Global and Regional Market Developments

Financial conditions weakened in emerging East Asia amid monetary tightening and headwinds to the economic outlook.

Financial conditions in emerging East Asian markets weakened from 28 February to 9 June.[1] Persistent inflationary pressure has led to monetary tightening in major advanced economies as well as in a few economies in emerging East Asia. Central banks in the Republic of Korea, Malaysia, the Philippines, and Singapore tightened their respective monetary policies during the review period to address inflationary concerns. While monetary stances in the region remained largely accommodative, regional financial conditions weakened amid expected further monetary tightening as well as uncertainty in the economic recovery associated with persistent inflation, rising commodity prices, a slower-than-expected recovery in the People's Republic of China (PRC) due to coronavirus disease (COVID-19) containment measures, supply chain disruptions, and the Russian invasion of Ukraine. The weakening was evidenced by the retreat in equity markets, portfolio outflows from the region, widening risk premiums, and the depreciation of emerging East Asian currencies against the United States (US) dollar (**Table A**). Higher inflation also pushed up bond yields in both advanced markets and emerging East Asia.

Continued inflation in major advanced markets and emerging East Asia pushed up bond yields and led to monetary tightening (**Figure A**). During the review period, 2-year and 10-year government bond yields in the US rose 138 basis points (bps) and 122 bps, respectively, following rising inflation and consecutive rate hikes in March and May. Consumer price inflation in the US continued to rise, with May posting an 8.6% year-on-year (y-o-y) uptick, following an increase of 8.3% y-o-y in April

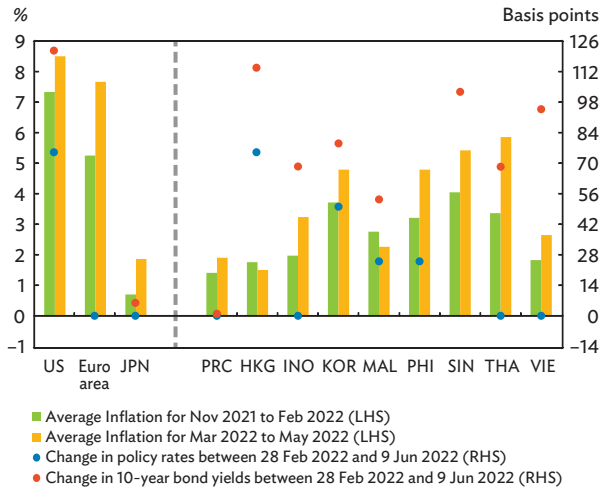
Table A: Changes in Financial Condition in Emerging East Asia and Major Advanced Economies

	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	138	122	–	(8.1)	–
United Kingdom	82	91	1	0.2	(6.9)
Japan	(5)	6	1	5.0	(14.4)
Germany	137	130	4	(1.8)	(5.4)
Emerging East Asia					
China, People's Rep. of	4	0.9	5	(6.5)	(5.7)
Hong Kong, China	126	114	–	(3.7)	(0.4)
Indonesia	81	69	(8)	4.3	(1.3)
Korea, Rep. of	89	79	14	(2.7)	(4.3)
Malaysia	91	53	4	(6.1)	(4.4)
Philippines	112	140	1	(7.6)	(3.2)
Singapore	100	103	–	(1.0)	(2.0)
Thailand	113	68	6	(2.6)	(5.4)
Viet Nam	69	95	(13)	(12.2)	(1.6)

( ) = negative, – = not available, bps = basis points, FX = foreign exchange.
Notes:
1. Data reflect changes between 28 February 2022 and 9 June 2022.
2. A positive (negative) value for the FX rate indicates the appreciation (depreciation) of the local currency against the United States dollar.
Source: *AsianBondsOnline* computations based on Bloomberg LP data.

[1] 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.

Figure A: Average Inflation and Changes in Policy Rates and Bond Yields in Major Advanced Markets and Emerging East Asia



PRC = China, Rep. of; HKG = Hong Kong, China; INO = Indonesia; JPN = Japan; KOR = Korea, Rep. of; LHS = left-hand side; MAL = Malaysia; PHI = Philippines; RHS = right-hand side; SIN = Singapore; THA = Thailand; US = United States; VIE = Viet Nam.
Note: Inflation average is for the period November 2021 through May 2022 except for Japan; Hong Kong, China; Malaysia; and Singapore (November 2021 through April 2022).
Source: Various local sources.

and 8.5% y-o-y in March. Core Personal Consumption Expenditures inflation stayed elevated at 6.3% y-o-y in April and 6.6% y-o-y in March. The US economic outlook remained robust with some signs of weakening during the review period. Gross domestic product (GDP) contracted an annualized 1.5% in the first quarter (Q1) of 2022, while monthly nonfarm payroll additions fell to 390,000 in May from 436,000 in April and 398,000 in March. The unemployment rate remained low at 3.6% each in March, April, and May, down from 3.8% in February. At its June Federal Open Market Committee meeting, the Federal Reserve revised the US GDP growth forecast for 2022 downward to 1.7% from its 2.8% forecast in March. The Federal Reserve also revised upward its Personal Consumption Expenditures inflation projection for 2022 to 5.2% from 4.3% in its March projections. High inflation combined with a weak GDP growth outlook led to an 8.1% loss in the S&P 500 stock index between 28 February and 9 June.

Amid high inflation, the Federal Reserve raised its 2022 forecast for the federal funds rate to 3.4% in June from 1.9% in March. Following the rate hike of 25 bps at its 14–15 March Federal Open Market Committee meeting, the Federal Reserve raised the federal funds target range by 50 bps at its 4–5 May meeting and 75 bps at its 14–15 June meeting on rising inflation. At its May meeting, the Federal Reserve also announced a "quantitative tightening" plan to reduce holdings of Treasury bonds, agency debt, and agency mortgage-backed debt in its System Open Market Account. Holdings will be reduced by up to USD47.5 billion per month for 3 months beginning in June, which would then accelerate to USD95 billion per month beginning in September. After the second and third rate hikes by the Federal Reserve in May and June, which brought the federal funds rate to 1.50%–1.75%, the federal funds rate futures index indicated more than an 80% probability of another 75 bps rate hike in July. The market expects the federal funds rate to exceed 3.25% by the end of 2022, as evidenced by a more than 95% probability (as of 16 June) of the rate to be higher than 3.25% at the end of 2022.[2]

In the euro area, GDP grew by 5.4% y-o-y in Q1 2022, up from the 4.7% y-o-y growth posted in the fourth quarter (Q4) of 2021, as the economy gradually reopened. However, inflation and economic uncertainty rose significantly due to the Russian invasion of Ukraine. Some signs of weakness were observed; for example, industrial production in March declined 0.8% y-o-y from 1.7% y-o-y growth in February, while inflation continued to rise as the flash estimate accelerated to 8.1% y-o-y in May from 7.4% y-o-y in both March and April. The European Central Bank (ECB) on 9 June affirmed the end of the Asset Purchase Programme starting 1 July. While it left its policy rates unchanged, the ECB announced that it would raise them by 25 bps in its July meeting, citing rising inflation.

The ECB also released updated economic forecasts in June from those made in March. GDP forecasts were revised downward for 2022 (2.8% from 3.7%) and 2023 (2.1% from 2.8%), while inflation was projected higher for 2022 (6.8% from 5.1%) and 2023 (3.5% from 2.1%).

Subsequently, on 15 June, the ECB held an emergency meeting to discuss its monetary normalization policy amid the market sell-off in some markets in the euro area. The ECB announced that it would provide flexibility in reinvesting redemptions under its Pandemic Emergency Purchase Program portfolio.

[2] CME Group. CME FedWatch Tool. https://www.cmegroup.com/trading/interest-rates/countdown-to-fomc.html.

Compared to the Federal Reserve and the ECB, the Bank of Japan (BOJ) maintained a relatively dovish stance amid a weaker domestic economic performance and modest inflation. Japan reported a GDP contraction of 0.5% y-o-y in Q1 2022 after an expansion of 4.0% y-o-y in Q4 2021. In April, the BOJ downgraded its GDP estimate and forecast for fiscal years 2021 and 2022 to 2.1% and 2.9%, respectively, from 2.8% and 3.8% in January. Inflation rose to 2.5% y-o-y in April from 1.2% y-o-y in March and 0.9% y-o-y in February. In April, the BOJ revised upward its inflation estimate and projection for fiscal years 2021 and 2022 to 0.1% and 1.9%, respectively, from 0.0% and 1.1% in January. At its June meeting, the BOJ left its policy rate unchanged at –0.1% and affirmed the continuation of 10-year Japanese Government Bond purchases to keep the target rate at 0.0%, as well as the purchase of exchange-traded funds and real estate investment trusts under annual caps of JPY12.0 trillion and JPY180.0 billion, respectively. Meanwhile, the BOJ indicated that it would gradually reduce holdings of commercial paper and corporate bonds to prepandemic levels of JPY2.0 trillion and JPY3.0 trillion, respectively, after having ended the purchases of these bonds in March.

While many regional central banks maintained easy monetary stances, some regional central banks started monetary tightening to contain inflationary pressure and prevent stress in financial markets amid aggressive US monetary policy tightening (**Table B**). During the review period from 28 February to 9 June, the 2-year and 10-year government bond yields in emerging East Asian economies collectively rose, largely tracking rising bond yields in the US and increasing inflationary pressure in the region. The Philippines posted the largest increase in 10-year government bond yields in the region at 140 bps, while its 2-year yield rose 112 bps, largely driven by the 25 bps rate hike by the Bangko Sentral ng Pilipinas on 19 May. The rate hike echoed sound economic growth of 8.3% y-o-y in Q1 2022 and concerns of persistent inflation, which rose to 5.4% y-o-y in May from 4.9% y-o-y in April and 4.0% y-o-y in March. On 23 June, the Bangko Sentral ng Pilipinas raised rates again by 25 bps. Bank Negara Malaysia announced a surprise rate hike of 25 bps during its 11 May monetary policy meeting, on the back of firm economic recovery and increased inflationary pressure. The Bank of Korea made two consecutive rate hikes of 25 bps each in April and May to curb rising inflation. Similarly, Singapore further tightened its

Table B: Changes in Monetary Stances in Major Advanced Economies and Emerging East Asia

Economy	Policy Rate 30-Jun-2021 (%)	Rate Change (%)												Policy Rate 9-Jun-2022 (%)	Change in Policy Rates (basis points)
		Jul-2021	Aug-2021	Sep-2021	Oct-2021	Nov-2021	Dec-2021	Jan-2022	Feb-2022	Mar-2022	Apr-2022	May-2022	Jun-2022		
United States	0.25									↑0.25		↑0.50		1.00	↑ 75
Euro Area	(0.50)													(0.50)	0
United Kingdom	0.10						↑0.15		↑0.25	↑0.25		↑0.25		1.00	↑ 90
Japan	(0.10)													(0.10)	0
China, People's Rep. of	2.95							↓0.10						2.85	↓ 10
Indonesia	3.50													3.50	0
Korea, Rep. of	0.50		↑0.25			↑0.25		↑0.25			↑0.25	↑0.25		1.75	↑ 125
Malaysia	1.75											↑0.25		2.00	↑ 25
Philippines	2.00											↑0.25		2.25	↑ 25
Singapore	–				↑			↑			↑			–	–
Thailand	0.50													0.50	0
Viet Nam	4.00													4.00	0

( ) = negative, – = not available.
Notes:
1. Data coverage is from 30 June 2021 to 9 June 2022.
2. For the People's Republic of China, data used in the chart are for the 1-year medium-term lending facility rate. While the 1-year benchmark lending rate is the official policy rate of the People's Bank of China, market players use the 1-year medium-term lending facility rate as a guide for the monetary policy direction of the People's Bank of China.
3. The up (down) arrow for Singapore signifies monetary policy tightening (loosening) by its central bank. The Monetary Authority of Singapore utilizes the exchange rate to guide its monetary policy.

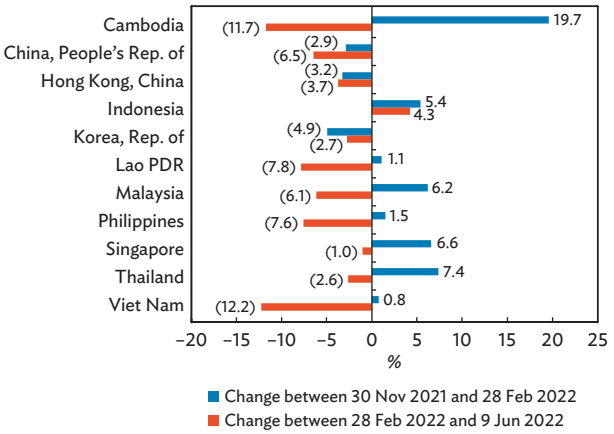
Sources: Bloomberg LP and various central bank websites.

monetary policy on 14 April by recentering the Singapore dollar nominal effective exchange rate and adjusting the slope of appreciation on expected improvement in economic growth and rising inflation. Thailand also witnessed a strong rise in its 2-year yield of 113 bps, as inflation stood well above the Bank of Thailand's full-year target range of between 1.0% and 3.0% during the first 5 months of 2022.

Contrary to the tightening actions of some central banks in the region, the People's Bank of China reduced the reserve requirement ratio of financial institutions by 25 bps on 25 April and lowered the 5-year loan prime rate on mortgages by 15 bps on 19 May. With monetary easing measures, modest inflation of 2.1% y-o-y in April and May, as well as a weaker-than-expected economic outlook amid pandemic containment measures and lockdowns in several major cities, the PRC's bond yields posted marginal changes.

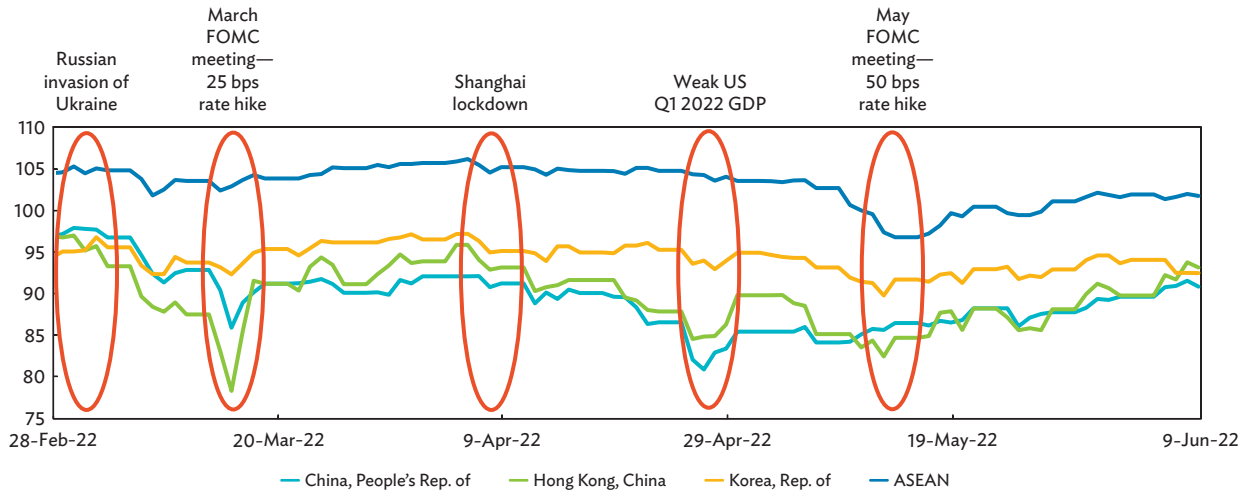
Continued inflationary pressure and monetary tightening by major advanced markets' and some regional central banks weighed on equity markets and weakened currencies in the region. During the review period, equity markets in emerging East Asia posted a weighted average loss of 4.6% (**Figure B**). Except for Indonesia, all regional markets recorded declines in equity markets, with Viet Nam posting the largest loss of 12.2% amid cautious investor sentiment over increased margin calls for leveraged investors (**Figure C**). The PRC's equity market fell 6.5% on bearish sentiments due to a bleak outlook for economic recovery. Meanwhile, the Indonesian market gained 4.3%, benefiting from improved corporate and government revenues on rising commodity prices.

Figure C: Changes in Equity Indexes in Emerging East Asia



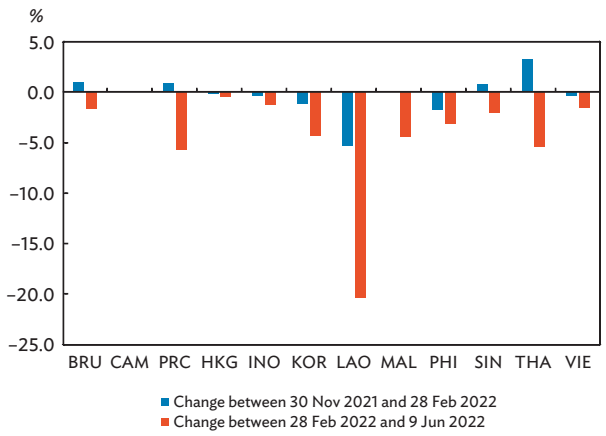
( ) = negative, Lao PDR = Lao People's Democratic Republic.
Source: *AsianBondsOnline* computations based on Bloomberg LP data.

Figure B: Equity Indexes in Emerging East Asia



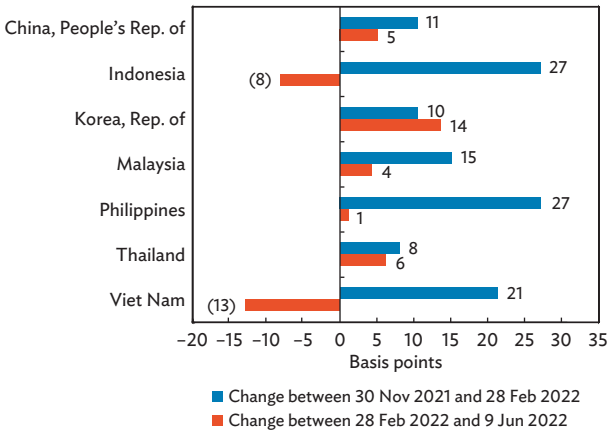
ASEAN = Association of Southeast Asian Nations, bps = basis points, FOMC = Federal Open Market Committee, GDP = gross national product, Q1 = first quarter, US = United States.
Notes:
1. 30 November 2021 = 100.
2. ASEAN comprises the markets of Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam.
3. Data as of 9 June 2022.
Source: *AsianBondsOnline* computations based on Bloomberg LP data.

Figure D: Changes in Emerging East Asian Currencies



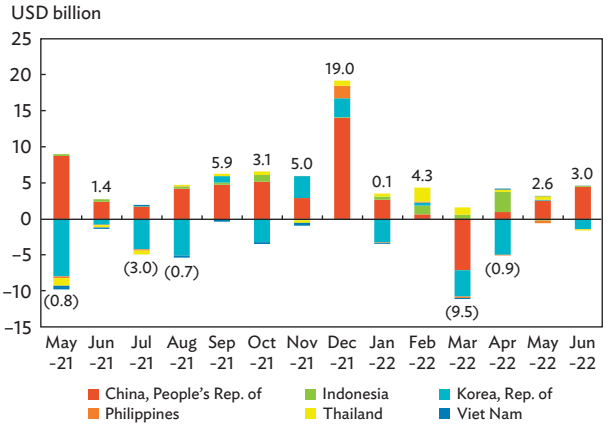
BRU = Brunei Darussalam; CAM = Cambodia; PRC = China, People's Rep. of; HKG = Hong Kong, China; INO = Indonesia; KOR = Korea, Rep. of; LAO = Lao People's Democratic Republic; MAL = Malaysia; PHI = Philippines; SIN = Singapore; THA = Thailand; VIE = Viet Nam.
Note: A positive (negative) value for the FX rate indicates the appreciation (depreciation) of the local currency against the United States dollar.
Source: *AsianBondsOnline* computations based on Bloomberg LP data.

Figure E: Changes in Credit Default Swap Spreads in Select Emerging East Asian Markets (senior 5-year)



( ) = negative.
Source: *AsianBondsOnline* computations based on Bloomberg LP data.

Figure F: Capital Flows into Equity Markets in Emerging East Asia



( ) = outflows, USD = United States dollar.
Notes:
1. Data coverage is from 1 May 2021 to 9 June 2022.
2. Figures refer to net inflows (net outflows) for each month.
Source: Institute of International Finance.

All emerging East Asian currencies depreciated against the US dollar amid continued monetary normalization by the Federal Reserve and increased uncertainty in regional economic recoveries (**Figure D**). Regional currencies posted a simple average depreciation of 3.2% and a GDP-weighted average depreciation of 5.1% during the review period. The Chinese yuan experienced the region's largest currency depreciation at 5.7% on a weakening economic outlook amid uncertainty related to pandemic containment measures. This was followed by the Thai baht, which fell 5.4% versus the US dollar after the current account deficit widened to USD3.4 billion in April, the largest amount in 9 years. Risk premiums in the region, proxied by credit default swap spreads, posted small and mixed movements, with a simple average hike of 1.4 bps and a GDP-weighted average increase of 4.7 bps during the review period (**Figure E**). While most markets witnessed widened risk premiums during the review period, Viet Nam's credit default swap spread narrowed by 13 bps on improved creditworthiness, as S&P Global Ratings upgraded Viet Nam's long-term foreign currency debt rating by one notch to BB+ on 26 May. Indonesia's credit default swap spread also declined 8 bps on improved government revenues due to rising commodity prices. The Indonesian finance ministry expects revenue collection to be 17.0% higher than the target set in the 2022 state budget.

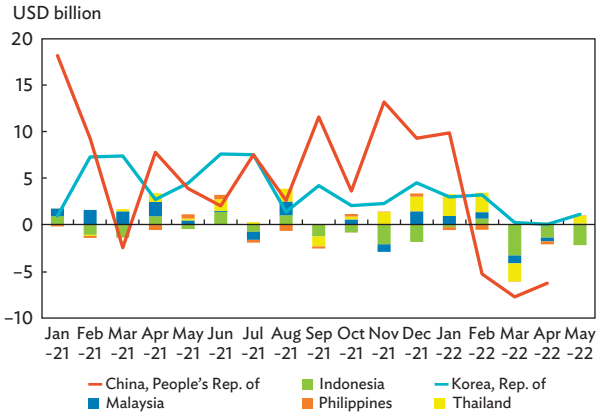
Portoflio capital flows in emerging East Asia's equity markets weakened during the review period, tracking market-specific patterns. Aggregated equity market capital outflows of USD4.3 billion were recorded from 28 February to 9 June, largely concentrated in the Republic of Korea (USD9.8 billion) over concerns of slowing growth after the Bank of Korea revised downward its 2022 growth forecast to 2.7% in May from 3.0% in February (**Figure F**). Meanwhile, some

Association of Southeast Asian Nations (ASEAN) markets like Indonesia and Thailand witnessed portfolio inflows in their equity markets from March through May on sound economic performances.

Foreign portfolio outflows were also observed in emerging East Asia's bond markets in March and April (**Figure G**). The PRC bond market recorded net outflows of USD14.1 billion amid a weakened economic outlook. Major ASEAN markets such as Indonesia, Malaysia, the Philippines, and Thailand collectively witnessed net foreign selling of USD8.0 billion in their bond markets. The Republic of Korea received small net foreign bond inflows of USD0.3 billion following its series of policy rate hikes. In May, ASEAN bond markets recorded net bond outflows of USD1.2 billion, largely concentrated in Indonesia. The overall negative sentiments in the region's bond markets led to an overall decline in the share of foreign holdings from January to April (**Figure H**). The foreign holdings share in Indonesia fell to 17.0% in April from 19.0% in January, while in the Philippines the foreign holdings share slipped from 1.8% to 1.1% during the same period. Nevertheless, bond markets in emerging East Asia demonstrated resilience to foreign sell-offs as domestic investors, particularly banks, continued to support local currency government bond markets (**Figure I**).

The risks to regional financial conditions are tilted toward the downside. Major risks include faster-than-expected monetary tightening in both the US and the region to contain persistent inflationary pressure; and heightened uncertainty in economic outlooks associated with rising commodity prices, a weaker-than-expected economic performance in the PRC, prolonged supply chain disruptions, and more-than-expected adverse spillovers from the Russian invasion of Ukraine. **Box 1** shows that Asian financial markets are significantly affected by US monetary policy news. On average, a 1 percentage point expected policy rate increase implied in the federal funds rate over the next 12 months is associated with regional currency depreciations of 0.7%, a 1.8% decline in major equity indexes, and a 7 bps increase in 10-year government bond yields on the day of a monetary policy announcement. Such impacts are statistically significant and persistent during the months after the announcement. As the Federal Reserve continues tightening its monetary policy, regional central banks need to monitor financial conditions closely to safeguard domestic financial stability.

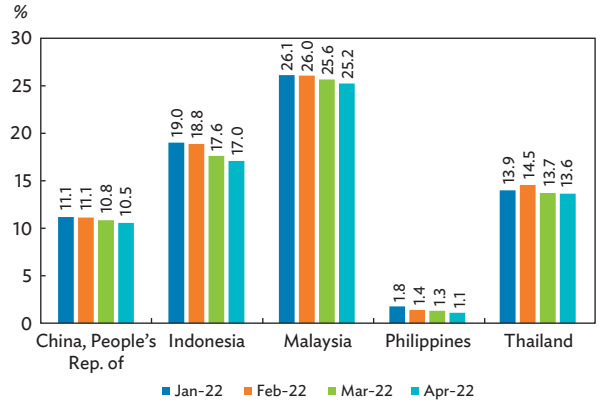
Figure G: Foreign Capital Flows in Local Currency Bond Markets in Emerging East Asia



USD = United States dollar.
Notes:
1. The Republic of Korea and Thailand provided data on bond flows. For the People's Republic of China, Indonesia, Malaysia, and the Philippines, month-on-month changes in foreign holdings of local currency government bonds were used as a proxy for bond flows.
2. Data are as of 31 May 2022 except for the People's Republic of China (30 April 2022).
3. Figures were computed based on 31 May 2022 exchange rates and do not include currency effects.

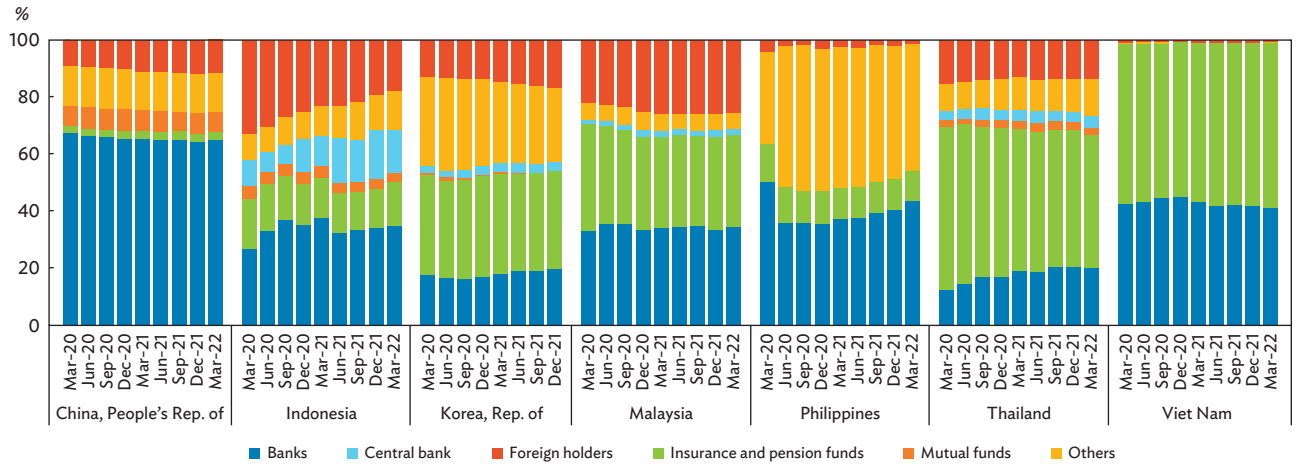
Sources: People's Republic of China (Bloomberg LP); Indonesia (Directorate General of Budget Financing and Risk Management, Ministry of Finance); Republic of Korea (Financial Supervisory Service); Malaysia (Bank Negara Malaysia); Philippines (Bureau of the Treasury); and Thailand (Thai Bond Market Association).

Figure H: Foreign Holdings of Local Currency Government Bonds in Select Emerging East Asian Markets (% of total)



Sources: People's Republic of China (Bloomberg LP and CEIC Data Company); Indonesia (Directorate General of Budget Financing and Risk Management, Ministry of Finance); Malaysia (Bank Negara Malaysia); Philippines (Bureau of the Treasury); and Thailand (Bank of Thailand).

Figure I: Investor Profiles of Local Currency Government Bonds in Select Emerging East Asian Markets



Notes:
1. Data for the Republic of Korea are up to December 2021.
2. "Others" include government institutions, individuals, securities companies, custodians, private corporations, and all other investors not elsewhere classified.
Source: *AsianBondsOnline* computations based on local market sources.

Meanwhile, several ASEAN central banks conducted asset purchase programs for the first time during the COVID-19 pandemic by buying domestic government bonds to facilitate market liquidity and foster low financing costs. **Box 2** examines the impact of these asset purchase programs on bond yield spreads in four ASEAN economies that implemented such operations—Indonesia, Malaysia, Thailand, and the Philippines—and finds that these programs contribute to a persistent decline in bond yield spreads, measured as the difference between 10-year government bond yields in these markets over that of US Treasuries. While these programs have so far shown to be effective in achieving their original objectives, regional central banks need to be cautious when they unwind asset holdings as they normalize monetary stances.

Box 1: United States Monetary Policy News and Financial Market Reactions in Developing Asia

With the importance of the United States (US) dollar in the global economy and close economic ties with much of the world, shifts in US monetary policy not only affect domestic financial conditions but also the financial conditions and investment sentiment in global economies and financial markets.[a] Prior to the 2007–2008 global financial crisis, the US Federal Reserve mainly adopted the federal funds rate as a conventional instrument to influence output, employment, inflation, and other macroeconomic variables. Then, on 25 November 2008, the Federal Reserve announced its first-ever program to purchase USD600 billion worth of obligations and securities to help improve financial conditions in financial markets (Federal Reserve 2008). Since then, the Federal Reserve has implemented asset purchase programs as an unconventional instrument to conduct monetary policy and guide market expectations.

The Federal Reserve's monetary policy decisions—whether through a conventional instrument like changes in the federal funds rate or an unconventional instrument like changes in the asset holdings of its System Open Market Account (SOMA)—have been found to significantly influence global financial conditions and generate strong reactions in emerging financial markets. For currencies, Albagli et al. (2019) show that—among emerging markets like India, Indonesia, the Republic of Korea, and Thailand—US monetary tightening through rate hikes led to greater currency depreciation after the 2007–2008 global financial crisis compared to before the crisis. Mueller, Tahbaz-Salehi, and Vedolin (2017) use changes in the federal funds rate and eurodollar futures as impacts of monetary easing measures to show that G10 currencies generally appreciate against the US dollar following Federal Open Market Committee (FOMC) meeting announcements of policy easing.[b] In equity and bond markets, Neely (2015) illustrates that international long-term bond yields decline after Federal Reserve announcements of large-scale asset purchases. Using changes in the 2-year US Treasury yield on announcement dates, Bowman, Londono, and Sapriza (2015) find that, in emerging markets globally, stock prices and exchange rates react positively and bond yields react negatively to announcements of asset purchase programs. Aizenman, Binici, and Hutchison (2016) find that news of quantitative tightening in 2013 led to negative reactions in emerging market stock indices and exchange rates versus the US dollar, but such news had an insignificant effect on emerging market sovereign spreads.

For portfolio flows, Banegas, Montes-Rojas, and Siga (2022) associate quantitative tightening with portfolio outflows from both equity and bond markets in the US. Anaya, Hachula, and Offermanns (2017) show that expansionary monetary shocks significantly increased portfolio outflows from the US, with corresponding portfolio inflows to emerging markets in Latin America, Asia, and Europe.

This study empirically estimates developing Asian financial markets' reactions to both conventional and unconventional US monetary policy shocks. It contributes to existing literature with new and comprehensive evidence on the magnitude and speed of market reactions across four indicators: (i) exchange rate changes, (ii) equity market performances, (iii) bond yields, and (iv) foreign portfolio flows. This paper also sheds new light on how conventional and unconventional US monetary policy shocks may lead to different financial market reactions in developing Asia. The findings provide useful policy implications for developing Asian central banks on how strong and how fast different financial assets react to different types of US monetary policy changes. Such knowledge is particularly important to safeguard regional financial stability as the Federal Reserve rapidly tightens monetary policy in 2022 to curb inflation, while many central banks in emerging East Asia maintain their relatively easy monetary stances.

To capture conventional US monetary policy shocks, the literature widely adopts the change in the federal funds rate futures on the day of a policy announcement as the measure of a conventional monetary policy shock (see, for example, Kuttner 2001, Gertler and Karadi 2015, Dahlhaus and Vasishtha 2020). This paper follows Dahlhaus and Vasishtha (2020) to use the daily change in 12-month federal funds rate futures on the day of an FOMC meeting announcement to account for conventional monetary policy shocks. In empirical models, the study follows Gertler and Karadi (2015) to use cumulative daily changes on policy announcement days over a 6-month horizon to capture forward guidance after US policy announcements.

To gauge unconventional monetary policy shocks, the literature either uses dummies for announcement dates to reflect asset purchase decisions or employs changes in SOMA holdings to capture the magnitude of asset purchases. Fratzscher, Lo Duca, and Straub (2018) argue that the latter measurement is more informative when examining market

[a] This box was written by Resi Ong Olivares (consultant) and Shu Tian (senior economist) in the Economic Research and Regional Cooperation Department of the Asian Development Bank.

[b] The G10 refer to the following: Australia, Canada, the European Union, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the US.

continued on next page

Box 1 *continued*

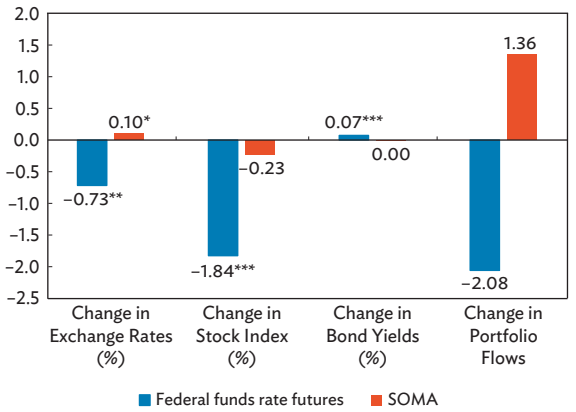
reactions. This study thus follows the spirit of Banegas, Montes-Rojas, and Siga (2022) to use log differences in the Federal Reserve's SOMA holdings over the 6 months following an FOMC meeting announcement.

This study then examines how US monetary policy changes influenced exchange rates, portfolio flows, equity indexes, and 10-year government bond yields from January 2004 to November 2021 in 12 developing Asia economies: Bangladesh, the People's Republic of China, India, Indonesia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, and Viet Nam.[c]

To gauge the direction and magnitude of financial market reactions, the study adopts panel regression to a month-economy panel by regressing changes in the financial market indicators on conventional and unconventional US monetary policy shocks, after controlling for current levels of the federal funds rate, US inflation, the US volatility index, and foreign exchange reserves and inflation in developing Asian markets, as well as time and market fixed effects. To understand the timing of transmission of US monetary policy shocks to developing Asian financial markets, this study follows Dahlhaus and Vasishtha (2020) to construct a common factor for each financial market indicator across developing Asia, using a principal-component method, and to visualize how conventional and unconventional US monetary policy shocks trigger financial market reactions in developing Asia, using impulse-response functions estimated from vector autoregression.

Empirical evidence from the panel regression shows that conventional US monetary tightening, in the form of a rate hike, leads to significant currency depreciation, negative equity market returns, and increased 10-year government bond yields in developing Asian markets on the announcement day (**Figure B1.1**). Specifically, a 1 percentage point increase in the federal funds rate over the next 6 months, implied in the 12-month futures contracts, is associated with an average currency depreciation of 0.73%, a 1.84% loss in equity indexes, and around a 7 basis points (bps) increase in 10-year government bond yields on the day of announcement in developing Asia. Meanwhile, unconventional monetary policy instruments, as proxied by changes in SOMA account holdings, are only significantly associated with a change in the exchange rate on the announcement day. On average, a 1 percentage point increase in SOMA holdings (quantitative easing) over the 6 months after the FOMC meeting announcement is associated with a 0.1% currency appreciation on the day of announcement. Neither type of monetary policy shock is linked to significant reactions in capital flows to developing Asia on the announcement day.

Figure B1.1: Impact of United States Monetary Policy News on Developing Asian Financial Markets



Notes: The blue bars represent the reactions of developing Asian financial markets to a 1 percentage point increase over 6 months after the announcement, implied in the 12-month federal funds rate futures, while the orange bars represent the impact of a 1 percentage point increase in securities holdings in the System Open Market Account (SOMA) on developing Asian financial markets. The financial indicators examined include percentage change in exchange rate against the United States dollar (USD), portfolio flows, and equity index, and the yield change on 10-year government bonds. Sample developing Asian markets comprise Bangladesh, the People's Republic of China, India, Indonesia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, and Viet Nam.
***, **, and * denote significance levels of 0.01, 0.05, and 0.10, respectively.
Source: Authors' calculations based on data from Bloomberg, CEIC, and the Institute of International Finance Capital Flows Database.

Using impulse-response functions estimated from vector autoregression, it is observed that after an FOMC announcement of conventional US monetary policy tightening in the form of a rate hike, developing Asian economies witness significant currency depreciation during the next 1–6 months, an immediate and significant negative reaction in equity markets in current month and the next month that is still observable after 3–4 months, and an increase in 10-year government bond yields over the next 3–6 months (**Figure B1.2**). Moreover, unconventional US monetary policy instruments, in the form of quantitative easing or an increase in SOMA holdings, trigger currency appreciation in the first month after the announcement and a decrease in bond yields 1–3 months after the announcement.

[c] Some markets do not have all four indicators due to data availability. Portfolio flow data are not available for Singapore, bond yield data are not available for Pakistan, while portfolio flow and bond yield data are not available for Bangladesh.

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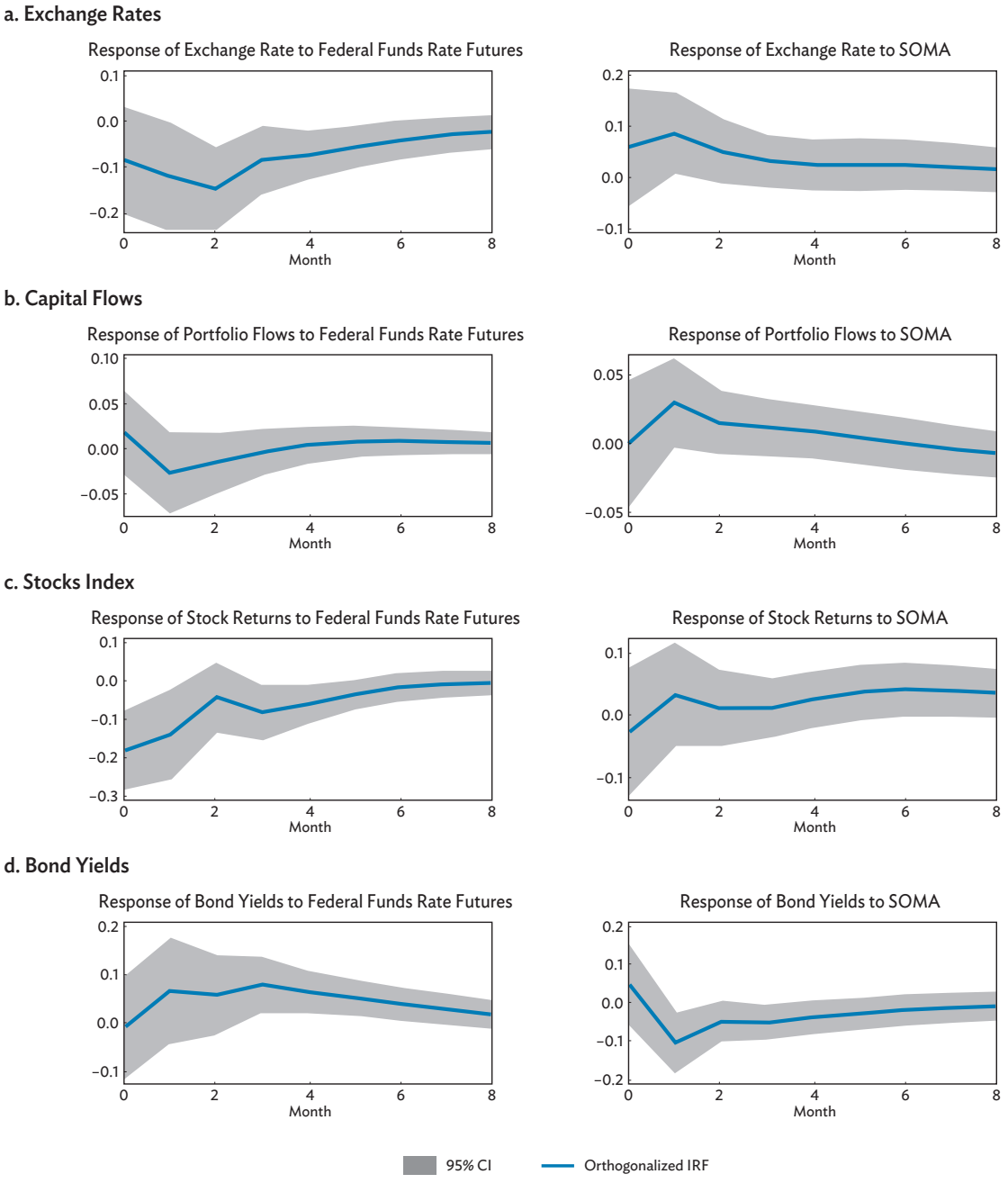
Box 1 *continued*

Figure B1.2: Responses of Exchange Rates, Portfolio Flows, Stock Returns, and Bond Yields in Developing Asia to a Standard Deviation Shock to the Federal Funds Futures Rate and System Open Market Account Holdings



CI = confidence interval, irf = impulse-response functions.
Notes: For each panel, the left-hand side depicts the impact in developing Asia of a one standard deviation change in 12-month federal funds rate futures (cumulative for 6 months), and the right-hand side depicts a one standard deviation change in the log difference of securities holdings in the System Open Market Account (SOMA) over the 6 months after a policy announcement. Developing Asia comprises Bangladesh, the People's Republic of China, India, Indonesia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, and Viet Nam.
Source: Authors' calculations based on data from Bloomberg, CEIC, and the Institute of International Finance Capital Flows Database.

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Box 1 *continued*

Overall, it seems that currency, equity, and bond markets in developing Asia have robust and significant reactions to conventional US monetary policy instruments relative to unconventional instruments. But both types of monetary policy tightening weaken financial conditions in developing Asia. In March, the Federal Reserve initiated a new round of monetary tightening with a 25 bps hike, which was followed by rate hikes of 50 bps in May and 75 bps in June, and is widely expected to be followed by another 75 bps rate hike in July. Asian financial conditions have weakened significantly since March. At its May FOMC meeting, the Federal Reserve announced it would begin unwinding its SOMA holdings in June. Therefore, it is important for developing Asian central banks to closely monitor changes in financial conditions in the region and make necessary policy adjustments to safeguard financial stability.

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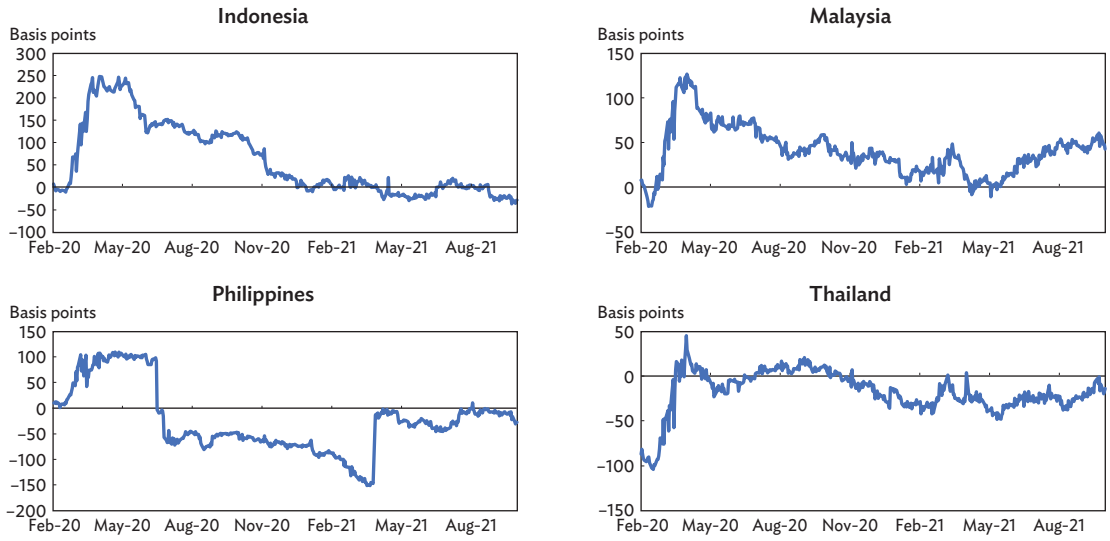
Box 2: Sovereign Bond Yield Spreads and Pandemic-Related Asset Purchase Programs in Four ASEAN Economies

Central banks in some emerging market economies engaged in quantitative easing during the coronavirus disease (COVID-19) pandemic by buying domestic government bonds.[a] These asset purchase programs (APPs) aimed at reducing bond yields, thereby supporting the stability of emerging economy financial markets (International Monetary Fund 2020, World Bank 2021, Asian Development Bank 2021). This box considers the impact of central bank APPs on bond spreads in the four member economies of the Association of Southeast Asian Nations (ASEAN) that implemented such operations: Indonesia, Malaysia, Thailand, and the Philippines.

Drawing on a new paper by Beirne and Sugandi (Forthcoming), the effectiveness of the monetary policy transmission mechanism of the APPs to bond spreads is examined, both in terms of magnitude and duration over a time horizon. A counterfactual assessment is also conducted to assess the additionality of the APPs. Central bank claims to the central government are used as a proxy indicator of APPs, given that actual purchase data are not publicly available. These claims increased sharply relative to prepandemic levels, and the growth rate of the claims is assumed to be an adequate approximation for actual asset purchases. This approach is superior to using a dummy variable for APPs, which is also consistent with our findings but fails to capture the intensity of quantitative easing purchases. The empirical work shows that APPs had a statistically significant dampening effect on bond yield spreads during the COVID-19 pandemic. To quantify the additionality of an APP in terms of transmission to bond spreads (i.e., 10-year government bond yields relative to those of United States Treasuries), the actual bond spreads were compared to spreads that would have prevailed under a scenario without an APP. The "no APP" scenario assumes a trajectory of bond spreads based on prepandemic fundamentals (**Figure B2.1**).

We find that APPs had varying degrees of bond market additionality across the four ASEAN economies that comprise our sample. For Thailand and the Philippines, we observe that actual spreads would have been higher without the APPs, while this effect takes time to materialize. The evidence supporting APP effectiveness on this basis is less prevalent in the cases of Indonesia and Malaysia. To examine the impact more rigorously, we estimate a series of country-specific vector autoregression regression models from 7 January 2010

Figure B2.1: Government Bond Yield Spread Gaps



Note: Reported is the difference between the actual bond spread and the bond spread implied by prepandemic fundamentals over the period 1 January 2010 to 28 February 2020. Where the actual spread is lower, denoted in the chart as a negative gap, then the inference is that the asset purchase program was effective in compressing the bond spread.
Source: Authors' calculations based on Beirne and Sugandi (Forthcoming).

[a] This box was written by John Beirne (vice-chair of research and senior research fellow) and Eric Sugandi (project consultant) of the Asian Development Bank Institute.

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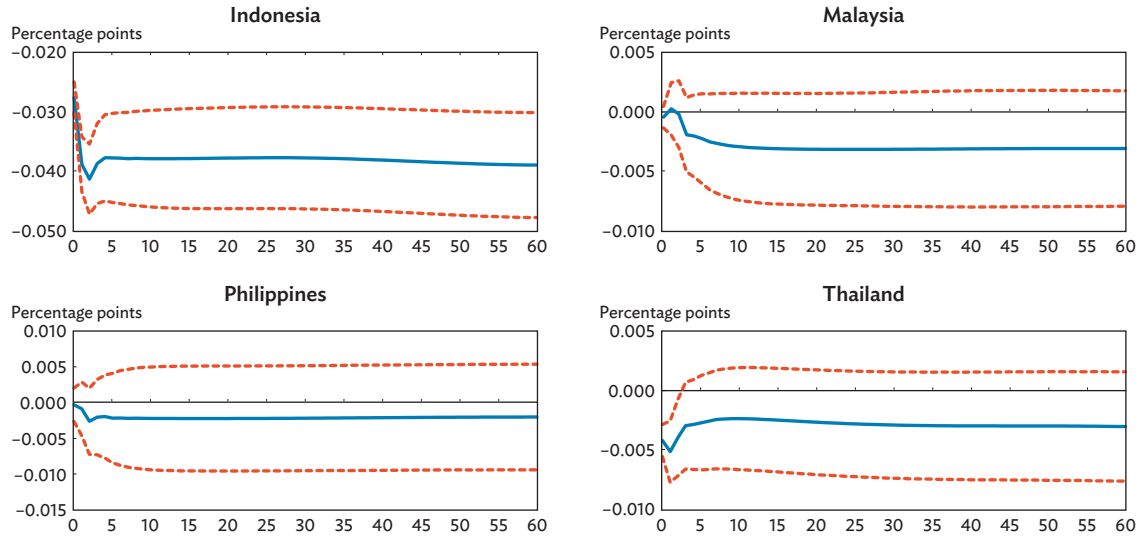
Box 2 *continued*

to 1 September 2021. The responses of bond spreads, as well as exchange rates, to shocks emanating from the APPs are shown in **Figures B2.2** and **B2.3**, respectively.

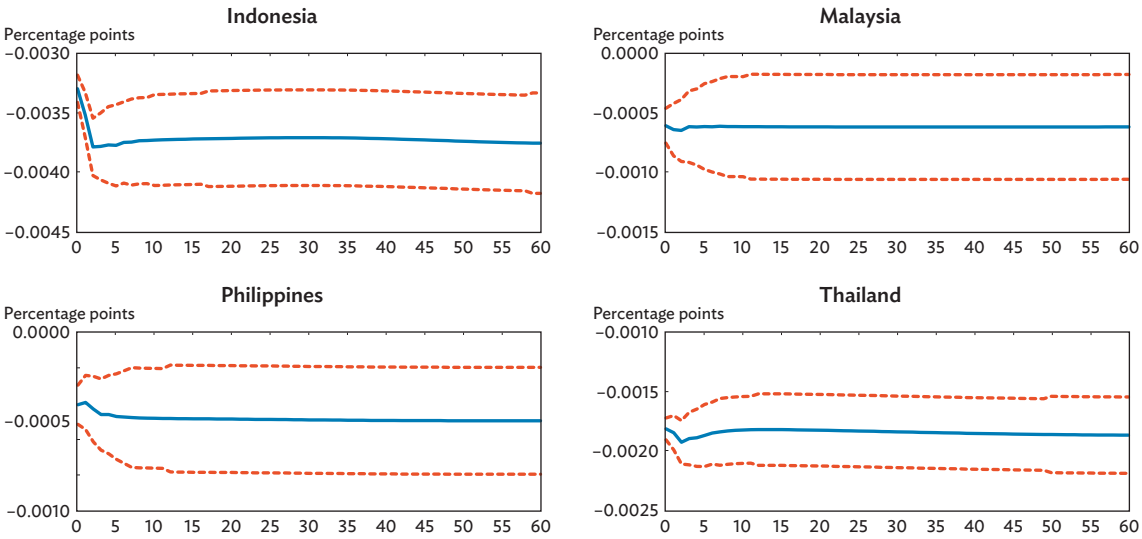
APP shocks lead to compressions in bond spreads in all four ASEAN economies, although we fail to find a statistically significant result at the 95% confidence level in the case of

Figure B2.2: Impulse Responses of Government Bond Spreads to Asset Purchase Program Shocks



Note: Reported are the impulse-response functions based on a one standard deviation shock imposed on the APP. The dotted lines represent 95% confidence intervals. The vertical axis represents percentage points, while the horizontal axis refers to the number of days.
Source: Authors' calculations based on Beirne and Sugandi (Forthcoming).

Figure B2.3: Impulse Responses of Exchange Rates to Asset Purchase Program Shocks



Note: Reported are the impulse-response functions based on a one standard deviation shock imposed on the APP. The dotted lines represent 95% confidence intervals. The vertical axis represents percentage points, while the horizontal axis refers to the number of days.
Source: Authors' calculations based on Beirne and Sugandi (Forthcoming).

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Box 2 *continued*

the Philippines. The magnitude of the bond spread response and its persistence, as regards statistical significance, is most notable for Indonesia. On the other hand, the bond spread reactions for Malaysia and Thailand remain significant only in the immediate period following the shock. In the case of exchange rate reactions to APP shocks, statistically significant effects are found across all four ASEAN economies. As in the case of bond spreads, the highest magnitude of exchange rate deprecation occurs in Indonesia. The size of the depreciation is somewhat lower for Thailand, followed by Malaysia and the Philippines.

Improved institutional development and central bank credibility in the four ASEAN economies in our sample, particularly since the global financial crisis, are important factors underpinning the effectiveness of the APPs. Ample liquidity and higher levels of financial development in the period since the global financial crisis have also contributed to the improved functioning of financial markets in these four ASEAN economies, thereby supporting monetary policy transmission. Overall, the evidence suggests that bond spread compressions due to central bank APPs are persistent, while significant stabilizing effects are found on exchange rates. Further analysis by Beirne and Sugandi (Forthcoming) shows that the APPs also helped to temper capital flow volatility during the COVID-19 pandemic, while no significant effect was found on inflation expectations. This latter point is particularly important from a monetary policy perspective. The quantitative easing measures were effective in their objective, to varying degrees, of relieving pressure on long-term bond yields and supporting stability in asset markets, while also not aggravating the medium-term inflation outlook.

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