political risk has receded significantly with the conclusion of the French presidential election, further improving global investor sentiment.

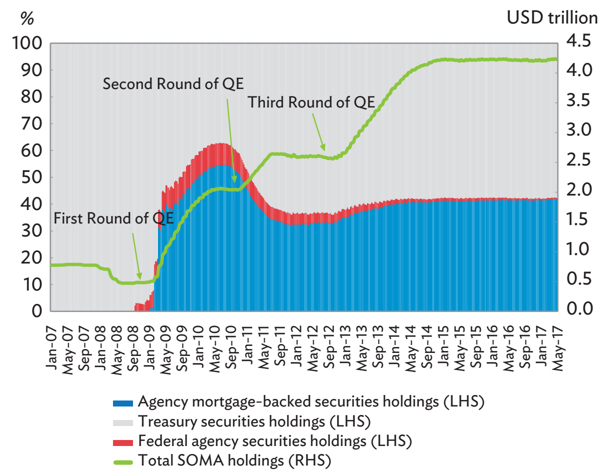
With risks declining and economic fundamentals strengthening, the Federal Reserve is likely to continue the normalization of its monetary policy. In the minutes of the Federal Open Market Committee March meeting, the federal funds rate was projected to continue rising to 1.4% and 2.1% by the end of 2017 and 2018, respectively.[d] While the Federal Reserve kept the System Open Market Account (SOMA) reinvestment policy unchanged, the minutes also implied a possible change in the reinvestment policy of the SOMA holdings of Treasury and agency securities later this year. The normalization of the Federal Reserve's balance sheet may have a more pronounced impact on global liquidity conditions than policy rate hikes.

**Possible effects of the Federal Reserve's balance sheet normalization on Emerging Asia's financial markets**

To accommodate economic recovery and improve financial conditions, the Federal Reserve conducted three rounds of quantitative easing (QE)—in November 2008, November 2010, and September 2012—by purchasing agency securities, mortgage-backed securities, and Treasuries. Between November 2008 and October 2014, when the Federal Reserve ended its quantitative easing program, the size of the Federal Reserve's securities holdings increased from USD0.48 trillion to USD4.20 trillion (**Figure B1.1**). As the US economy gradually recovered from the Global Financial Crisis, the Federal Reserve started to normalize monetary policy, publishing *Policy Normalization Principles and Plans* in September 2014.[e] The Federal Reserve has raised policy rates three times by a total of 75 basis points since December 2015 and kept the size of the SOMA portfolio stable by reinvesting the principal repayments of maturing securities to keep long-term interest rates low and thus foster accommodative financial conditions.

Policy rate hikes directly affect short-term interest rates and may raise long-term interest rates when economic fundamentals become robust. The increase in financing costs could be offset by higher capital returns under solid economic growth and accommodative financial conditions. However, the normalization of the Federal Reserve's balance sheet will affect accommodative liquidity conditions by

**Figure B1.1: Size and Composition of the System Open Market Account Portfolio**




LHS = left-hand side, QE = quantitative easing, RHS = right-hand side, USD = United States dollar.
Note: Data as of 3 May 2017.
Source: Federal Reserve Bank of New York. System Open Market Account Holdings.

[a] For the eurozone, the growth figure is taken from Eurostat. http://ec.europa.eu/eurostat/documents/2995521/8057546/2-08062017-AP-EN.pdf/8321df8a-ba1b-433e-9cdc-bfd81e3f4a45

[b] For the US, the growth figure is the second estimate of the Department of Commerce. https://www.bea.gov/newsreleases/national/gdp/2017/gdp1q17_2nd.htm. The Federal Reserve reference is based on the minutes of the Federal Open Market Committee meetings in March. https://www.federalreserve.gov/monetarypolicy/fomcminutes20170315.htm and May https://www.federalreserve.gov/monetarypolicy/fomcminutes20170503.htm

[c] For the unemployment rate, the growth figure is based on https://www.bls.gov/news.release/empsit.nr0.htm

[d] https://www.federalreserve.gov/monetarypolicy/fomcminutes20170315ep.htm

[e] https://www.federalreserve.gov/newsevents/pressreleases/monetary20140917c.htm

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## Box 1: Emerging Asia's Financial Stability under Tightening Global Liquidity Conditions
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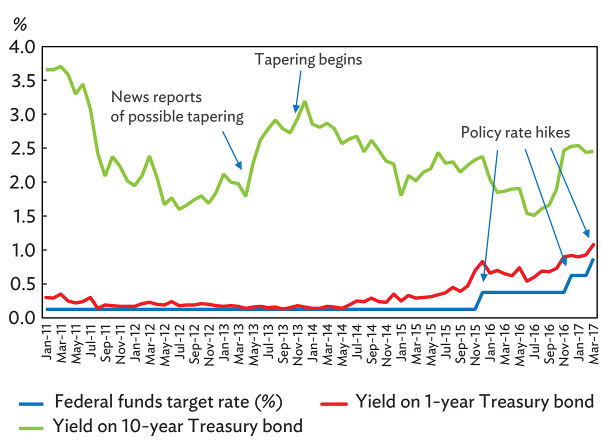
reducing the supply of narrow money. Financial markets, especially bond markets, may react quickly and price in the reduction of market liquidity, pushing up the entire yield curve (**Figure B1.2**).

The "Taper Tantrum" episode in 2013 offers valuable lessons. On 22 May 2013, Chairman Ben Bernanke first hinted at a possible phase out of the Federal Reserve's asset purchase program. In June, the Federal Reserve again indicated a potential cut in its asset purchases by the end of the year. Financial markets immediately priced in this information during the second quarter of 2013, well before the Federal Reserve started to taper its bond purchases in December 2013. By the end of 2013, the spot yield on 10-year Treasury bonds had shot up to 3.2%, and the term spread between 1-year and 10-year Treasury bonds had widened to 3.0%. Bond yields rose and bond trading volume shrank in emerging Asian bond markets in anticipation of tighter financial conditions (**Figures B1.3a, B1.3b**).[f] Figure B1.3a shows that the impact of the Taper Tantrum on emerging Asian sovereign bond yields was generally greater than the Federal Reserve's subsequent policy rate hikes.

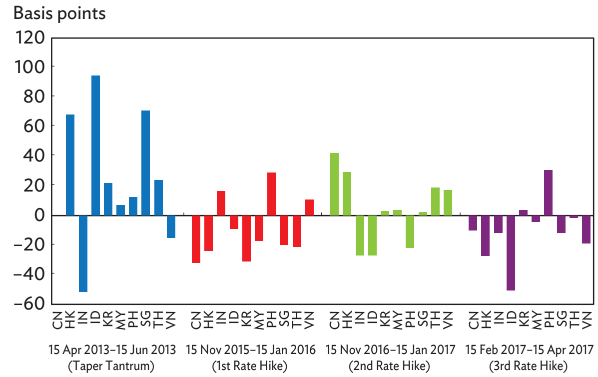
The Federal Reserve signaled in its March 2017 meeting of the Federal Open Market Committee that the normalization

### Figure B1.2: Bond Yield Reactions to Policy Rate Hikes and Asset Purchase Tapering




Note: Policy rate and Treasury nominal coupon spot yield are in a percentage and recorded at the end of each month.
Source: Haver Analytics.

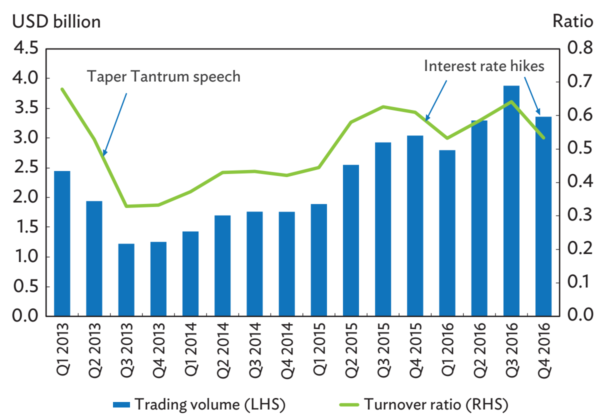
### Figure B1.3a: Changes in Yields on 10-Year Sovereign Bonds in Emerging Asia




CN = People's Republic of China, HK = Hong Kong, China, ID = Indonesia, IN = India, KR = Republic of Korea, MY = Malaysia, PH = Philippines, SG = Singapore, TH = Thailand, and VN = Viet Nam.
Notes:
1. Emerging Asia comprises the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam.
2. Intervals reflect 1 month prior and 1 month after the taper announcement and interest rate hikes.
3. For the People's Republic of China, there was no change in 10-year sovereign bond yields for the period between 15 April 2013 and 15 June 2013.

Source: Bloomberg LP.

### Figure B1.3b: Quarterly Trading Volumes and Turnover Ratios of Sovereign Bonds in Emerging East Asia




LHS = left-hand side, Q1 = first quarter, Q2 = second quarter, Q3 = third quarter, Q4 = fourth quarter, RHS = right-hand side.
Notes:
1. Emerging East Asia comprises the People's Republic of China; Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; Singapore; and Thailand.
2. Quarterly trading volume figures are based on 31 December 2016 currency exchange rates and do not include currency effects.

Source: *AsianBondsOnline*.

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

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## Box 1: Emerging Asia's Financial Stability under Tightening Global Liquidity Conditions

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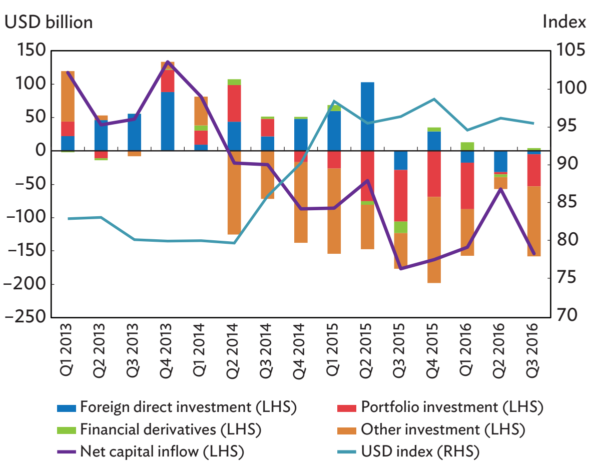
of its portfolio holdings may start at the end of 2017. The reduction in the Federal Reserve's security holdings and further policy rate hikes would both push up the US dollar and trigger capital outflows from emerging Asia. It is therefore important to understand the possible effects of the normalization of the Federal Reserve's balance sheet on emerging Asia's financial stability.

First, capital outflows can exert depreciation pressures. With the US economy strengthening, subsequent interest rate hikes will push up the US dollar. Shortly before US policy rate hikes in December 2016 and March 2017, emerging Asian currencies depreciated against the US dollar. Historically, capital flows to emerging Asian economies tend to be sensitive to the US dollar index (**Figure B1.4**). This is especially true for economies with flexible exchange rate regimes.

**Figure B1.4: Capital Flows in Emerging Asia and the United States Dollar Index**




LHS = left-hand side, Q1 = first quarter, Q2 = second quarter, Q3 = third quarter, Q4 = fourth quarter, RHS = right-hand side, USD = United States dollar.

Notes:
1. Emerging Asia comprises the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei,China; Thailand; and Viet Nam.
2. For USD index, a value above (below) 100 indicates the appreciaition (depreciation) of the US dollar against major world currencies.

Sources: Bloomberg LP and Haver Analytics.

Second, long-term financing costs may rise. Given growing global financial integration, higher US bond yields could have a contagion effect on emerging Asian bond markets, raising the region's long-term financing costs. Higher financing costs would pressure valuations and push down financial asset prices, possibly influencing investment and growth.

Third, the higher level of foreign and domestic leverage in emerging Asia challenges regional financial stability. Currency depreciation increases the repayment burden of borrowers with US dollar-denominated debt.

In sum, US monetary tightening could spill over to emerging Asia, raising financing costs and curbing growth. Tighter liquidity would also harm the financing conditions of institutions with a high degree of leverage and significant debt exposure.

**Risks could be mitigated in the short term, but a tighter liquidity stance would persist over a longer time horizon.**

With the experience of the Taper Tantrum in mind, the Federal Reserve's *Policy Normalization Principles and Plans* indicated that the normalization of its balance sheet would be based on ceasing reinvestment of principal repayments rather than directly selling securities in the market. The gradual and predictable reduction of SOMA holdings is intended to minimize shocks to financial markets.

As of 3 May 2017, SOMA's security holdings stood at USD4.23 trillion. SOMA's securities that mature within the next 10 years are mostly Treasury securities. Around 59% of Treasury holdings, which are valued at USD1.45 trillion, will mature within the next 5 years (**Figures B1.5, B1.6**). Therefore, as the Federal Reserve gradually shrinks its balance sheet by ceasing to reinvest matured principal, its impact on financial markets could be manageable. In May 2016, the Federal Reserve Bank of New York conducted a small-value sale operation, selling less than USD250 million of Treasury securities with maturities of 2–3 years.[h] During the sale operation period, financial markets largely reacted calmly. While the US dollar index and equity markets remained stable, the 10-year Treasury bond yield and the volatility index rose initially, then reversed shortly thereafter (**Figure B1.7**).

[h] https://www.newyorkfed.org/markets/opolicy/operating_policy_160517a

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## Box 1: Emerging Asia's Financial Stability under Tightening Global Liquidity Conditions
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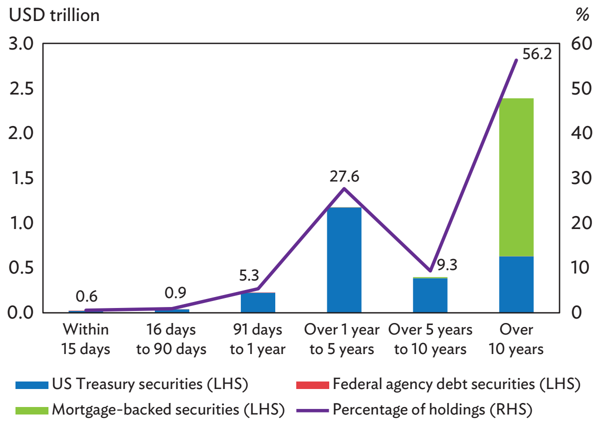
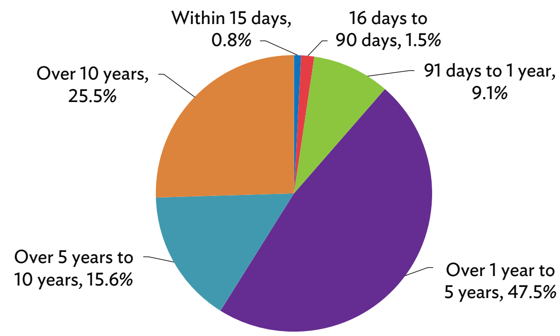
**Figure B1.5: Maturity Distribution of Total System Open Market Account Securities Holdings**




LHS = left-hand side, RHS = right-hand side.
Note: Data are as of 3 May 2017.
Source: The Federal Reserve of the United States.

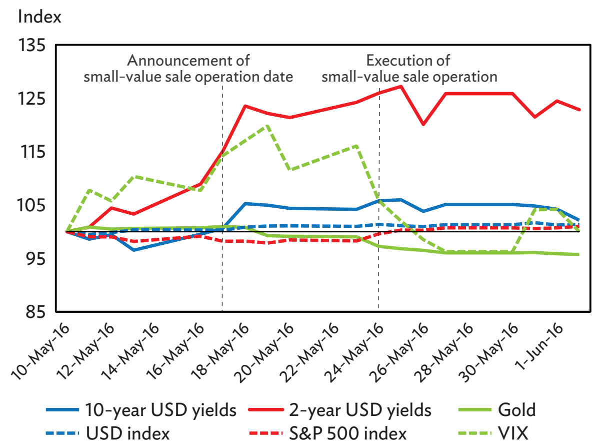
**Figure B1.6: Maturity Distribution of System Open Market Account Treasury Securities Holdings**




Note: Data are as of 3 May 2017.
Source: The Federal Reserve of the United States.

Given the gradual nature of the Federal Reserve's balance sheet normalization and strong economic fundamentals in emerging Asian economies, the possible spillover effects of US monetary policy in the region could be manageable in the short term. However, as political risks recede and economic growth gains momentum, the prospect of monetary policy normalization in the eurozone increases, at least over the medium term. Global financial conditions are trending tighter as global growth picks up. Against a backdrop of leverage built up during the past few years of easy money, it is time for emerging Asia to prepare itself for tightening global liquidity by strengthening financial conditions.

**Figure B1.7: Market Reaction to the Federal Reserve's Small-Value Sale Operation**




S&P = Standard & Poor's, USD = United States dollar, VIX = Chicago Board Options Exchange Volatility Index.
Note: 10 May 2016 = 100.
Source: Bloomberg LP.

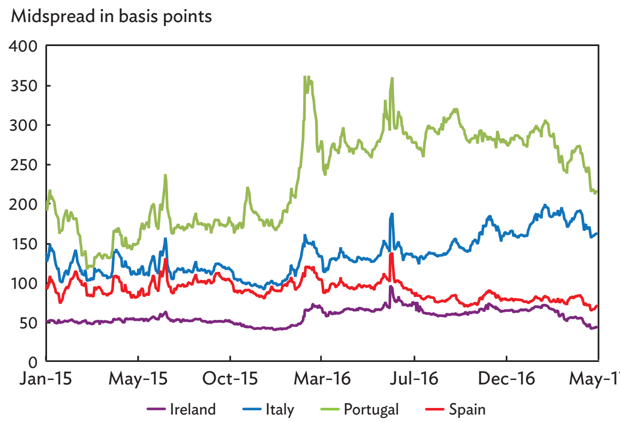
track to regain its momentum following the prolonged slowdown during 2014–2015, which was triggered by a consumption tax hike and emerging market weakness.

At a broader level, global growth prospects are brightening after an extended period of sluggishness. Until recently, the US economy was the sole bright spot in an otherwise gloomy picture, but growth is now picking up in other parts of the world. According to the International Monetary Fund's April forecast, global output is projected to expand 3.5% in 2017 and 3.6% in 2018, up from 3.1% in 2016. In tandem with global output, the volume of global trade is picking up too, with projected growth of 3.8% in 2017 and 3.9% in 2018, up from 2.2% in 2016. The recovery has become more broad-based as robust growth is projected for both advanced and developing economies, including developing Asia.[5] According to the Asian Development Bank's April forecast, developing Asia will grow by 5.7% in both 2017 and 2018. In the PRC, growth will reach 6.5% in 2017 and 6.2% in 2018.

Partly due to strengthening global growth prospects, financial stability has generally improved across the world. Long-term interest rates have risen, which will benefit the earnings of banks and insurance companies, while risk premiums and volatility have declined. Emerging East Asia is enjoying an improvement in its financial stability. Reflecting a more benign financial environment, credit default swap spreads are down across the region (**Figure B**). The improvement in financial stability is also evident in select European markets, where spreads have declined in Ireland, Italy, Portugal, and Spain (**Figure C**). Similar to the pattern observed for credit default swap spreads, US equity volatility index has declined, as has the emerging market bond spread (**Figure D**). Bond market spreads have also fallen in individual emerging East Asian markets (**Figure E**). In short, while there are some risks to global financial stability, the global financial environment has become more benign in line with the improved global economic outlook.

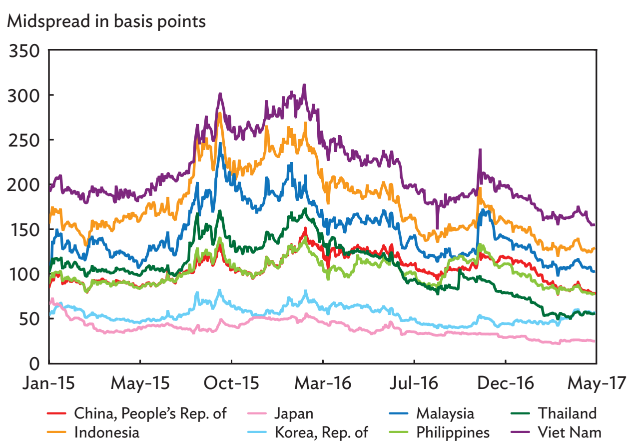
The improved global economic outlook is strengthening global investor sentiment. As a result, investors are rediscovering their risk appetite for emerging market assets. Foreign capital inflows have increased the share of foreign investors in local currency bond markets across emerging East Asia (**Figure F**). The largest gains

**Figure C: Credit Default Swap Spreads for Select European Markets** (senior 5-year)



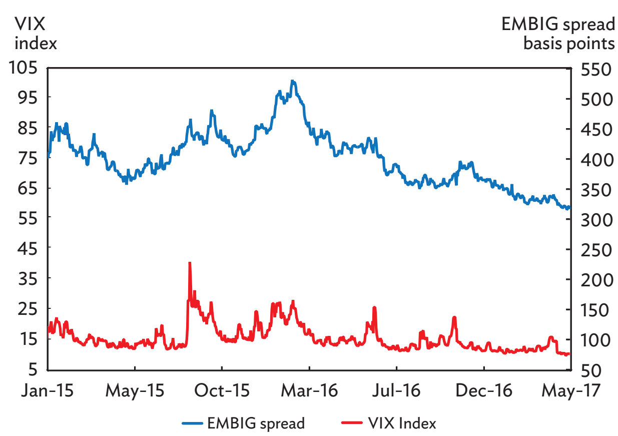

Notes:
1. Based on United States dollar-denominated sovereign bonds.
2. Data as of 15 May 2017.
Source: Bloomberg LP.

**Figure B: Credit Default Swap Spreads** (senior 5-year)




Notes:
1. Based on United States dollar-denominated sovereign bonds.
2. Data as of 15 May 2017.
Source: Bloomberg LP.

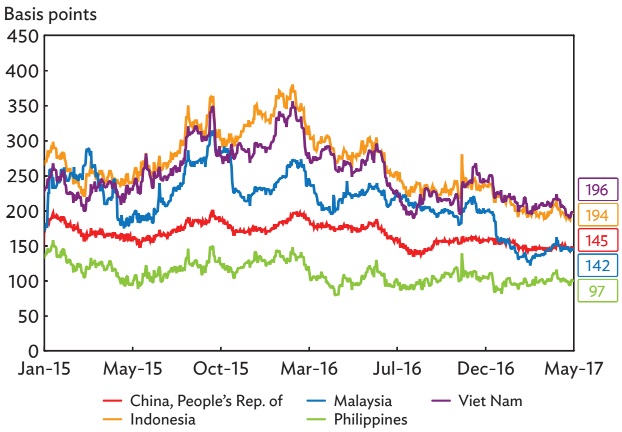
**Figure D: United States Equities Volatility and Emerging Market Sovereign Bond Spreads**




EMBIG = Emerging Markets Bond Index Global, VIX = Chicago Board Options Exchange Volatility Index.
Note: Data as of 15 May 2017.
Source: Bloomberg LP.

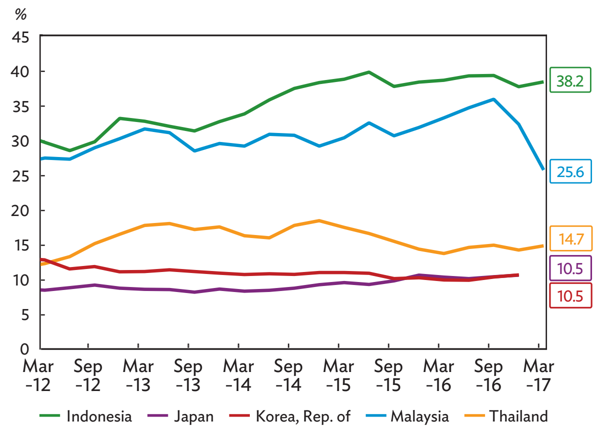
[5] Developing Asia comprises the 45 regional developing member economies of the Asian Development Bank.

**Figure E: JP Morgan Emerging Markets Bond Index Sovereign Stripped Spreads**




Notes:
1. Based on United States dollar-denominated sovereign bonds.
2. Data as of 15 May 2017.
Source: Bloomberg LP.

**Figure F: Foreign Holdings of Local Currency Government Bonds in Select Asian Economies** (% of total)




Note: Data as of end-March 2017 except for Japan and the Republic of Korea (end-December 2016).
Source: *AsianBondsOnline*.

were seen in Indonesia, where the holdings share of foreign investors climbed 0.7 percentage points between the end of December 2016 and the end of March 2017. Indonesia's robust long-term growth prospects continue to attract foreign capital inflows. Malaysia was the only market that experienced a drop in its share of foreign investors during the review period, as the inability of investors to hedge their investments precipitated capital outflows.

Overall, the brightening global outlook and receding risks to global financial stability make for a benign environment for emerging East Asian local currency bond markets. Nevertheless, a number of downside risk factors remain. Some of these risk factors are specific to individual economies. For instance, on 24 May, Moody's Investor Service downgraded the PRC's sovereign credit rating from Aa3 to A1, citing financial risks due to growing debt. Following the PRC's downgrade, Hong Kong, China's sovereign credit rating was also downgraded by Moody's Investor Service. At the same time, the economies of the region face some common risks.

**Above all, tightening global liquidity conditions may pose a threat to emerging East Asia's financial stability**. The Federal Reserve raised the federal funds rate in March and the market consensus points to more increases later this year. Continuing US interest rate hikes could challenge the financial vulnerabilities of emerging markets by tightening global liquidity conditions and strengthening the US dollar. The balance sheets of emerging East Asian companies that borrowed heavily during the period of low global interest rates would be adversely affected. Those that borrowed in US dollars would be hit even harder. In addition to interest rate hikes, the Federal Reserve is likely to start reducing the vast amounts of US government securities it acquired during three rounds of quantitative easing. Such balance sheet normalization may further tighten global liquidity conditions and could pose risks to emerging financial markets. During the Taper Tantrum episode of May–June 2013, when then Federal Reserve chairman Ben Bernanke first hinted at tapering the asset purchase program, yields rose and trading volumes fell in emerging East Asian bond markets (**Box 1**). If the improved economic outlook and financial stability induces the central banks of other major advanced economies, especially the ECB, to normalize their monetary policies, then global liquidity will tighten even further.

**The massive global cyberattack of May 2017 highlights the serious risks that cybersecurity poses to financial security (Box 2)**. The WannaCry ransomware attack, which was unprecedented in scale, infected more than 230,000 computers in over 150 countries and highlighted the vulnerability of financial systems to cybercrime. The vulnerability is likely to be even greater in developing economies, which tend to have weaker cybersecurity than advanced economies. The 2016 cyberattack against the central bank of Bangladesh, in which hackers used the SWIFT network to send fraudulent instructions for payment, underlines the severity of the risk. The hackers tried to steal almost USD1 billion from the country's foreign reserves and succeeded in taking USD101 million, of which only a portion has yet been recovered. The loss of almost USD1 billion would have seriously undermined public confidence in the central bank and threatened the stability of the entire financial system. There is a clear need for Asian financial regulators to strengthen cybersecurity.

## Box 2: Cybersecurity and Financial Stability

The global cyberattacks of May 2017 highlighted the critical importance of cybersecurity for financial stability. The attackers disabled computers by encrypting data and demanded ransom payments in the Bitcoin cryptocurrency. The WannaCry ransomware cryptoworm attack started on 12 May and is widely viewed as having been unprecedented in scale. The attack infected over 230,000 computers in more than 150 markets around the world. The victims included global corporate heavyweights such as FedEx, Deutsche Bahn AG, and Telefonica, S.A. Shortly after the cyberattack began, a web security researcher found a way to kill the cryptoworm. As a result, the attack had been suppressed as of 19 May. While the researcher's actions averted a cyber disaster, the WannaCry episode underlines the vulnerability of information technology (IT) networks to cybercrime.

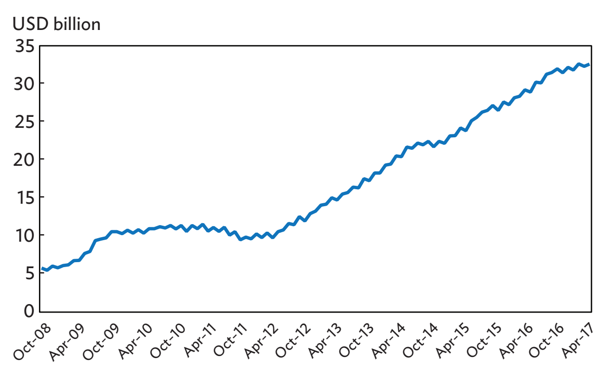
Perhaps nowhere is the potential for cybercrime greater than in the financial industry, which relies on IT networks to process transactions worth trillions of dollars. General cybercrime such as the WannaCry attacks, as well as financial cybercrime, affect both advanced economies and developing economies. However, developing economies tend to be more vulnerable to cybercrime due to their weaker, less-sophisticated cybersecurity infrastructure. Public confidence in developing economy financial systems, which are less developed than those of advanced economies, tends to be more fragile. Therefore, financial cybercrime has the potential to seriously undermine financial stability in developing economies, a potential that came to light during the cybertheft directed at the central bank of Bangladesh in 2016.

In February 2016, criminals accessed the SWIFT network, widely used around the world for banking transactions, to attempt to steal USD951 million of Bangladesh's foreign exchange reserves from Bangladesh's central bank (Bangladesh Bank). The perpetrators succeeded in withdrawing USD101 million from a Bangladesh Bank account at the Federal Reserve Bank of New York, and then diverted USD80 million to the Philippines and another USD21 million to Sri Lanka. Bangladesh Bank managed to recover the USD21 million traced to Sri Lanka. As of the end of 2016, it expected to recover a little more than half of the USD80 million traced to the Philippines.

The perpetrators were able to capitalize on weaknesses in the cybersecurity infrastructure of Bangladesh Bank to steal the funds. Then they used a global banking network, SWIFT, to shift funds across borders without raising any alarm bells. If the perpetrators had succeeded in stealing their target of USD951 million, the loss of such a significant amount of foreign reserves would have undermined public confidence in Bangladesh's central bank and its entire financial system (**Figure B2.1**). The Bangladesh Bank incident shows that in developing economies, even central banks may be subject to cybertheft.

Although the Bangladesh Bank theft is perhaps the most highly publicized incident of financial cybercrime in recent years, it is hardly a unique case. In an earlier

**Figure B2.1: Bangladesh's International Reserves**




USD = United States dollar.
Note: Data as of end-April 2017.
Sources: Bangladesh Bank and Haver Analytics.

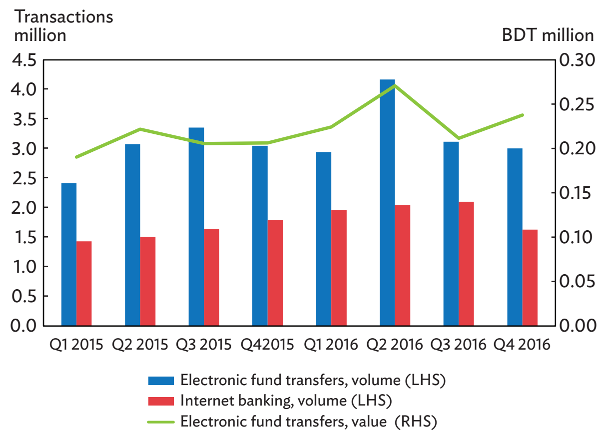
*continued on next page*

## Box 2: Cybersecurity and Financial Stability *continued*

attack in Bangladesh in 2013, hackers stole USD250,000 from the Sonali Bank of Bangladesh. In December 2016, the Central Bank of Russia announced that hackers had taken USD31 million from its correspondent banks during the course of the year. A cyberattack took place against a commercial bank in Viet Nam around the time of the Bangladesh attack. In early 2015, there was a fraudulent transfer of funds from an Ecuadorian commercial bank to bank accounts in Hong Kong, China. As many as 12 banks across Southeast Asia may have suffered comparable attacks, which used a malware similar to the one used in the 2014 attacks against Sony Pictures. One of the common traits of the cyberattacks that occurred in 2015–2016 was the manipulation of the SWIFT banking network. Thus, the growing number of financial cybercrime incidents points to increased risk to financial security.

According to the Office of Financial Research, cybersecurity attacks threaten financial stability in different ways.[a] First, cybersecurity threats entail direct costs for banks and other financial institutions, including the loss of funds and added IT expenditures. Second, since financial companies are linked to each other and nonfinancial companies in complex digital networks that are based on electronic payments, cybersecurity incidents can create a broader risk to financial stability. Third, and related to the second point, a cyberattack that infects a systemically important bank or financial institution can have sizable spillover effects on the stability of the entire financial system. These potential costs and the experience of incidents such as the cybertheft of Bangladesh Bank underline the need for developing economies to strengthen the cybersecurity infrastructure of their banks and financial institutions. Given the growing threat that financial cybercrime poses to financial stability, the financial regulatory authorities of developing economies should consider including cybersecurity as part of their prudential supervision mandate. In addition to protecting financial stability, enhanced cybersecurity can promote the development of electronic banking and, more broadly, the use of IT services in financial services in Bangladesh and elsewhere (**Figure B2.2**).

**Figure B2.2: E-Banking in Bangladesh**




BDT = Bangladeshi taka, LHS = left-hand side, RHS = right-hand side.
Sources: Bangladesh Bank and Haver Analytics.

[a] Office of Financial Research. 2017. *OFR Viewpoint 17-01 Cybersecurity and Financial Stability: Risks and Resilience*. 15 February.