

Global and Regional Market Developments

Bond yields fall in emerging East Asia amid an uncertain growth outlook and heightened risk aversion.

Between 31 December 2019 and 29 February 2020, 2-year and 10-year local currency government bond yields fell in all major advanced economies, a few select European markets, and most emerging East Asian economies on the back of risk-off investment sentiment fueled by the outbreak of the coronavirus disease 2019 (COVID-19) and an uncertain global economic growth outlook (**Table A**).¹

In emerging East Asia, all 10-year government bond yields and nearly all 2-year government bond yields declined between 31 December and 29 February following a few policy rate cuts by central banks, heightened risk aversion due to the outbreak of COVID-19, and increased uncertainty in the regional economic outlook. Hong Kong, China saw the largest declines in 10-year and 2-year government bond yields at 77 and 51 basis points (bps), respectively. Several central banks in the region cut their policy rates during the review period and revised their economic growth forecast for 2020 downward (**Table B**). To mitigate the impact of COVID-19, the People's Bank

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	(66)	(77)	-	(8.6)	-
United Kingdom	(24)	(38)	0.1	(12.8)	(3.3)
Japan	(12)	(14)	1	(10.7)	0.7
Germany	(17)	(42)	0.6	(10.3)	(1.7)
Emerging East Asia					
China, People's Rep. of	(40)	(41)	22	(5.6)	(0.4)
Hong Kong, China	(51)	(77)	-	(7.3)	(0.03)
Indonesia	(49)	(11)	39	(13.4)	(3.2)
Korea, Rep. of	(26)	(35)	14	(9.6)	(4.8)
Malaysia	(39)	(49)	28	(6.7)	(2.9)
Philippines	13	(15)	25	(13.1)	(0.6)
Singapore	(25)	(36)	-	(6.6)	(3.4)
Thailand	(36)	(42)	15	(15.1)	(5.8)
Viet Nam	20	(50)	20	(8.2)	(0.3)
Select European Markets					
Greece	3	(9)	60	(21.4)	(1.7)
Ireland	(9)	(31)	(0.1)	(10.9)	(1.7)
Italy	3	(26)	30	(6.5)	(1.7)
Portugal	4	(20)	10	(8.6)	(1.7)
Spain	(3)	(20)	7	(8.6)	(1.7)

() = negative, - = not available, bps = basis points, FX = foreign exchange.

Notes:

1. Data reflect changes between 31 December 2019 and 29 February 2020.

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.

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.

Table B: Policy Rate Changes

Economies	Policy Rate 31-Dec-2019 (%)	Rate Changes		Policy Rate 29-Feb-2020 (%)	Year-to-Date Change in Policy Rates (basis points)
		Jan-2020 (%)	Feb-2020 (%)		
United States	1.75			1.75	
Euro Area	(0.50)			(0.50)	
Japan	(0.10)			(0.10)	
China, People's Rep. of	4.35			4.35	
Hong Kong, China	2.00			2.00	
Indonesia	5.00		↓ 0.25	4.75	↓ 25
Korea, Rep. of	1.25			1.25	
Malaysia	3.00	↓ 0.25		2.75	↓ 25
Philippines	4.00		↓ 0.25	3.75	↓ 25
Thailand	1.25		↓ 0.25	1.00	↓ 25
Viet Nam	6.00			6.00	

() = negative.

Note: Data as of 29 February 2019.

Source: Various central bank websites.

of China reduced banks' reserve requirement ratio by 50 bps on 6 January and cut an additional 10 bps from the medium-term lending facility rate on 16 February. Malaysia announced a 25-bps policy rate cut in January and another 25-bps reduction in March. The Bank of Thailand reduced the policy rate by 25 bps on 5 February and expects gross domestic product (GDP) growth to be slower than originally forecast due to the delayed passage of the budget and the impact of the coronavirus, among other reasons. This was followed by a 25-bps policy rate cut by the central bank in the Philippines on 6 February. Bank Indonesia lowered the 7-day reverse repurchase rate by 25 bps to 4.75% at its 19–20 February Board of Governors meeting. The Indonesian central bank also revised downward its 2020 economic growth forecast to 5.0%–5.4% from an earlier estimate of 5.1%–5.5%, reflecting the impact of the COVID-19 outbreak on the global economic recovery.

While the Monetary Authority of Singapore made no change to its monetary policy during the review period, the Government of Singapore passed its 2020 budget on 18 February that included fiscal stimulus to mitigate the negative economic impact of the COVID-19 outbreak in the short-term and bolster growth. These measures included a SGD5.6 billion special economic package and an SGD800 million increase in the Ministry of Health's budget. Singapore also downgraded its 2020 GDP forecast from between 0.5% and 2.5% to between -0.5% and 1.5% due to uncertainties regarding the impact of COVID-19. Similarly, the Bank of Korea lowered its 2020 GDP forecast to 2.0% from the 2.3% forecast announced in November. The government also announced a more than KRW20 trillion support package in response to

the COVID-19 outbreak. A supplemental budget worth KRW11.7 trillion is also being sought by the government. In Hong Kong, China, the government announced a broad stimulus package worth HKD120 billion, including cash handouts of HKD10,000 for residents aged 18 years old and above.

However, the continued spread of COVID-19 and the economic impact of quarantine measures led to a number of central banks easing in March. On 16 March, the Bank of Korea conducted an emergency policy rate cut of 50 bps. The State Bank of Vietnam also announced a 100-bps cut on its refinancing rate effective 17 March. On 19 March, the Bangko Sentral ng Pilipinas followed with a 50-bps policy rate cut while Bank Indonesia announced a 25-bps reduction to its policy rate.

Monetary stances in major advanced economies remained stable during the observation period (Table B). The United States (US) Federal Reserve left the federal funds rate unchanged at between 1.50% and 1.75% during its 28–29 January monetary policy meeting, noting that the US economy continued to post gains as the labor market remained robust. The Federal Reserve also highlighted its concern over lower-than-targeted inflation in 2019. Personal Consumption Expenditures inflation in the US rose slightly to 1.7% in January from 1.5% in December, which was still below the targeted rate of 2.0%. US GDP expanded 2.1% year-on-year (y-o-y) in the fourth quarter of 2019, the same as in the previous quarter. December GDP growth forecasts remained unchanged from prior forecasts in September at 2.0% for 2020, 1.9% for 2021, and 1.8% for 2022. The US labor

market remained strong, with January nonfarm payrolls rising to 273,000 from 184,000 in December and the unemployment rate holding steady at 3.6% in January. As COVID-19 spread to more economies around the world, global stock markets slumped significantly since late February and continued to fall further in March. The evolving impact of COVID-19 led to an intensification of policy actions, with the Federal Reserve implementing an emergency rate cut of 50 bps on 3 March. This was followed soon after by an additional 100 bps rate cut on 15 March and additional asset purchases.

The European Central Bank (ECB) left monetary policy unchanged on 23 January, with the interest rates on main refinancing operations, the marginal lending facility, and the deposit facility held at 0.00%, 0.25%, and -0.50%, respectively. The monthly purchase amount of EUR20 billion under the asset purchase program was also left unchanged. The ECB noted moderate economic growth, with euro area GDP expanding 0.9% y-o-y in the fourth quarter of 2019, down from 1.2% y-o-y in the previous quarter. The 2020 GDP growth forecast was slightly downgraded to 1.1% in December from 1.2% in September, while growth forecasts for 2021 and 2022 were left unchanged at 1.4% each. As the COVID-19 continues to evolve to more European markets, ECB announced on 2 March that it was closely monitoring the situation and stood ready to respond if needed. On 12 March, the ECB announced further measures, with an additional annual asset purchase of EUR120 billion. The forecast for GDP in 2020 was also lowered to 0.8% and 1.3% for 2021. On 19 March, the ECB responded even more strongly and launched a EUR750 billion Pandemic Asset Purchase Programme.

In January, the Bank of Japan (BOJ) left unchanged its monetary policy rate at -0.1%, the 10-year government bond yield at 0.0%, and the asset purchase program at JPY80 trillion per year for Japan Government Bonds. Following the passage of spending measures by the Government of Japan, the fiscal year 2019 GDP growth estimate was raised to 0.8% in January from October's estimate of 0.6%, while GDP growth forecasts for 2020 and 2021 were raised to 0.9% and 1.1%, respectively, from 0.7% and 1.0%. To mitigate the negative impact of COVID-19 on economic activities in 2020, the BOJ injected JPY500 billion in financial markets via reverse repurchase agreements on 2 March. On 16 March, the BOJ engaged in additional easing measures, doubling its asset purchases of exchange-traded funds.

Economic Outlook

Global growth had been widely expected to strengthen in 2020 and 2021 relative to 2019, but this assessment is being challenged by a major new source of uncertainty. According to the International Monetary Fund's (IMF) *World Economic Outlook Update January 2020*, the global economy grew an estimated 2.9% in 2019 and is projected to expand 3.3% in 2020 and 3.4% in 2021. However, these projections were made prior to the COVID-19 outbreak.

Even before the onset of COVID-19, economic forecasts were being downgraded due to negative shocks in India and other emerging markets. The IMF lowered its global growth projections by 0.1 percentage points for 2020 and 0.2 percentage points for 2021 compared with its October 2019 projections. World trade is expected to expand 2.9% in 2020 and 3.7% in 2021, up from 1.0% in 2019. Trade tensions between the People's Republic of China (PRC) and the US continued to pose a major downside risk to global growth prospects. On 15 January, the world's two biggest economies signed a Phase 1 trade deal under which the US agreed to cut some tariffs on imports from the PRC in exchange for PRC commitments to buy more US farm, energy, and manufactured products. However, the deal is temporary and limited in scope, and falls far short of a comprehensive settlement. Geopolitical tensions in the Middle East pose another downside risk. On a positive note, global financial conditions remain broadly benign and monetary policy stances are largely accommodative.

The IMF's projections of stronger global growth are largely predicated on assumptions of stronger growth in emerging markets and developing economies, which will outweigh the downward growth trajectory of advanced economies. The US economy is expected to grow 2.0% in 2020 and 1.7% in 2021, down from 2.3% in 2019. The advanced economies as a whole are forecast to expand 1.6% in both 2020 and 2021, slightly down from 1.7% in 2019. On the other hand, growth in emerging markets and developing economies is projected to increase to 4.4% in 2020 and 4.6% in 2021 from 3.7% in 2019.

The IMF projects consumer price inflation in emerging markets and developing economies to fall from 5.1% in 2019 to 4.6% in 2020 and 4.5% in 2021. The corresponding figures for advanced economies are 1.4%, 1.7%, and 1.9%. Weak global oil prices are limiting inflationary pressures around the world.

COVID-19 poses a major downside risk to global growth but it will have the biggest negative economic impact on developing Asia.² The disease first erupted in the PRC, which is expected to suffer the bulk of the economic fallout from the outbreak. Given its outsized effect on other Asian economies, the negative impact of the disease on the PRC will inevitably spill over to the rest of the region, most notably East and Southeast Asian economies with extensive trade and other linkages with the PRC.

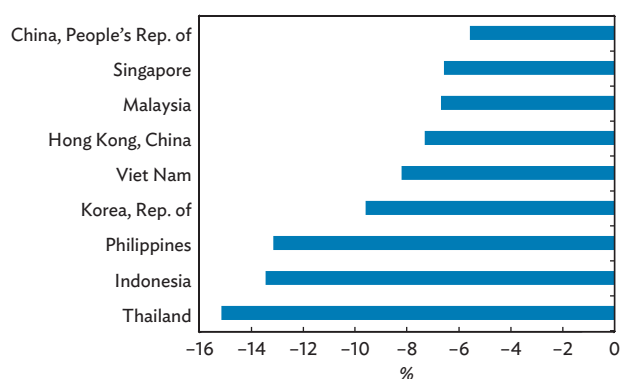
The Asian Development Bank's (ADB) *Asian Development Outlook 2019 Supplement*, released in December, forecast the region's economy to expand 5.2% in 2020 after growing 5.9% in 2018 and an estimated 5.2% in 2019. The PRC, which grew 6.6% in 2018 and an estimated 6.1% in 2019, is projected to expand 5.8%. The 2018, 2019, and 2020 figures for the 10 members of the Association of Southeast Asian Nations are 5.0%, 4.4%, and 4.7%, respectively. GDP in the Republic of Korea is projected to grow 2.3% in 2020 after rising 2.7% in 2018 and an estimated 2.0% in 2019. The growth figures for Hong Kong, China are 3.0% in 2018, an estimated -1.2% in 2019, and a projected 0.3% in 2020. The ADB report notes that the region faces a challenging external environment, in particular persistent trade tensions between the PRC and the US, which adversely affects not only exports but also business sentiment and investment. According to the ADB report, the region's consumer price inflation will increase from 2.4% in 2018 to an estimated 2.8% in 2019 and further to 3.1% in 2020.

COVID-19 has emerged as a major source of uncertainty for the global and regional economic outlook, as explained

in **Box 1**. The accuracy of the economic outlook discussed above will depend heavily on the evolution of the disease. If it is contained relatively quickly, there is much greater cause for optimism about the economic outlook for Asia and the world. If, on the other hand, the disease persists for an extended period, the economic damage is bound to be more substantial. Current estimates of the negative impact of COVID-19 on the PRC's GDP growth in 2020 typically range from 0.3% to 1.7%. The corresponding figures for the rest of developing Asia range from 0.2% to 0.5%. In summary, all growth projections are subject to a great deal of uncertainty due to COVID-19.

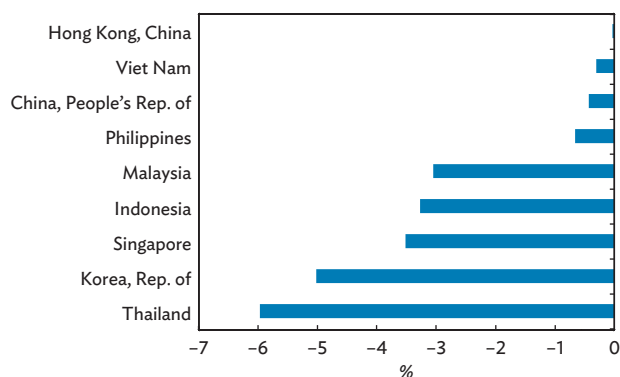
The outbreak and evolution of COVID-19, as well as its impact on the global economic outlook, has significantly affected risk sentiment in financial markets even if the economic impact will likely be confined to a short-term horizon. Between 31 December 2019 and 29 February 2020, all regional equity markets fell on the back of moderating global growth and heightened risk aversion driven by COVID-19 (**Figure A**). Emerging East Asian currencies also depreciated during the review period on a weaker global growth outlook (**Figure B**). Heightened risk aversion and associated economic growth moderation pushed up credit default swap spreads, the CBOE Volatility Index, and JP Morgan Emerging Markets Bond Index Sovereign Stripped Spreads (**Figures C, D, and E**).

Figure A: Changes in Equity Indexes in Emerging East Asia



Note: Changes between 31 December 2019 and 29 February 2020.
Source: Bloomberg LP.

Figure B: Changes in Month-End Spot Exchange Rates vs. the United States Dollar



Notes:

- Changes between 31 December 2019 and 29 February 2020.
- A positive (negative) value for the foreign exchange rate indicates the appreciation (depreciation) of the local currency against the United States dollar.

Source: Bloomberg LP.

² Developing Asia comprises the 46 developing member economies of the Asian Development Bank.

Figure C: Credit Default Swap Spreads in Select Asian Markets (senior 5-year)

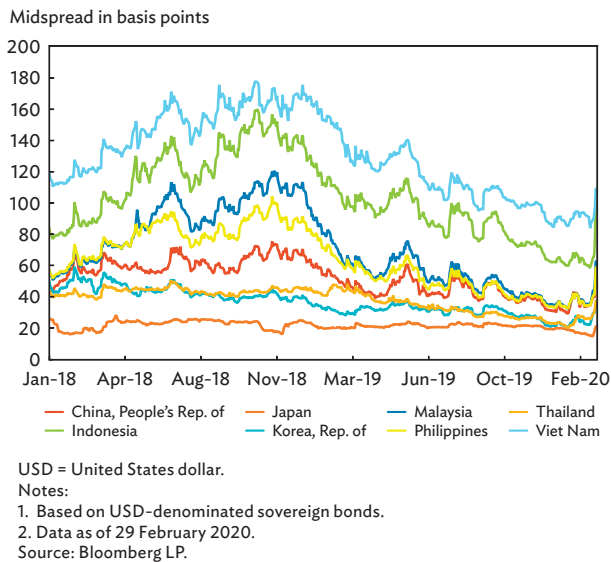
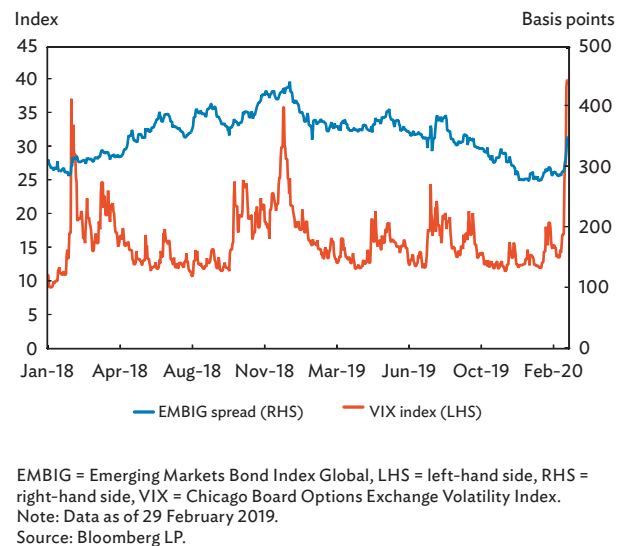


Figure D: United States Equity Volatility and Emerging Market Sovereign Bond Spread



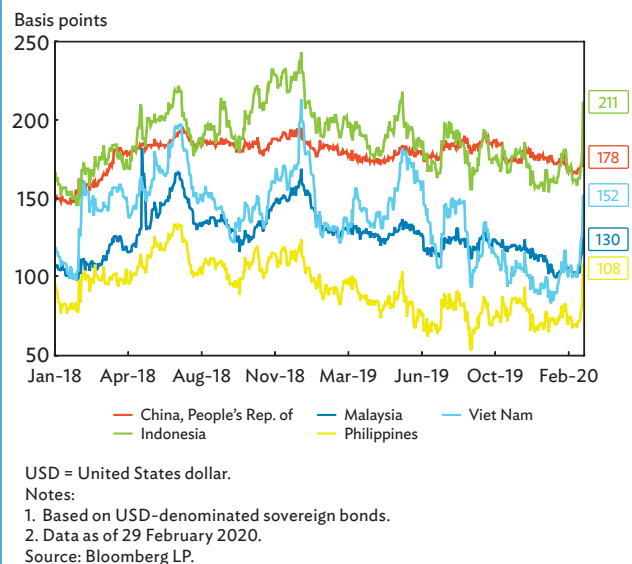
To further understand equity markets' reaction to the outbreak of COVID-19, **Box 2** examines the sectoral performance of stocks in the PRC and Hong Kong, China; other emerging East Asian markets; and markets other than emerging East Asia. Different sectors have largely reacted to COVID-19 at the market level and the stock market's reaction to the outbreak is more pronounced in economies once cases start to rapidly increase. Global stock markets also showed contagion during the market slump in the last week of February.

Foreign holdings of local currency government bonds in emerging East Asia were largely stable during the review period (**Figure F**). The largest gains in the foreign holdings' share occurred in Malaysia, following portfolio rebalancing activities. Foreign holdings also increased in the PRC as investors continued to invest in the bond market.

Risks to Emerging East Asian Bond Markets

Overall, downside risks continue to outweigh upside risks. Prior to the outbreak of COVID-19, there was a growing consensus that although risks were tilted to the downside, the gap between upside and downside risks was declining. However, the outbreak of COVID-19, which is by far the biggest downside risk to emerging East Asia's economic outlook and financial stability, has significantly widened the gap. In fact, the disease

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



has overtaken the PRC-US trade conflict as the single biggest source of uncertainty surrounding the world economy and global financial markets.

COVID-19 first emerged in Wuhan, a large city of more than 10 million in Hubei province in the central PRC, in December 2019. The number of infections and fatalities spread like wildfire across much of the PRC

Box 1: The Economic Impact of COVID-19 on Developing Asia

The coronavirus disease 2019 (COVID-19) was first identified in the city of Wuhan in the People's Republic of China (PRC) in December 2019.^a The number of confirmed cases has grown rapidly since then, spreading initially in the PRC and subsequently in the Republic of Korea, Italy, Iran, and other economies. At the end of February 2020, COVID-19 had infected 85,403 people in 55 economies and caused 2,924 deaths worldwide. The number of cases and fatalities from COVID-19 has already far surpassed the corresponding figures for the severe acute respiratory syndrome (SARS) outbreak in 2003. While COVID-19 is first and foremost a public health crisis, it is bound to have sizable economic repercussions, an issue we explore in this box.

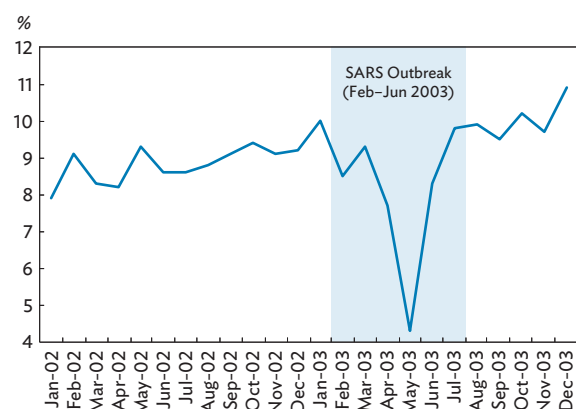
Channels of Economic Impact

There are several channels through which COVID-19 can affect economic activity. These include a decline in domestic consumption and possibly investment, a decline in tourism and business travel, spillovers from weakened demand into other sectors and economies through trade and production linkages, supply-side disruptions to production and trade, and effects on public health and health care spending.

Domestic consumption in the PRC is experiencing a temporary but sharp decline due to behavioral and policy changes as people stay home either as a precaution or because they have been told to. This also occurred during the SARS outbreak in 2003, when retail sales in the PRC declined by almost 3 percentage points during the second quarter of 2003 (**Figure B1.1**). The magnitude of the consumption shock during the current outbreak could well be bigger than in 2003 depending on the length and severity of the outbreak, as well as the policy responses. In the scenario of a protracted outbreak that affects companies' long-term business plans, a decline in investment is also possible.

Other developing Asian economies outside of the PRC will be affected through tourism and business travel.^b Tourism is an important source of revenue for many economies in the region, and visitors from the PRC account for a large and growing share of tourists throughout developing Asia (**Figure B1.2**). Tourism arrivals and receipts are expected to decline sharply as a result of travel bans and precautionary behavior. Many airlines have suspended or severely curtailed flights to the PRC. Non-Chinese tourist arrivals are also expected to decline as tourists avoid traveling in the region. During the SARS outbreak, Southeast and East Asian countries—such as Indonesia, Thailand, and the

Figure B1.1: Retail Sales and Personal Consumption Expenditures in the People's Republic of China during the SARS Outbreak, 2002–2003 (y-o-y, %)



SARS = severe acute respiratory syndrome.

Note: From Asian Development Bank. 2020. *The Economic Impact of the COVID-19 Outbreak on Developing Asia*. <https://www.adb.org/publications/economic-impact-covid19-developing-asia>.

Sources: Haver Analytics, CEIC Data Company, World Health Organization, and Asian Development Bank.

Republic of Korea—witnessed declines in tourist arrivals from outside Asia even though they had very few SARS cases (**Figure B1.3**).

Demand shocks can spill over into other sectors and economies via trade and production linkages. The PRC is a major export market for many developing Asian economies (**Figure B1.4**). As such, a sharp drop in the PRC's demand for goods and services is likely to be felt across the region.

Supply-side disruptions will also reverberate across the region and the world. The PRC is at the center of global manufacturing value chains. Many economies export large amounts of intermediate goods to the PRC and use inputs from the PRC in their production processes. COVID-19 has seriously disrupted production in the PRC due to business closures and the inability of workers to move freely between home and work. These disruptions will negatively impact production in and trade with other economies, especially those in East and Southeast Asia that are closely intertwined with the PRC in regional production networks.

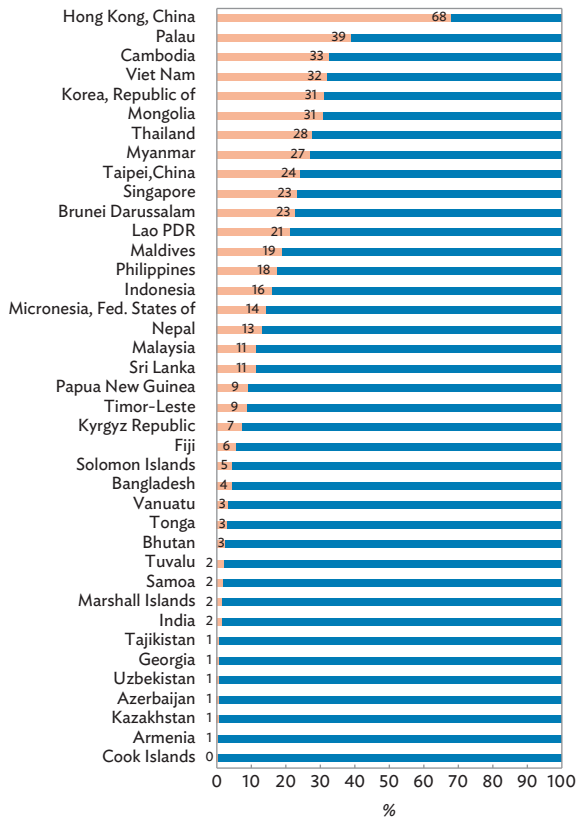
Finally, COVID-19 may also entail long-term health effects via mortality and morbidity, and through an increase in (and diversion of) health care expenditures.

^a This box is a shortened version of Asian Development Bank. 2020. *The Economic Impact of the COVID-19 Outbreak on Developing Asia*. <https://www.adb.org/publications/economic-impact-covid19-developing-asia>.

^b Developing Asia comprises the 46 developing member economies of the Asian Development Bank.

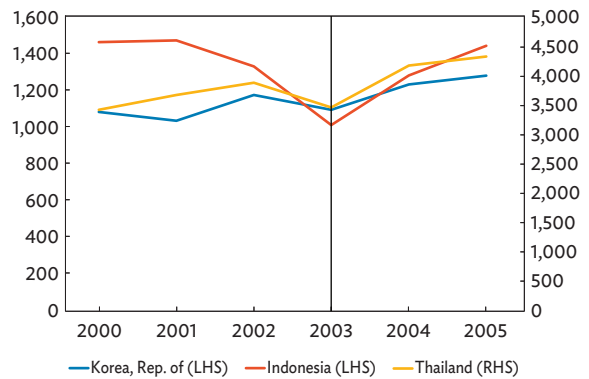
Box 1: The Economic Impact of COVID-19 on Developing Asia *continued*

Figure B1.2: Tourist Arrivals from the People’s Republic of China as a Share of Total Arrivals, 2018



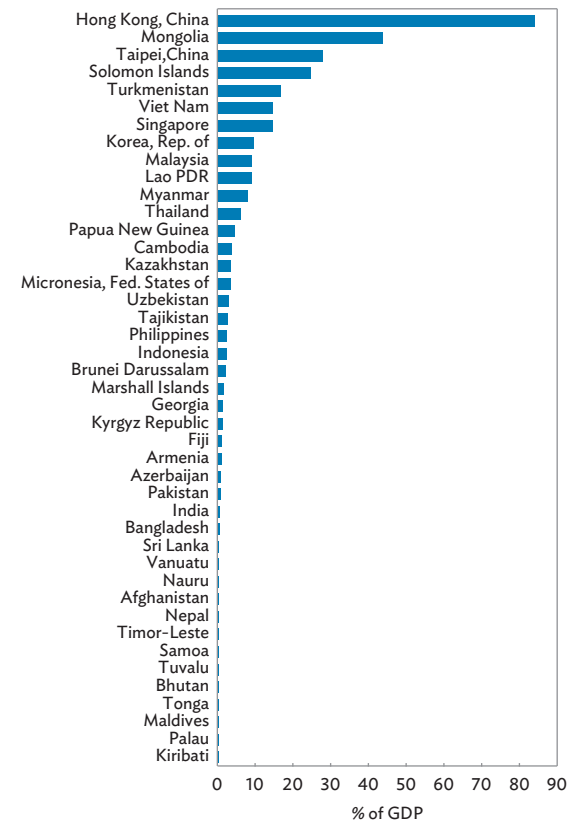
Lao PDR = Lao People’s Democratic Republic.
Source: World Tourism Organization.

Figure B1.3: Tourist Arrivals from Outside Asia to Select Developing Member Economies, 2002–2004



LHS = left-hand side, RHS = right-hand side.
Source: World Tourism Organization.

Figure B1.4: Exports to the People’s Republic of China by Percentage of Gross Domestic Product, 2016–2018 Average



Lao PDR = Lao People’s Democratic Republic.
Source: CEIC Data Company (accessed 10 February 2020).

Estimated Economic Impacts under Several Scenarios

The magnitude of the economic impact of COVID-19 will depend on the outbreak’s evolution, which continues to be very unpredictable. Any analysis of COVID-19’s impact thus requires experimenting with multiple scenarios. The Asian Development Bank (ADB) explored four scenarios with detailed assumptions that are explained in **Table B1.1**. As COVID-19 evolves, ADB will regularly update its assessment, with the next update to be included in the *Asian Development Outlook 2020*, which will be launched on 1 April.

The multiscenario analysis suggests a global impact in the range of USD77 billion–USD347 billion, or 0.1%–0.4% of global gross domestic product (GDP), with a moderate case estimate of USD156 billion, or 0.2% of global GDP (**Table B1.2**). Two-thirds of the impact will fall on the PRC,

Box 1: The Economic Impact of COVID-19 on Developing Asia *continued*

Table B1.1: Full Set of Scenario Assumptions

Scenario	Channel	Duration of Travel Bans and Sharp Decline in Domestic Demand	Tourism and Travel Bans	Decline in PRC Consumption Relative to No-Outbreak Scenario	Decline in PRC Investment Relative to No-Outbreak Scenario	Decline in Domestic Consumption in Selected Economy
Best case		2 months	<ul style="list-style-type: none"> Chinese outbound tourism drops by 50% for 2 months. For economies imposing travel bans, no tourism receipts from the PRC for 2 months. Inbound PRC tourism and receipts fall by as much as during the SARS outbreak. Tourism from outside Asia to non-PRC East and Southeast Asian economies falls by as much as during the SARS outbreak (assume peak decline lasts 2 months). 	0.7% (based on 2.75-pp decline in retail sales growth in Q32003 vs. prior 9 quarters)	None	None
Moderate case		3 months	<ul style="list-style-type: none"> Chinese outbound tourism drops by 50% for 3 months. For economies imposing travel bans, no tourism receipts from the PRC for 3 months. Inbound PRC tourism and receipts fall by an additional 10% relative to the base case. Tourism from outside Asia to non-PRC East and Southeast Asian economies falls by an additional 10% relative to the best case (i.e., 1 additional month). 	2% (based on 2-pp decline in PCE growth in 2003 vs. 2000-2002 average)	None	None
Worst case		6 months	<ul style="list-style-type: none"> Chinese outbound tourism drops by 50% for 6 months. For economies imposing travel bans, no tourism receipts from the PRC for 6 months. Inbound PRC tourism and receipts fall by an additional 30% relative to the base case. Tourism from outside Asia to non-PRC East and Southeast Asian economies falls by an additional 40% relative to the best case (i.e., 4 additional months). 	2% (based on 2-pp decline in PCE growth in 2003 vs. 2000-2002 average)	2% (protracted outbreak worsens business sentiment)	None
Hypothetical worst case (specific to each selected economy)		6 months; plus outbreak in selected economy lasting 3 months	<ul style="list-style-type: none"> Chinese outbound tourism drops by 50% for 6 months For economies imposing travel bans, no tourism receipts from the PRC for 6 months. Inbound PRC tourism and receipts fall by an additional 30% relative to the base case. Tourism from outside Asia to non-PRC East and Southeast Asian economies falls by an additional 40% relative to the best case (i.e., 4 additional months). 	2% (based on 2-pp decline in PCE growth in 2003 vs. 2000-2002 average)	2% (protracted outbreak worsens business sentiment)	2% (selected economy only)

DMC = developing member country, PCE = personal consumption expenditure, pp = percentage point, PRC = People's Republic of China, SARS = severe acute respiratory syndrome.

Source: Asian Development Bank. 2020. *The Economic Impact of the COVID-19 Outbreak on Developing Asia*. <https://www.adb.org/publications/economic-impact-covid19-developing-asia>.

Table B1.2: Estimated Global and Regional Impact of COVID-19 under Different Scenarios

	Best Case		Moderate Case		Worst Case	
	% of GDP	Losses (USD million)	% of GDP	Losses (USD million)	% of GDP	Losses (USD million)
World	-0.089	76,693	-0.182	155,948	-0.404	346,975
People's Republic of China	-0.323	43,890	-0.757	103,056	-1.740	236,793
Developing Asia (excluding the People's Republic of China)	-0.171	15,658	-0.244	22,284	-0.463	42,243
Rest of the World	-0.011	17,145	-0.020	30,608	-0.044	67,938

GDP = gross domestic product, USD = United States dollar.

Source: Asian Development Bank. 2020. *The Economic Impact of the COVID-19 Outbreak on Developing Asia*. <https://www.adb.org/publications/economic-impact-covid19-developing-asia>.

where the outbreak has been concentrated so far. In the moderate scenario, the economic loss to the PRC relative to a no-outbreak scenario is USD103 billion, or nearly 0.8% of domestic GDP. The remainder of the impact on the global economy is split roughly equally between the rest of developing Asia and the rest of the world. Specifically, the

rest of developing Asia would suffer a loss of USD22 billion, or 0.2% of its GDP, under the moderate scenario.

The main channel through which many economies in developing Asia will be affected is through a substantial drop in tourism demand (**Table B1.3**). There is anecdotal evidence

continued on next page

Box 1: The Economic Impact of COVID-19 on Developing Asia *continued*

Table B1.3: Decline in Tourism Revenues in Emerging East Asia

	Best Case		Moderate Case		Worst Case	
	% of GDP	Losses (USD million)	% of GDP	Losses (USD million)	% of GDP	Losses (USD million)
Cambodia	-1.409	-345.7	-1.929	-473.4	-3.490	-856.5
Hong Kong, China	-0.906	-3,286.7	-1.178	-4,273.6	-1.995	-7,234.1
Thailand	-0.845	-4,265.8	-1.224	-6,180.2	-2.361	-11,923.5
Singapore	-0.739	-2,692.8	-0.941	-3,427.4	-1.546	-5,631.3
Viet Nam	-0.432	-1,059.2	-0.614	-1,504.6	-1.158	-2,840.6
Philippines	-0.242	-801.4	-0.352	-1,164.4	-0.681	-2,253.6
Indonesia	-0.166	-1,730.5	-0.207	-2,155.9	-0.329	-3,432.1
Lao People's Democratic Republic	-0.164	-29.5	-0.231	-41.5	-0.431	-77.4
Malaysia	-0.163	-584.3	-0.212	-762.0	-0.361	-1,295.0
Myanmar	-0.149	-106.3	-0.224	-159.4	-0.448	-318.8
China, People's Rep. of	-0.112	-15,241.6	-0.149	-20,215.0	-0.258	-35,135.3
Brunei Darussalam	-0.086	-11.7	-0.113	-15.3	-0.192	-26.1
Korea, Rep. of	-0.073	-1,184.5	-0.103	-1,671.7	-0.193	-3,133.3

GDP = gross domestic product, USD = United States dollar.

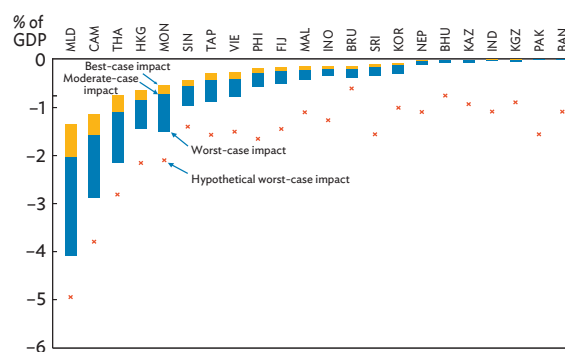
Source: Asian Development Bank. 2020. *The Economic Impact of the COVID-19 Outbreak on Developing Asia*. <https://www.adb.org/publications/economic-impact-covid19-developing-asia>.

that tourism arrivals in many developing Asian economies dropped between 50% and 90% in February relative to the prior year. Overall estimates suggest a loss of USD15 billion–USD35 billion in tourism receipts for the PRC and USD19 billion–USD45 billion for the rest of developing Asia.

Developing Asian economies with strong trade and production linkages with the PRC—such as Hong Kong, China; Singapore; Viet Nam; and the Philippines—will also be materially affected by the COVID-19 outbreak. For many economies in the region, the PRC is both a significant source of foreign tourists and a major export destination (Figure B1.4).

The estimated impact on individual economies—and sectors—could be much larger under a hypothetical worst-case scenario in which a given economy experiences a significant outbreak of its own (Figure B1.5). The epidemiological evolution of COVID-19, which will significantly affect its economic impact, remains highly fluid. The disease has begun to spread more forcefully outside of the PRC, with the Republic of Korea, Iran, and Italy witnessing large outbreaks. In addition, global equity markets and oil prices suffered huge losses in the first 2 weeks of March. As mentioned above, ADB will continue to monitor new developments and update its assessment, which will be included in *Asian Development Outlook 2020* to be released on 1 April.

Figure B1.5: Global Value Chain Exposure to the People's Republic of China for Select Economies, 2018



BAN = Bangladesh; BHU = Bhutan; BRU = Brunei Darussalam; CAM = Cambodia; FIJ = Fiji; HKG = Hong Kong, China; IND = India; INO = Indonesia; KAZ = Kazakhstan; KGZ = Kyrgyz Republic; KOR = Republic of Korea; LAO = Lao People's Democratic Republic; MAL = Malaysia; MLD = Maldives; MON = Mongolia; NEP = Nepal; PAK = Pakistan; PHI = Philippines; SIN = Singapore; SRI = Sri Lanka; TAP = Taipei, China; THA = Thailand; VIE = Viet Nam.

Notes: Bars indicate the range of estimated impact, with the top of the bar indicating the best-case scenario impact, the midline indicating the moderate scenario impact, and the bottom of the bar indicating the worst-case scenario impact. The marker shows the economic impact of a hypothetical worst-case scenario where a significant outbreak occurs in that economy. These should not be interpreted as a prediction that an outbreak will occur in any of these economies; in most of these economies there are very few cases of COVID-19. Rather, they are meant to guide policy makers in determining how costly an outbreak could be so they can properly evaluate the benefits and costs of prevention and early response.

Source: Asian Development Bank estimates.

Box 2: How Are Financial Markets Reacting to the COVID-19 Outbreak?

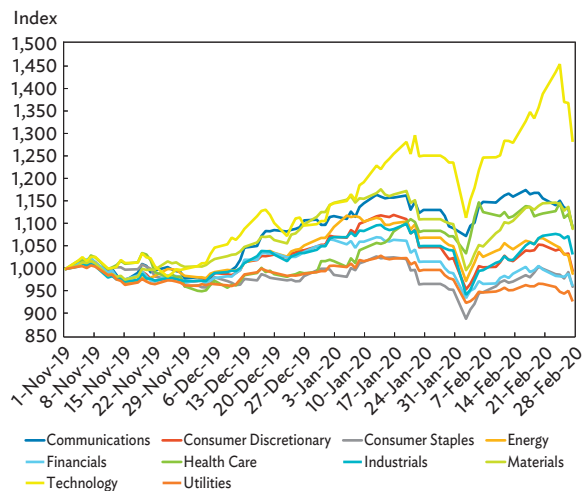
The recent outbreak of the coronavirus disease 2019 (COVID-19) in the People's Republic of China (PRC) had infected more than 85,000 people and caused more than 2,900 deaths as of 29 February 2020.^a To fight against the spread of the virus, the Government of the PRC mobilized vast resources and restricted many normal economic activities. These developments will weigh on economic growth in the first quarter of 2020 and beyond. While COVID-19's impact on the real economy will eventually be revealed in actual economic performance indicators, the ongoing reaction of equity markets can serve as a forward-looking signal of the potential economic impacts.

To understand how global equity markets are reacting to the spread of COVID-19, we develop sector-specific, capitalization-weighted indexes of stocks in different regions and observe the movements of these indexes. To observe the patterns of equity market reactions in different regions, listed stocks are classified into one of three regions: (i) the PRC and Hong Kong, China; (ii) the Association of Southeast Asian Nations (ASEAN) plus the Republic of Korea and Japan (collectively known as ASEAN+2); and (iii) the rest of the world.^b For each regional pool, the stocks are further grouped into sectors based on Bloomberg Industry Classification Standard Level 1.

To construct the capitalization-weighted index, this research sets 1 November 2019 as the base date of the index and aggregates the total market capitalization (i.e., stock price multiplied by the number of shares outstanding for all stocks excluding new initial public offerings and delistings) in each of the sector groups from each region. The total value is then converted to 1,000 (i.e., the starting level of the index) using a divisor. For each trading day after 1 November 2019, the market capitalization of the same groups of stocks is aggregated and divided by the same divisor to obtain the index level for that day. Since each stock's impact on the index value depends on its market capitalization, the daily price change in the index is therefore a capitalization-weighted return of all the stocks in the index. The data are collected from *Wind Information* for the PRC, and from Bloomberg LP for Hong Kong, China; ASEAN+2; and the rest of the world.

Figures B2.1, B2.2, and B2.3 show how the stocks of different sectors in different regions performed from 1 November 2019 to 28 February 2020. Figure B2.1, which includes the sector indexes of the PRC and

Figure B2.1: Sector-Level Stock Index Performances in the People's Republic of China and Hong Kong, China



Notes:

1. 1 November 2019 = 1,000.
 2. Data based on Bloomberg Industry Classification Standard Level 1.
 3. Data coverage period is from 1 November 2019 to 28 February 2020.
- Source: *AsianBondsOnline* computations based on Bloomberg LP data.

Hong Kong, China, show sector-specific movements from 1 November 2019 until 20 January 2020. By late January, the indexes demonstrate strong comovement as the outbreak of COVID-19 further evolved, the government took nationwide measures to fight the outbreak, and the related negative impacts on economic activities became clearer. Such comovement was observed around each key COVID-19-related development through the first half of February. With gradual signs of the outbreak stabilizing within the PRC starting to appear in the middle of February, the sector indexes once again demonstrated more sector-specific movements until the last week of February when global stock markets dropped on negative sentiment driven by the rapid spread of COVID-19 outside of the PRC.

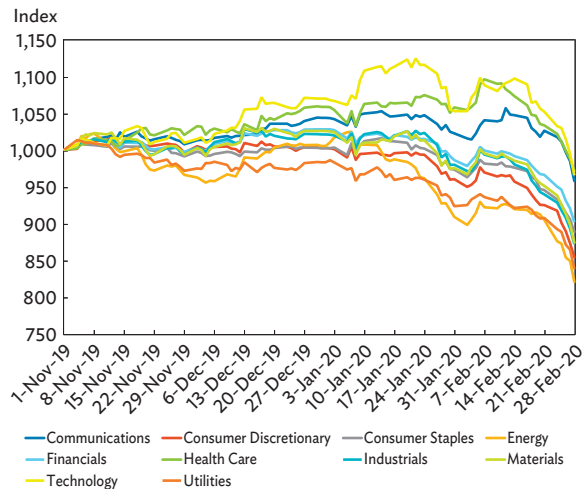
Figure B2.2 shows sector index performances in ASEAN+2 stock markets, which were broadly similar to those observed in the PRC and Hong Kong, China. Each sector largely tracked its sector-specific fundamentals from 1 November 2019 until the middle of January 2020. From late January until 19 February, the sector indexes reacted to COVID-19-related events, albeit with weaker reactions compared to those in the PRC and Hong Kong, China. However, as more COVID-19

^a World Health Organization. COVID-19 Situation Report—40. 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200229-sitrep-40-covid-19.pdf?sfvrsn=849d0665_2.

^b This section presents general trends in the performances of different sector indexes in different regions. The designed index can also be affected by differences in trading rules such as different price limits and trading restrictions in different markets.

Box 2: How Are Financial Markets Reacting to the COVID-19 Outbreak? *continued*

Figure B2.2: Sector-Level Stock Index Performances in ASEAN, Japan, and the Republic of Korea

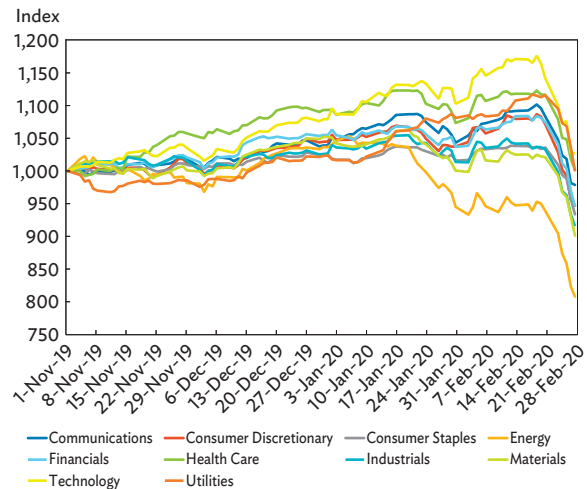


ASEAN = Association of Southeast Asian Nations.

Notes:

1. In this figure, ASEAN comprises Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam.
 2. 1 November 2019 = 1,000.
 3. Data based on Bloomberg Industry Classification Standard Level 1.
 4. Data coverage period is from 1 November 2019 to 28 February 2020.
- Source: *AsianBondsOnline* computations based on Bloomberg LP data.

Figure B2.3: Sector-Level Stock Index Performances in the Rest of the World



Notes:

1. In this figure, the rest of the world comprises Australia; Canada; Finland; France; Germany; India; Italy; the Russian Federation; Spain; Sri Lanka; Sweden; Taipei, China; and the United States.
 2. 1 November 2019 = 1,000.
 3. Data based on Bloomberg Industry Classification Standard Level 1.
 4. Data coverage period is from 1 November 2019 to 28 February 2020.
- Source: *AsianBondsOnline* computations based on Bloomberg LP data.

cases were confirmed in Japan and the Republic of Korea, sector stock indexes in ASEAN+2 experienced rapid declines from 20 February to 28 February.

Figure B2.3 shows the performance of stocks in the rest of the world during the same period. For the majority of the review period, these markets witnessed largely sector-specific movements with milder reactions to COVID-19-related news than occurred in the PRC and Hong Kong, China. However, stock markets in the rest of the world reacted strongly in late February amid a rapid rise in confirmed COVID-19 cases in some European and Middle East countries. The last week of February witnessed a major slump in global stock markets on the back of heightened risk aversion.

A detailed examination of sector returns is listed in **Table B2.1**, which reports the cumulative daily returns on the sector indexes of all three regions for 2-week periods from 1 January to 28 February. During the second half of January, stocks in the PRC and Hong Kong, China experienced market-wide declines in most sectors. Consumer discretionary and consumer staples posted the largest dips

at 8.5% and 7.0%, respectively. Stocks in ASEAN+2 and rest of the world were also negatively affected but to a milder extent. During the first 2 weeks of February, equity markets in the PRC and Hong Kong, China showed signs of stabilizing. During the last 2 weeks of February, with the number of confirmed cases outside the PRC and Hong Kong, China climbing fast, equity markets in ASEAN+2 and the rest of world experienced sharp declines. Markets in the PRC and Hong Kong, China were also affected by market contagion.

Table B2.2 compares the 2-month cumulative performance of sector indexes in all three regions. The results confirm that global equity markets reacted negatively to the outbreak of COVID-19 largely at the market level.

Overall, the trends suggest that (i) COVID-19 shocks to financial markets are largely occurring at the aggregate market-wide level; (ii) the reactions are related to investor sentiment, with more pronounced reactions to the COVID-19 outbreak in affected regions; and (iii) there were clear signs of equity market contagion during the last week of February when markets that had been stabilizing were weighed down by the global market slump.

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Box 2: How Are Financial Markets Reacting to the COVID-19 Outbreak? *continued*

Table B2.1: Sector Performance by Region

Sector	1 Jan–15 Jan 2020			16 Jan–31 Jan 2020			1 Feb–15 Feb 2020			16 Feb–29 Feb 2020		
	PRC + HKG	ASEAN+2	Rest of World	PRC + HKG	ASEAN+2	Rest of World	PRC + HKG	ASEAN+2	Rest of World	PRC + HKG	ASEAN+2	Rest of World
Communications	5.24	0.51	3.32	(5.75)	(2.50)	(2.88)	6.25	2.42	4.58	(6.01)	(8.84)	(10.77)
Consumer Discretionary	5.83	(0.97)	1.48	(8.46)	(3.33)	(2.16)	(0.33)	(0.28)	4.01	(2.00)	(11.29)	(12.88)
Consumer Staples	2.40	1.15	0.70	(7.00)	(3.98)	(1.57)	2.19	0.26	2.20	(1.11)	(9.29)	(10.49)
Energy	2.73	(1.79)	0.10	(4.32)	(8.17)	(9.26)	(0.26)	1.19	0.33	(5.13)	(11.22)	(15.60)
Financials	1.05	(1.05)	0.19	(6.80)	(3.07)	(1.88)	0.07	0.57	4.46	(2.75)	(9.43)	(13.43)
Health Care	4.04	0.06	2.16	1.33	(0.07)	(3.97)	4.27	1.48	4.14	(1.98)	(9.90)	(10.81)
Industrials	3.69	(0.23)	1.80	(4.46)	(3.77)	(2.95)	(1.47)	0.06	2.76	1.30	(11.63)	(12.72)
Materials	3.40	(1.15)	(0.10)	(5.62)	(3.81)	(4.86)	1.20	1.08	2.44	(1.48)	(11.87)	(12.66)
Technology	11.09	3.16	3.30	0.24	(4.65)	(1.02)	4.17	4.16	6.06	0.74	(12.65)	(12.87)
Utilities	2.83	(2.03)	2.09	(4.62)	(4.14)	3.44	(2.26)	(0.29)	2.48	(2.57)	(9.32)	(10.13)

() = negative; ASEAN = Association of Southeast Asian Nations; HKG = Hong Kong, China; PRC = People's Republic of China.

Notes:

1. In this table, ASEAN+2 comprises Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam plus Japan and the Republic of Korea.
2. The rest of the world comprises Australia; Canada; Finland; France; Germany; India; Italy; the Russian Federation; Spain; Sri Lanka; Sweden; Taipei, China; and the United States.
3. Data based on Bloomberg Industry Classification Standard Level 1.

Sources: *AsianBondsOnline* computations based on data from Bloomberg LP and *Wind Information*.

Table B2.2: Sector Performance by Region before and after the COVID-19 Outbreak

Sector	1 Nov 2019–31 Dec 2019			1 Jan 2020–29 Feb 2020		
	PRC + HKG	ASEAN+2	Rest of World	PRC + HKG	ASEAN+2	Rest of World
Communications	9.46	4.28	3.87	(0.26)	(8.41)	(5.75)
Consumer Discretionary	5.27	0.30	4.43	(4.97)	(15.86)	(9.55)
Consumer Staples	0.21	0.19	2.49	(3.51)	(11.85)	(9.17)
Energy	6.69	0.58	3.71	(6.97)	(19.99)	(24.44)
Financials	5.10	2.75	5.38	(8.42)	(12.97)	(10.65)
Health Care	1.93	5.74	8.98	7.66	(8.43)	(8.48)
Industrials	4.99	2.12	2.63	(0.95)	(15.57)	(11.12)
Materials	11.90	2.59	5.12	(2.50)	(15.75)	(15.18)
Technology	10.30	6.81	7.66	16.24	(9.97)	(4.54)
Utilities	(0.40)	(1.67)	2.33	(6.62)	(15.77)	(2.13)

() = negative; ASEAN = Association of Southeast Asian Nations; HKG = Hong Kong, China; PRC = People's Republic of China.

Notes:

1. In this table, ASEAN+2 comprises Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam plus Japan and the Republic of Korea.
2. The rest of the world comprises Australia; Canada; Finland; France; Germany; India; Italy; the Russian Federation; Spain; Sri Lanka; Sweden; Taipei, China; and the United States.
3. Data based on Bloomberg Industry Classification Standard Level 1.

Sources: *AsianBondsOnline* computations based on data from Bloomberg LP and *Wind Information*.

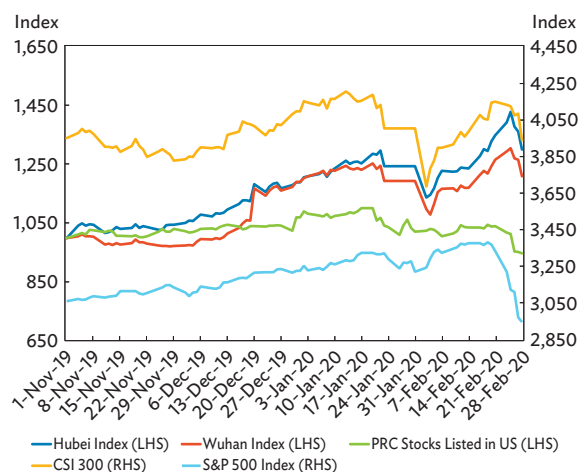
To reconfirm that equity markets are responding to COVID-19-related news at the market level, we conduct a focus group comparison based on relevant geographical factors. For the PRC market, we construct two similar capitalization-weighted indexes using the stocks of firms located in Hubei Province (Hubei Index) and Wuhan City (Wuhan Index). The performances of these two indexes are compared with the Shanghai–Shenzhen 300 (CSI 300)

Index over the same period. In the United States (US) market, we formed a similar capitalization-weighted index of US-listed Chinese companies and compared it with the Standard and Poor's 500 (S&P 500) Index. **Figure B2.4** shows the movements of all five of these indexes. While the Hubei Index and the Wuhan Index largely tracked the CSI 300 Index, albeit with some idiosyncratic movements prior to 20 January, the Hubei Index and the Wuhan Index

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Box 2: How Are Financial Markets Reacting to the COVID-19 Outbreak? *continued*

Figure B2.4: Stock Index Performances for Select Locations and Major Indexes



CSI 300 = Shanghai–Shenzhen China Securities Index, LHS = left-hand side, PRC = People’s Republic of China, RHS = right-hand side, S&P 500 = Standard & Poor’s Index, US = United States.

Notes:

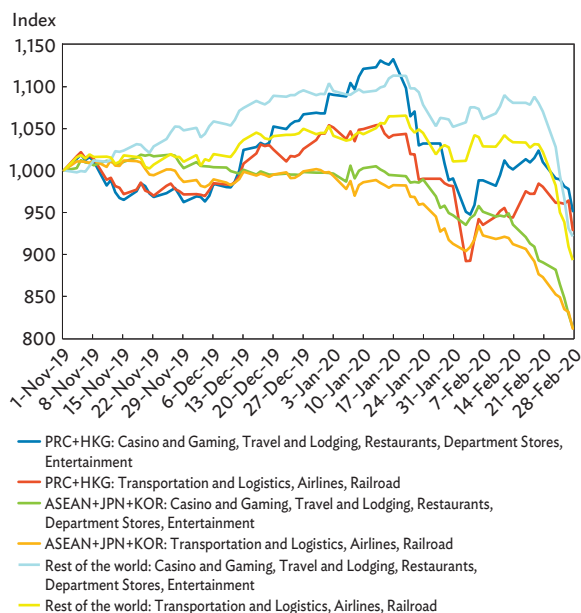
1. 1 November 2019 = 1,000.
2. Data coverage period is from 1 November 2019 to 28 February 2020.

Source: *Wind Information* and *Bloomberg LP*.

started to comove more closely with the CSI 300 Index after 20 January in response to COVID-19-related news. In the US market, the stocks of Chinese companies closely tracked the movement of the S&P 500 Index and showed limited reaction to COVID-19-related news until 20 February. However, amid the market slump during the last 10 days of February, the stocks of US-listed Chinese companies were, to a lesser extent, negatively affected by the plunging S&P 500 Index. Notably, these stocks did not follow the market trend in the PRC, where stock prices were picking up as the global slump started. These two comparisons further demonstrate that equity market reactions to the outbreak have tended to occur at the market level.

To reconfirm that COVID-19 shocks affect markets where concerns over an outbreak are more pronounced, we focused on stocks from two Bloomberg Industry Classification Systems Level 2 sectors that are most likely to be affected by COVID-19-related developments. These are (i) casino and gaming, travel and lodging, restaurants, department stores, and entertainment (Leisure Index); and (ii) transportation and logistics, airlines, and railroads (Logistics Index). As **Figure B2.5** shows, from 20 January to 5 February, when the PRC was the most affected market, both the Leisure Index and the Logistics Index suffered larger declines in the PRC

Figure B2.5: Stock Index Performances for Selected Sectors across Regions



ASEAN = Association of Southeast Asian Nations; HKG = Hong Kong, China; JPN = Japan; KOR = Republic of Korea; PRC = People’s Republic of China.

Notes:

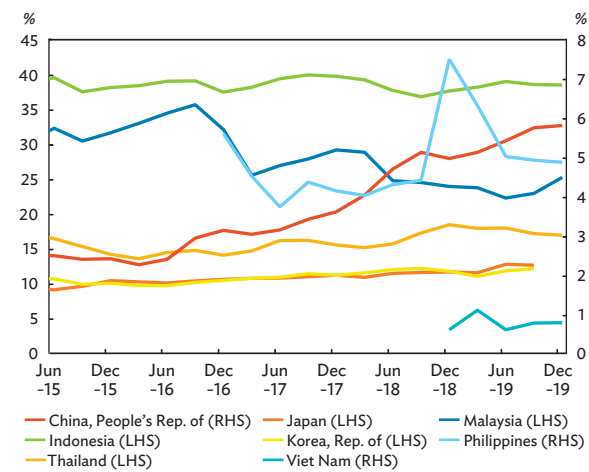
1. In this figure, ASEAN comprises Cambodia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam.
2. In this figure, the rest of the world comprises Australia; Canada; Finland; France; Germany; India; Italy; the Russian Federation; Spain; Sri Lanka; Sweden; Taipei, China; and the United States.
3. 1 November 2019 = 1,000.
4. Data based on Bloomberg Industry Classification Standard Level 2 breakdown.
5. Data coverage period is from 1 November 2019 to 28 February 2020.

Source: *AsianBondsOnline* computations based on *Bloomberg LP* data.

and Hong Kong, China than in the other two regions included in the study. From 14 February to 21 February, the Leisure and Logistics Indexes suffered the largest declines in ASEAN+2 markets, as Japan and the Republic of Korea experienced an increase in confirmed cases. However, from 21 February—when Europe, the Middle East, and the US began reporting an increase in COVID-19 cases—equity markets in the rest of world reacted sharply as global markets experienced a contagion of fear during the last week of February.

In sum, equity markets’ reactions to COVID-19-related news have been quite intuitive. First, equity markets reacted to such information largely at the market level. Second, the reaction was most pronounced in markets where the number of COVID-19 cases rose quickly. Third, when COVID-19 spread to the global economy, global equity markets experienced contagion during the ensuing market slump.

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



LHS = left-hand side, RHS = right-hand side.

Note: Data as of 31 December 2019 except for Japan and the Republic of Korea (30 September 2019).

Source: *AsianBondsOnline*.

and beyond to reach 85,403 and 2,924, respectively, as of 29 February.³ While the overwhelming majority of cases have been in the PRC, especially Hubei province, a number of other countries, most notably the Republic of Korea, Iran, and Italy have also suffered major outbreaks. By the end of February, the number of cases seemed to be stabilizing in the PRC while growing rapidly in the rest of the world. Much remains unknown about the disease, including the maximum incubation period, which is adding to the general public's fear and panic. It is too early to tell when COVID-19 will be contained and brought under control. The highly infectious nature of the disease has led to a contagion of fear affecting many individuals across the PRC, Asia, and other regions. This contagion of fear has been amplified by social media, which barely existed during the SARS outbreak, a broadly similar outbreak that originated in the PRC in 2003. Although highly infectious, the fatality rate of COVID-19 appears to be relatively low at 1.0%–2.0%.

Given the contagious nature of COVID-19 and the contagion of fear it has spawned, the disease is likely to have sizable economic effects. There are at least three major channels through which the disease will adversely affect economies. First, consumption and retail sales are likely to take a major hit as consumers refrain from going out. This will be especially true in the PRC and other

countries that have suffered a major outbreak of the disease. The behavioral changes induced by the disease—such as not going to restaurants, shopping centers, or cinemas—will dampen domestic demand. Leisure and hospitality industries, including domestic demand, will also suffer. Second, international travel and tourism is bound to suffer as a result of travel restrictions imposed on flights originating in or transiting through COVID-19 hotspots. Even in the absence of restrictions, tourists and business travelers alike will postpone or cancel plans as a precautionary measure against becoming infected. Given the PRC's large and growing importance as a source of international tourists, countries where tourism is an important part of the economy will be hit especially hard. Finally, trade and production linkages are another source of spillovers. The slowdown of the PRC's economic growth will reduce the exports of other countries to the PRC. Given the PRC's central role in regional production networks, production disruptions in the PRC will reverberate across East and Southeast Asian economies with which the PRC has close trade and other economic linkages.

There are other channels through which COVID-19 can adversely affect economic performance. For example, weak business confidence can harm investment. This is especially true if the disease persists for an extended period of time, thereby harming long-term economic prospects. Most estimates of the negative economic impact of COVID-19 on the PRC's GDP range from 0.3 to 1.7 percentage points in 2020. That is, if the PRC would have grown by 5.9% in 2020 in the absence of the disease, growth of between 4.2% and 5.6% is now expected. Such an impact is substantial by any measure. Furthermore, the spillover effects from the PRC's slowdown will slow growth in the rest of the region and the world.

The negative impact of the disease will not only be limited to the real economy but also be felt in financial markets. For example, as a result of the rapid increase in the number of infections in the Republic of Korea since the middle of February, the won-dollar rate briefly fell below the psychologically significant 1,200-to-1 mark. In addition, equity markets in the region and the rest of the world are reacting to news about the disease. The effect of the disease on the real economy and financial markets are not independent of each other. In particular, the weakening of the real economy will harm the performance of firms and jeopardize their ability

³ World Health Organization. COVID-19 Situation Report—40. 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200229-sitrep-40-covid-19.pdf?sfvrsn=849d0665_2.

to repay debts. This, in turn, will saddle banks with bad loans, damaging their balance sheets and thus threatening the soundness and stability of the banking system. The negative effect of COVID-19 on the real economy and financial markets became more pronounced during the first 2 weeks of March. Global oil prices and global stock markets fell sharply, reflecting growing concerns about a global pandemic.

Although COVID-19 is by far the biggest downside risk to global growth and financial stability, it is by no means the only one. In particular, PRC-US trade tensions continue to pose a major threat. The Phase 1 deal agreed upon by the two economic giants is clearly a welcome development. It binds them to fulfill specific commitments through the end of 2020 and thus makes it unlikely that new disputes will arise this year. Yet, the trade conflict awaits a comprehensive, systematic resolution. In the absence of a long-term fundamental agreement, the conflict will remain a significant source of uncertainty for the world economy and global financial markets. Other risks include geopolitical risks associated

with tensions in the Middle East. If those tensions are not defused and instead escalate into direct conflict, the outcome may be a serious disruption in the flow of oil from the region to the rest of the world.

Despite the short-term challenge posted by COVID-19, emerging East Asia continues to pursue an agenda of sustainable development, which can help mitigate the negative effects of climate change and global warming. Green bonds serve as an effective instrument to finance environment-friendly investments such as cleaner power plants. At the same time, green bonds can contribute to bond market development in the region as policy makers and regulators level the playing field for the issuance of such bonds. Specifically, a bond market regulatory framework, including issuance and trading mechanisms, would benefit from green bond market development (**Box 3**). On the demand side, environmental, social, and governance investing has become increasingly popular among the global asset management community. Existing evidence shows that such investments can deliver good returns (**Box 4**).

Box 3: Green Bond Quantitative Performance during Periods of Market Stress—2020 Update

Introduction

Green bonds can be an effective market-based approach to financing climate solutions for investors with sustainable investment mandates. But the potential existence of a “greenium” is a significant hindrance to conventional investors buying these bonds as a mainstream investment, as they have to justify any reduction in spread compensation from a risk-and-return perspective, consistent with their own fiduciary duty. If, however, a “green factor” exists for green bonds that sustainably delivers superior risk-adjusted returns and/or exhibit downside risk protection—qualities that investors can assign a value to—then a greenium may be explainable from a fundamental market-pricing perspective. To test this hypothesis, we analyzed the secondary market performance of green bonds versus conventional equivalents to isolate the green factor and test for a relationship with secondary market performance.

This update extends our prior research to include analysis of green bonds’ relative performance in both the United States (US) dollar and euro markets, with new findings and an expanded data set to make comparisons between regions.

Performance of Green vs. Conventional Bond Equivalents: Total Returns of EUR-Denominated Bond Baskets Matched for Sector, Currency, Liquidity, Issuance Vintage, Size, and Country Risk

First, we compared the total return performance of matched baskets of green and conventional bonds in the same sector to isolate the green factor as a driver of returns by controlling for idiosyncratic factors. We created baskets of all EUR-denominated, green-labeled and conventional, non-hybrid, fixed-rate, benchmark-sized bonds issued between April 2016 and September 2017 by European-domiciled, investment-grade-rated, power utility companies. The average duration, credit rating, and spread level of the baskets at the start of the review period were similar. Liquidity was considered equivalent because all bonds in the sample were issued in the same period, and the average notional value of the green bond basket at EUR675 million was larger than the EUR560 million average notional value of the conventional equivalent basket. Because the underlying country composition of issuers in the baskets differed, we made two versions of the conventional bond basket to account for country risk: (i) one with as-issued country weights and (ii) another with country

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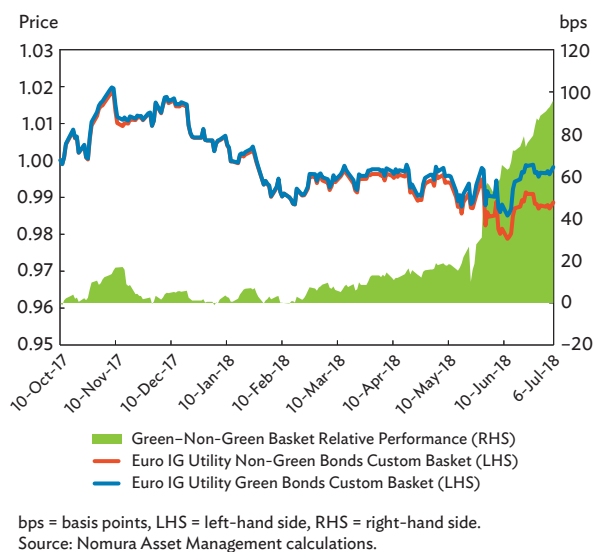
Box 3: Green Bond Quantitative Performance during Periods of Market Stress— 2020 Update *continued*

weights equalized to that of the green bond basket to account for intra-euro area country risk.

The total returns of the green bond basket outperformed the conventional bond baskets, both the as-issued and equalized country-weight versions, by 90 basis points (bps) and 48 bps, respectively, between 1 October 2017 and 11 July 2018.

The green bond basket's outperformance became most pronounced in May 2018, coinciding with a period of general market volatility following elections in Italy (**Figure B3.1**).

Figure B3.1: Performance of Green vs. Conventional Bonds—Total Returns of EUR-Denominated Bond Baskets Matched for Sector, Currency, and Liquidity



Additionally, we tested if the green factor's performance effect extended beyond individually labeled green bonds to all of the issuer's new bonds, regardless of label. We classified all corporate issuers as either a green bond issuer if they had at least one green bond outstanding between April 2016 and September 2017, or as a non-green bond issuers if they did not. We then constructed matched baskets of all newly issued bonds as before. The green bond issuer basket outperformed the non-green bond issuer basket by 42 bps when using as-issued country weights and by 49 bps with equalized country weights, again mainly during the period of market volatility in and around May 2018. This indicates that the green factor may enhance the issuer's overall credit profile. This seems reasonable, as the act of issuing even a single green bond

requires top-level management buy-in and a commitment to sustainability, data collection, transparency, and reporting in a way that extends through the entire organization.

Performance Analysis of Green vs. Non-Green: Relative Performance of EUR-Denominated and USD-Denominated Corporate Bonds of the Same Issuer Curve in Periods of Credit Market Stress

We then analyzed the relative spread performance of green versus conventional bonds at the issuer level to control for non-green idiosyncratic factors in both the euro and dollar markets. We calculated the individual performance of each green and conventional bond relative to fair value for that issuer's liquid curve, using discrete periods of generalized credit market volatility as natural experiments to shock the EUR- and USD-denominated corporate credit curves across issuers. For pricing data, we used periods of credit market volatility and spread widening in May–June 2018 following the Italian elections for the EUR-denominated bond analysis and October–December 2018 during a 20% sell-off in S&P 500 stocks for the USD-denominated bond analysis.

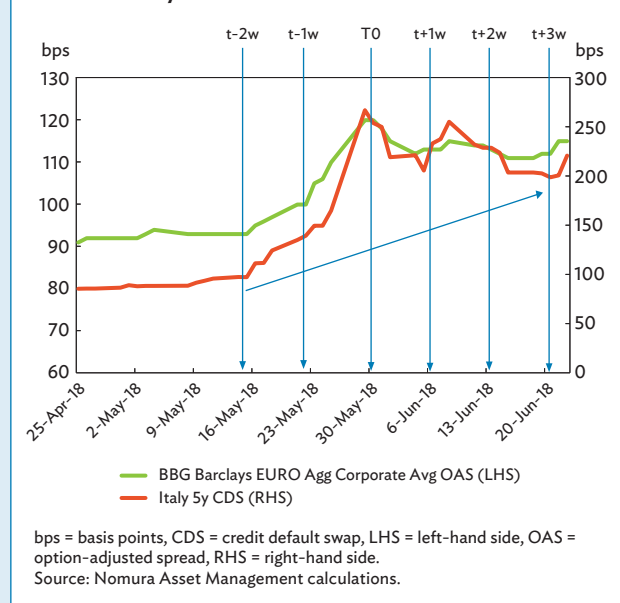
Method of Analysis

For the EUR-denominated green bond analysis, we selected 14 European investment-grade banks and utility companies with liquid, fixed-rate, non-hybrid credit curves and at least one liquid green bond (minimum size EUR500 million, average size EUR750 million). We calculated fair value yield curves for each issuer using regression analysis. We calculated each bond's difference (in bps) from the fair value curve on 16 May 2018, which was 2 weeks before the peak in spread widening, or "T-2w," and again on the new equilibrium shocked curve as of 20 June 2018, which was 3 weeks after the peak in spread widening, or "T+3w." We defined performance as the net change in a bond's spread to fair value (in bps residual) from T-2w to T+3w (**Figure B3.2**). For example, the Intesa Sanpaolo 2022 (ISPIM 0.875% 6/2022) green bond was 0.4 bps wide (cheap) to the fair value curve at T-2w and 4.8 bps tight (rich) to the curve on T+3w, implying 5.2 bps of net tightening (richening) (**Figure B3.3**). As the sum of all bond fair-value residuals sums to zero, this method ensured internal consistency and comparability across issuers.

For the USD-denominated green bond analysis, we identified nine US investment-grade financial corporations and energy utilities with liquid, fixed-rate, non-hybrid credit curves and at

Box 3: Green Bond Quantitative Performance during Periods of Market Stress— 2020 Update *continued*

Figure B3.2: EUR-Denominated Aggregate Corporate OAS and Italy 5-Year CDS

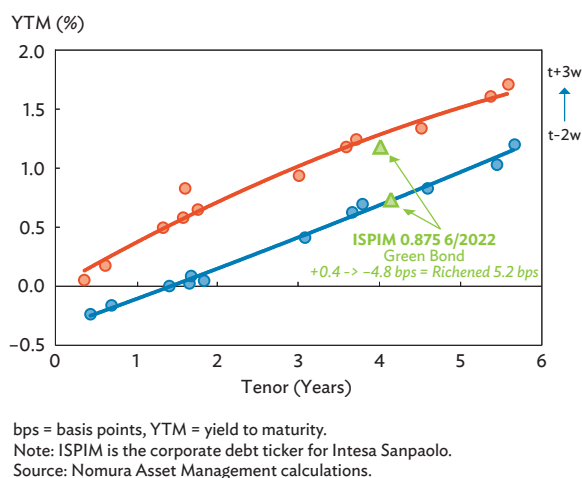


least one liquid green bond (minimum size USD300 million, average size USD605 million). We calculated fair value curves and the degree of divergence for each issuer and bond in the same manner as the EUR-denominated sample. We used start and end dates based on the trough and peak of US dollar market credit spreads from 3 October 2018 to 2 January 2019, because in this case the market immediately recovered after the sell-off without any well-defined new equilibrium level ever being established. As in the EUR-denominated bond analysis, performance was calculated as the net change in the fair value residual at the start and end points of the observation period.

Analysis Results and Discussion

During the respective sample periods, EUR-denominated green bonds on average outperformed conventional bonds on the same issuer curve (i.e., spreads tightened) by an average of 1.5 bps, while USD-denominated green bonds outperformed conventional bonds by an average of 2.8 bps. The average green bond outperformance for the combined EUR-denominated and USD-denominated bond market sample was 2.0 bps. The pattern of outperformance of green bond relative returns at the issuer level was asymmetrically distributed, with a skew of 1.0 bp of outperformance across the EUR-denominated and USD-denominated samples. In

Figure B3.3: ISPI—Intesa Sanpaolo SpA Bank (Italy)



other words, green bonds tended to either perform the same or outperform conventional bonds during periods of market stress (**Table B3.1**).

Green bonds, whether denominated in euros or US dollars, showed a consistent pattern of outperformance during the review period against conventional bonds with respect to industry sector and credit rating (**Table B3.2**). The average outperformance of green bonds in the utilities sector (euros 2.7 bps, US dollars 3.6 bps) was greater than in the financial sector (euros 0.8 bps, US dollars 1.3 bps). Furthermore, the degree of both EUR- and USD-denominated green bond outperformance showed a strong correlation with decreasing credit ratings (i.e., the riskier the credit, the more green bonds outperformed on the same issuer's curve.) This may reflect market-implied relative materiality across segments; that is, “greenness” is more highly valued among utility credits than financial credits, and among lower-rated credits than higher-rated credits.

Specific to the EUR-denominated bond sample where intra-euro area country risk is present, a significant factor explaining the degree of green bond outperformance for any particular issuer in the sample regardless of sector is whether the issuer was an Italian company (**Table B3.3**). Enel SpA (integrated energy utility) and Intesa Sanpaolo SpA (bank) on average experienced the largest green vs. conventional bond relative performance gaps in the EUR-denominated sample at 8.3 bps and 5.2 bps, respectively. In this case, the green bond outperformance effect—or downside risk resiliency—was

Box 3: Green Bond Quantitative Performance during Periods of Market Stress— 2020 Update *continued*

Table B3.1: Issuer Average Green Bond Performance Relative to Non-Green Bonds

A. EUR-Denominated Green Bonds

Issuer Name	Debt Ticker	Credit Rating Band	Sector	Average Green Bond Relative Performance, T-2w to T+3w (bps)	Country
Enel	ENELIM	BBB	Utilities	(8.3)	Italy
Intesa Sanpaolo	ISPIM	BBB	Financial	(5.2)	Italy
EDF	EDF	A	Utilities	(4.0)	France
Tennet	TENN	A	Utilities	(1.3)	Netherlands
SocGen	SOCGEN	A	Financial	(1.3)	France
BBVA	BBVASM	A	Financial	(0.9)	Spain
Engie	ENGIFP	A	Utilities	(0.5)	France
Berlin Hypo	BHH	A	Financial	(0.4)	Germany
ABN Amro	ABNANV	A	Financial	(0.3)	Netherlands
NRW Bank	NRWBK	AA	Financial	(0.2)	Germany
ING	INTNED	A	Financial	0.3	Netherlands
KfW	KfW	AAA	Financial	0.5	Germany
Iberdrola	IBESM	BBB	Utilities	0.5	Spain
BNP	BNP	A	Financial	0.6	France

B. USD-Denominated Green Bonds

Issuer Name	Debt Ticker	Credit Rating Band	Sector	Average Green Bond Relative Performance from Trough to Peak (bps)
Southern Power Co	SO	BBB	Utilities	(7.0)
Public Service Co of Colorado	XEL	A	Utilities	(5.2)
Interstate Power and Light	LNT	BBB	Utilities	(5.1)
Alexandria Real Estate Properties	ARE	BBB	Financial	(4.1)
DTE Electric Co	DTE	A	Utilities	(3.7)
MidAmerican Energy	BRKHEC	AA	Utilities	(0.3)
Bank of America Corp	BAC	A	Financial	(0.3)
Westar Energy	EVRG	A	Utilities	(0.3)
Digital Realty Trust	DLR	BBB	Financial	0.3

() = negative.

Note: A negative figure indicates net spread tightening (i.e., outperformance by the issuer's green bonds).

Source: Nomura Asset Management calculations.

largest for the issuers most exposed to the underlying driver of the sell-off (i.e., Italian sovereign risk).

Is a Greenium Justifiable as an “Insurance Premium”?

These results support the view that green bonds can deliver superior risk-adjusted performance with downside risk protection and that this may be attributable to a green factor after controlling for idiosyncratic variables. The expanded performance data show evidence of a market-implied green factor materiality that differs with respect

to sector and credit rating, but not currency. Furthermore, this green factor extends to all of an issuer's newly issued bonds, possibly implying that a commitment to green bond issuance can itself be an indicator of superior sustainability and/or governance, which are important factors for investors pursuing environmental-, social-, and governance-integrated strategies. If true, we postulate that the market may eventually come to justify some degree of a greenium as a fundamental quality factor, like an “insurance premium” with intrinsic value, thereby supporting sustainable growth in the green bond market.

continued on next page

Box 3: Green Bond Quantitative Performance during Periods of Market Stress— 2020 Update *continued*

Table B3.2: Cross-Sector Analysis of Green Bond Relative Performance by Currency, Credit Rating Band, and Sector

	Utilities	Financial	All	AAA	AA	A	BBB
EUR	(2.7)	(0.8)	(1.5)	0.5	(0.2)	(0.9)	(4.3)
USD	(3.6)	(1.3)	(2.8)		(0.3)	(2.4)	(3.9)
All Currencies	(3.2)	(0.9)	(2.0)	0.5	(0.3)	(1.3)	(4.1)

	Utilities	Financial	All	EUR	USD
AAA		0.5	0.5	0.5	
AA	(0.3)	(0.2)	(0.3)	(0.2)	(0.3)
A	(2.5)	(0.3)	(1.3)	(0.9)	(2.4)
BBB	(4.9)	(3.0)	(4.1)	(4.3)	(3.9)
All Ratings	(3.2)	(0.9)	(2.0)	(1.5)	(2.8)

	EUR	USD	All	AAA	AA	A	BBB
Utilities	(2.7)	(3.6)	(3.2)		(0.3)	(2.5)	(4.9)
Financial	(0.8)	(1.3)	(0.9)	0.5	(0.2)	(0.3)	(3.0)
All Sectors	(1.5)	(2.8)	(2.0)	0.5	(0.3)	(1.3)	(4.1)

() = negative, EUR = euro, USD = United States dollar.

Note: A negative figure indicates net spread tightening (i.e., outperformance by green bonds).

Source: Nomura Asset Management calculations.

Table B3.3: EUR-Denominated Green Bond Relative Performance by Country of Risk

	Utilities	Financial	All	AAA	AA	A	BBB
Italy	(8.3)	(5.2)	(6.7)				(6.7)
France	(2.2)	(0.3)	(1.3)			(1.3)	
Netherlands	(1.3)	0.0	(0.4)			(0.4)	
Spain	0.5	(0.9)	(0.2)			(0.9)	0.5
Germany		(0.1)	(0.1)	0.5	(0.2)	(0.4)	
All Countries	(2.7)	(0.8)	(1.5)	0.5	(0.2)	(0.9)	(4.3)

() = negative.

Note: A negative figure indicates net spread tightening (i.e., outperformance by green bonds).

Source: Nomura Asset Management calculations.

Box 4: The Alpha and Beta of ESG Investing

With rising awareness of environmental, social, and governance (ESG) issues worldwide, responsible investing has gained considerable traction, particularly in Europe and North America during the past 5 years. In 2018, Amundi, Europe's largest asset manager and a pioneer in responsible investment, researched the impact of ESG investment criteria on portfolio performance.^a Amundi's research on the impact of ESG investing on equity asset pricing found that when an alpha strategy is massively implemented, it becomes a beta strategy. In Europe, the massive mobilization of institutional investors pursuing ESG investing has impacted demand mechanisms, with a subsequent effect on prices, thereby also triggering a performance premium.

According to Amundi's findings, 2014 marked a turning point as ESG screening drove an outperformance in developed market equities, with a strong impact on environmental investment in North America and governance investment in the euro area. While ESG investing generally tended to penalize both passive and active investors between 2010 and 2013, ESG investing was a source of outperformance from 2014 to 2017 in both Europe and North America. For example, buying the best-in-class (20% best-ranked) stocks and selling the worst-in-class (20% worst-ranked) stocks would have generated an annualized return of 3.3% in North America and 6.6% in the euro area during the period 2014–2017, while these figures were, respectively, –2.70% and –1.20% during the period 2010–2013.

Among the three ESG pillars, the environmental pillar in North America and the governance pillar in the euro area performed the strongest. From 2016, the social component improved significantly and is now being positively priced by the stock market. Overall, the study revealed that ESG investing does not impact all stocks, but rather it tends to impact best-in-class and worst-in-class assets.

In a 2019 update, Amundi confirmed its earlier findings and identified the following additional trends:

- **Transatlantic divide.** After 8 years of consistency, we observed a divergence between North America and the euro area in ESG equity trends. In North America, there was a decrease in alpha generation in all

three dimensions in 2019, and even a loss in the environmental pillar. In the euro area, the same positive dynamic still operated with the environmental and social pillars outperforming. For example, buying the best-in-class ESG stocks and selling the worst-in-class ESG stocks would have generated an annualized return of 5.8% in the euro area but only 0.6% in North America (versus 6.6% and 3.3% for the period 2014–2017).

- **Social: From laggard to leader.** From 2010 to 2017, the social pillar's integration lagged when compared with the environmental and governance pillars. However, since 2018, social has been the best-performing pillar. When a portfolio took a long position in the 20% of best-ranked stocks and a short position in the 20% of worst-ranked stocks, this led to an annualized return of 2.9% in the euro area and 1.6% in North America. Similarly, optimized index management, in which the weighting of companies in the index is optimized to obtain the lowest possible tracking error, would have created an excess return of about 60 basis points (bps) and 40 bps in the euro area and North America, respectively, for a tracking error of 50 bps. We believe this resulted from more sustainable investors exploring the latest trends in ESG investing amid rising interest in social themes.
- **ESG investing: Growing in complexity.** Our study shows that ESG investing goes beyond the exclusion of worst-in-class stocks or the selection of best-in-class stocks.^b We found that the growing relationship between ESG ranking and performance is sometimes affected by the behavior of second-to-worst-in-class stocks. We hypothesize that the abnormal performance of these stocks is due to the development of forward-looking strategies, with some investors betting on improving companies instead of well-scored companies. We argue that the emergence of ESG momentum strategies and the shift toward a dynamic view of ESG ratings is a positive development, as it reinforces the complexity of ESG integration. This demonstrates that sustainable investors might better understand underlying issues and are moving beyond a binary view of corporations.

^a The updated study, *ESG Investing in Recent Years: New Insights from Old Challenges*, and the original seminal paper, *The Alpha and Beta of ESG Investing*, can be found on the webpage of the Amundi Research Center at <http://research-center.amundi.com>. The latest research is based on quantitative data from January 2018 to June 2019 using ESG metrics provided by the Amundi ESG Research Department. For each company, the overall ESG score and the ratings for the separate environmental, social, and governance categories were assessed by Amundi ESG analysts, who rated each stock using a scoring system determined by four external providers. Amundi ESG analysts reviewed and finalized the score of each company.

^b Second-to-worst in class stocks: This research divides the stocks into five quintiles according to their ESG score. Those in the worst-in-class category (fifth quintile) are the 20% of stocks with the lowest ESG score. The second-to-worst-in-class stocks are those in the fourth quintile.

Box 4: The Alpha and Beta of ESG Investing *continued*

In conclusion, ESG investing is rapidly evolving. In 2016, the size of the global responsible investment market was USD22.9 trillion. Two years later, it stood at USD30.7 trillion (**Table B4**). While the ESG investing space is becoming more complex—for example, environmental policy reversals in the United States, a shift from a static to dynamic view of ESG scores, lead and lag integration of the different dimensions—our results show that the ESG fundamentals are still present. Best-in-class and worst-in-class approaches still work overall, and this is good news on the investment side.

Table B4: Size and Growth of Global Responsible Investment Markets

Markets	Size (USD trillion)	Growth in 2 Years (%)	Market Share (%)
Australia and New Zealand	0.7	46	2
Canada	1.7	42	6
Europe	14.1	11	46
Japan	2.2	364	7
United States	12.0	38	39
Total	30.7	34	100

Source: Global Sustainable Investment Alliance (2019).