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Contents

Table

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Definitions

In this *Regional Economic Outlook: Asia and Pacific*, the following groupings are employed:

- "ASEAN" refers to Brunei Darussalam, Cambodia, Indonesia, Lao P.D.R., Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam, unless otherwise specified.
- "ASEAN-5" refers to Indonesia, Malaysia, the Philippines, Singapore, and Thailand.
- "South Asia" refers to Bangladesh, Bhutan, India, Maldives, Nepal, and Sri Lanka.
- "Asia" refers to ASEAN, East Asia, advanced Asia, South Asia, and other Asian economies.
- "EU" refers to the European Union.

The following abbreviations are used:

ASEAN	Association of Southeast Asian Nations
COVID-19	coronavirus disease
GDP	gross domestic product
GVC	global value chain
ICU	intensive care unit
NO_2	nitrogen dioxide
NTB	nontariff barrier

The following conventions are used:.

- In figures and tables, shaded areas show IMF projections.
- "Basis points" refer to hundredths of 1 percentage point (for example, 25 basis points are equivalent to ¼ of 1 percentage point).

As used in this report, the term "country" does not in all cases refer to a territorial entity that is a state as understood by international law and practice. As used here, the term also covers some territorial entities that are not states but for which statistical data are maintained on a separate and independent basis.

Navigating Waves of New Variants: Pandemic Resurgence Slows the Recovery

1. Overview

The COVID-19 pandemic has taken a turn for the worse in some parts of the world, and the global economy is projected to grow by 5.9 percent in 2021 and by 4.9 percent in 2022 (0.1 percentage point lower for 2021 than in the July 2021 *World Economic Outlook Update*). Vaccine access has emerged as the principal fault line along which the global recovery splits into those that can look forward to further normalization of activity (mostly advanced economies) and those that face mounting hospitalizations and death tolls because of resurgent infections. Beyond 2022, global growth is projected to moderate to about 3.5 percent over the medium term. The ongoing rise in inflation is expected to be transitory, though uncertainty remains high.

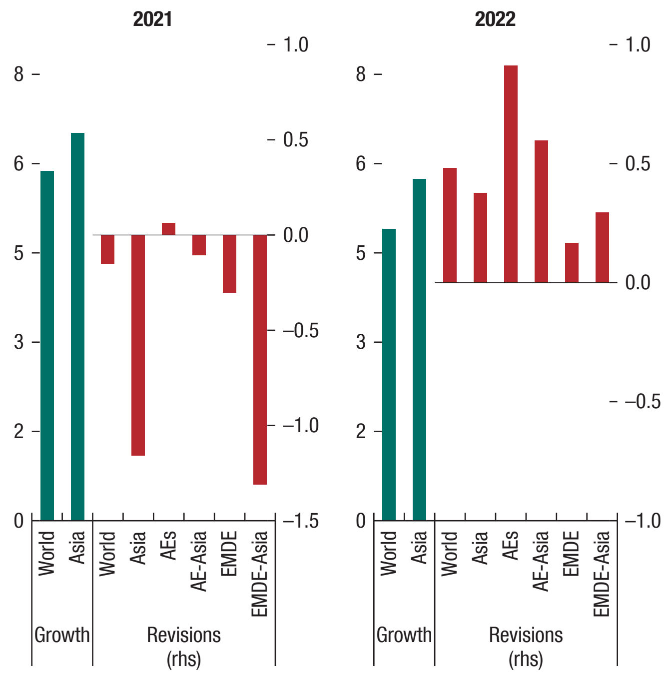
The Asian outlook for 2021 has been downgraded by more than 1 percent to 6.5 percent compared with the April 2021 *World Economic Outlook* because of new peaks of the pandemic cycle driven by the highly contagious Delta variant. As vaccination rates accelerate, the region is expected to grow slightly faster in 2022 than anticipated earlier. Although Asia and Pacific remains the fastest growing region in the world, the divergence between Asian advanced economies and emerging market and developing economies is deepening, reflecting vaccination coverage and policy support, and medium-term output levels in emerging market and developing economies are expected to remain below pre-pandemic trends. Risks are tilted to the downside, mainly because of uncertain pandemic dynamics, vaccine efficacy against virus variants, supply chain disruptions, and potential global financial spillovers from US monetary normalization in the presence of domestic financial vulnerabilities.

Policy must be responsive to this changed context, redoubling efforts to accelerate vaccinations, continuing macroeconomic support (policy space permitting) but with improved targeting, and accelerating reforms to develop new growth drivers. Achieving widespread vaccination is the foremost priority because delayed deployment and unequal access are contributing to more protracted recoveries. In addition, the global commodity price rebound and lingering global value chain (GVC) disruptions are fueling inflation and weighing on growth prospects. A less-dynamic recovery would call for longer-lasting policy accommodation, which in turn calls for vigilant financial regulation to preserve financial stability. Fiscal policies should continue to support the recovery but within medium-term fiscal frameworks to maintain credibility. Central banks should be prepared to act quickly if the recovery strengthens faster than expected or if inflation expectations rise. A push for social policies, structural reforms, and investments in digital and green sectors is needed to raise productivity and give a fair shot to schoolchildren and workers scarred by the pandemic.

This *Regional Economic Outlook* draws on two studies focused on the imperatives for a strong and durable recovery. Chapter 3 examines the determinants of COVID-19 vaccine rollouts and quantifies the effects of vaccinations on health and economic outcomes. It shows that vaccine deployment is driven primarily by the pandemic's severity in 2020, procurement strategies, the extent of local production, vaccine acceptance, and the quality of the health infrastructure. The chapter provides new empirical evidence that swift and broad administration of vaccines can offer a significant boost in economic activity, with the effect increasing over time and when a larger share of population gets vaccinated. Health benefits from vaccination are even more salient when a country is in the middle of a significant outbreak and containment measures are in place. Vaccine spillovers, quantified in the chapter, imply that no country can recover fully until all countries have broad access to vaccines.

Chapter 4 analyzes how trade liberalization can boost productivity and output potential, limiting regional scarring from the pandemic. Trade has historically been a powerful driver of growth and poverty alleviation in Asia, but its momentum—including GVC trade—has stalled, partly because of waning liberalization since the mid-1990s amid still-high trade restrictions. The analysis underscores the scope to reduce nontariff barriers (which are significantly higher in Asia than in other regions) to accelerate inclusive prosperity and build on the progress achieved through regional agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and the Regional Comprehensive Economic Partnership.

Figure 2.1. Growth Revisions in Asia versus the World
(Percentage points)



Sources: World Economic Outlook Database; and IMF staff calculations.
Note: Revisions show the difference between projections in October 2021 WEO and April 2021 WEO. Positive numbers indicate upward revision. AE = advanced economy; EMDE = emerging market and developing economy; rhs = right-hand scale; WEO = World Economic Outlook.

2. Navigating Waves of New Variants: Pandemic Resurgence Slows the Recovery

The first half of 2021 saw stronger-than-expected global GDP outturns as economies adapted to the pandemic and associated restrictions, and macro policies remained supportive. Advanced economies are forecast to grow 5.6 percent in 2021, led by a rebound in the US and Europe. Prospects for emerging market and developing economies have been marked down, especially in Asia, where the pandemic's resurgence has triggered lockdowns that are hampering the recovery (Figure 2.1). Inflation has been on the rise, driven by rebounding commodity prices and supply-demand mismatches that are expected to be mostly transitory.

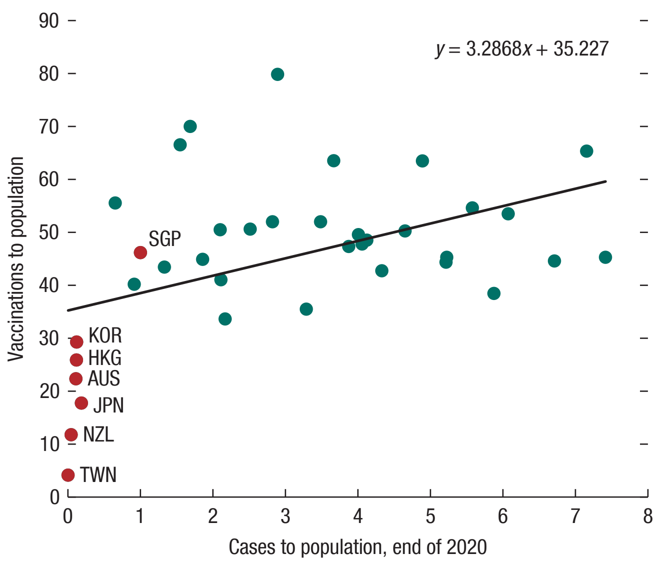
Recent Developments in the Region

The global COVID-19 pandemic is still ravaging the region. Despite successful virus containment in 2020, some economies (Australia, Japan, Korea, New Zealand, Taiwan Province of China, and Vietnam) are facing setbacks amid an initially slow progress in vaccine rollouts, while procurement delays, production constraints, and weaker health infrastructure (Association of Southeast Asian Nations [ASEAN] countries,[1] India, and other low-income countries) have impeded timely rollouts and therapeutics in others (Figures 2.2 and 2.3; Chapter 3). The highly transmissible Delta variant is contributing to surging cases, mass hospitalizations, and tragic loss of life, especially in densely populated south and southeast Asia.

Although global demand for Asian manufacturing and exports has underpinned recoveries, real GDP outturns have still fallen below *World Economic Outlook* forecasts in countries with resurging infections amid low vaccination rates. Manufacturing held up in the first half of 2021 because of surging demand for pandemic-related

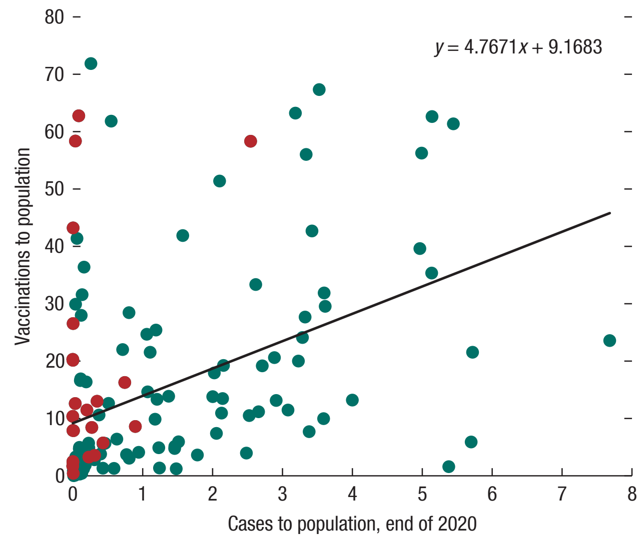
[1]ASEAN countries include Brunei Darussalam, Cambodia, Indonesia, Lao P.D.R., Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

Figure 2.2. Initial Vaccination and COVID-19 Cases, AEs
(Percentage)



Sources: Johns Hopkins University; Our World in Data Coronavirus Pandemic (COVID-19) Database; and IMF staff calculations.
Note: Vaccination data is as of June 2021. Country abbreviations are International Organization for Standardization country codes. AE = advanced economy.

Figure 2.3. Initial Vaccination and COVID-19 Cases, EMDEs
(Percentage)



Sources: Johns Hopkins University; Our World in Data Coronavirus Pandemic (COVID-19) Database; and IMF staff calculations.
Note: Vaccination data is as of June 2021. EMDE = emerging market and developing economy.

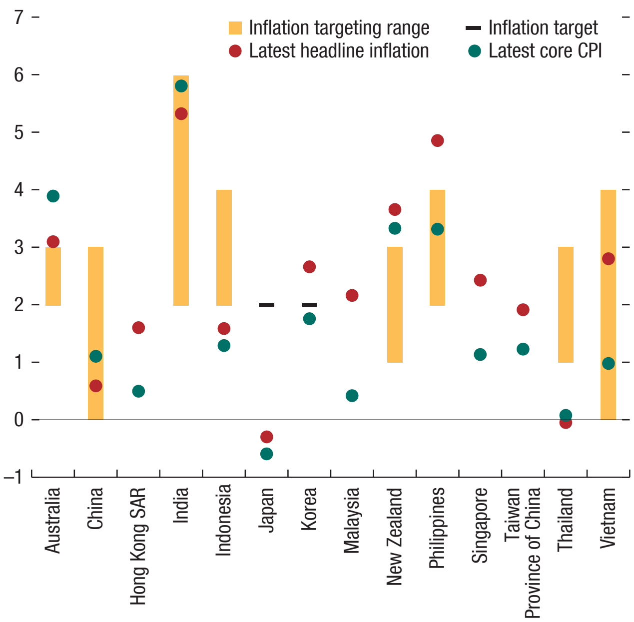
supplies, but services and retail sales are taking longer to recover. Recent high-frequency indicators are more mixed, suggesting a softening of manufacturing and related investment in the third quarter of 2021 because of weakening external demand (from China and globally) and virus outbreaks in some economies (for example, Malaysia, Taiwan Province of China, and Vietnam) prompting factory shutdowns. The spread of the Delta variant in countries with relatively low vaccination rates has triggered stricter containment measures to limit hospitalizations and deaths. In such countries, mobility has not rebounded to pre-pandemic levels, instead dropping back to pandemic troughs in sync with renewed peaks of COVID-19 infections that weighed on contact-intensive services.

Asia's Near-Term Outlook

Despite the headwinds from new pandemic peaks, the Asia and Pacific region is projected to remain the fastest growing region in the world with 6 ½ percent growth in 2021, led by China and India. But within the region, the divergence between advanced economies and emerging market and developing economies is deepening as high-tech exporters take full advantage of favorable external demand and accommodative financial conditions, while service exporters (for example, the Pacific island countries and Thailand) and economies with limited fiscal space lag.

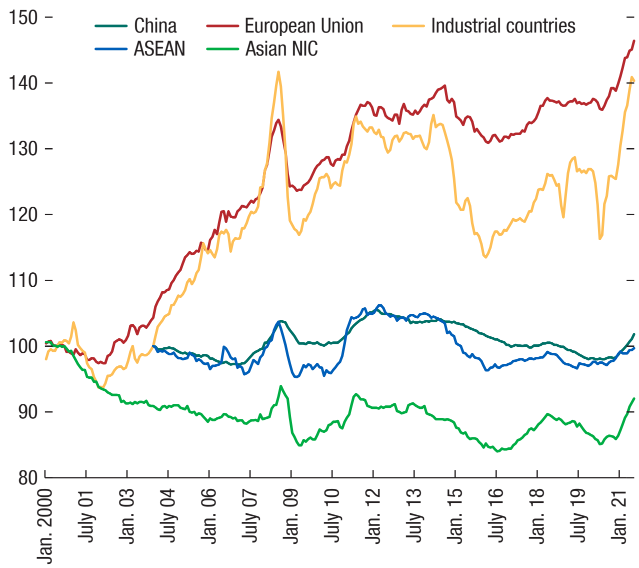
- China is projected to grow by 8.0 percent, but the recovery remains unbalanced because private consumption continues to lag amid repeated outbreaks and significant fiscal policy tightening.
- Growth prospects for Japan have been downgraded to 2.4 percent after a disappointing second quarter and state-of-emergency extensions. Most advanced economies (Australia, Korea, New Zealand, and Taiwan Province of China) have benefited from either the high-tech or commodity boom but are facing renewed headwinds from pandemic waves.

Figure 2.4. Headline versus Core Inflation
(Percent)



Sources: Haver Analytics; and IMF staff calculations.
Note: CPI = consumer price index; SAR = Special Administrative Region.

Figure 2.5. US Import Prices by Country of Origin
(Index = 100—first observation)



Sources: US Bureau of Labor Statistics; and IMF staff calculations.
Note: Import price indexes for each group are normalized to 100 at the starting period of observations. ASEAN = Association of Southeast Asian Nations; NIC = newly industrialized countries—Hong Kong SAR, Singapore, South Korean, and Taiwan.

- India is projected to grow by 9.5 percent after a sharp decline in 2020. The pandemic surge earlier this year had a larger-than-expected adverse impact on growth, but the subsequent rebound in activity has gained strength, supported by favorable external conditions and policy accommodation.
- Other emerging market and developing economies, notably the ASEAN-5 countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand), are still facing severe challenges from a resurgent virus and weakness in contact-intensive sectors.
- Growth in Cambodia, Lao P.D.R., the Pacific islands, and South Asia is suffering from the hit to tourism and constrained policy space.

Headline inflation is on the rise across the region, fueled by shifting global demand, rising food and fuel prices, and supply chain disruptions. But it is expected to fall mostly within target ranges as transitory pressures subside (Figure 2.4), especially given substantial prevailing output gaps. Core inflation has risen to a lesser extent, and the pass-through from producer to consumer prices has been limited, with generally well-anchored inflation expectations. Export prices have remained relatively flat, suggesting an erosion of profit margins in tradable sectors and no significant evidence of Asia exporting inflation elsewhere (Figure 2.5).

The policy mix has remained accommodative in Asian advanced economies that sustained the pace of asset purchases and in emerging market and developing economies that retained low policy rates. The Bank of Japan assessed its policy framework and maintained its yield curve control framework. New Zealand was the first advanced economy to taper and Korea to raise policy rates, given the advanced stage of recoveries and concerns of rising household leverage in the latter. Unlike in other regions, Asian emerging market and developing economies have kept their policy rates at historical lows (except for Sri Lanka) and retained unconventional policies, including monetary financing (India, Indonesia, and the Philippines). The accommodative financial conditions have allowed the fiscal authorities to maintain unprecedented support to vulnerable households and firms through the first half of 2021 (ASEAN-5 and India), though some countries have moderated (low-income and Pacific island countries) or withdrawn stimulus (China) to slow the increase in public debt.

Regional current account surpluses are projected to remain broadly unchanged in 2021, as the unwinding of crisis-induced movements—notably from exports of medical equipment, home electronics, consumer durables, subdued travel, and lower oil prices—are offset by the larger twin deficits in the US. Global imbalances should narrow over 2022–26 as US twin deficits subside.

Near-Term Risks

The projections are subject to high uncertainty regarding the emergence of new variants, the outlook for supply chain disruptions and inflation, and shifts in global financial conditions. Over the coming months, new infection waves remain the biggest concern. Although the uptick in global vaccine production, along with promising regional production hubs and donations, moderate risks for countries that depend on the COVID-19 Vaccines Global Access initiative, unequal vaccine distribution and efficacy against emerging variants amplify the potential for a protracted pandemic with more hospitalizations and potential lockdowns subduing recovery (see Chapter 3).

Global financial conditions have been highly accommodative, but untimely policy normalization or misconstrued policy communications in the US could engender significant capital outflows and higher borrowing costs for Asian emerging market and developing economies, especially those with large financing needs or elevated debt levels (see Box 2.1). In addition, regulatory forbearance during the crisis heightens the risk of rising financial distress as balance sheet deterioration is recognized and highly leveraged firms face greater refinancing costs.

On the supply side, higher commodity prices and shipping costs, coupled with continued disruption of global value chains (GVCs), are amplifying concerns about inflation persistence and export resilience. Lasting delays in mining operations, shipment backlogs, semiconductor shortages, surging freight costs, and snap quarantine restrictions in key manufacturing and shipping areas magnify inflation risk and may cause structural changes to production, delivery, and storage capacity across sectors. Geopolitical risks remain elevated, and the escalation of trade and technology tensions—notably between the US and China—could weigh on investment and productivity growth. The growing threat of natural disasters continues to weigh on low-income countries, especially Pacific island countries.

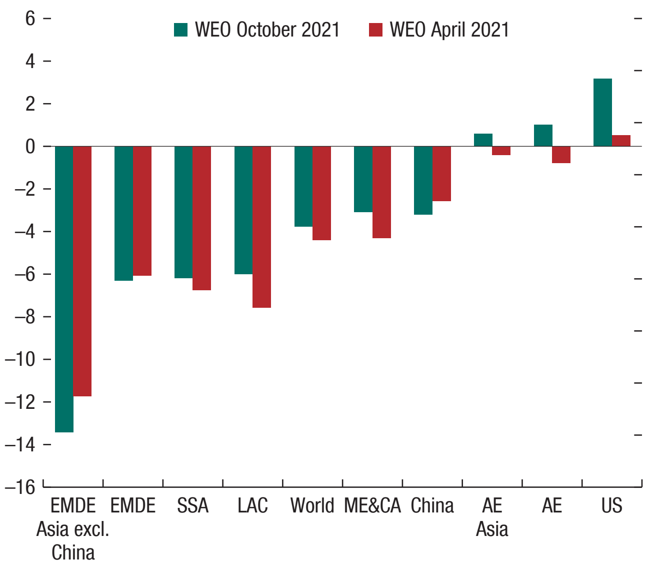
Mitigating Scarring

COVID-19 has resulted in unprecedented output losses in the Asia and Pacific region, leading to inevitable scarring in diminished productivity and lost jobs (see Rhee and Svirydzenka 2021). Losses will likely be larger than expected earlier, especially in emerging market and developing economies (excluding China), which have been hit hardest by the new waves of the virus, and in fiscally constrained and tourist-dependent economies, including the Pacific island countries (Figure 2.6). Social and nontelework industries continue to shed jobs, and their prospects do not appear bright, delaying the employment recovery. As a result, inequality and poverty rates have surged in many countries, leading to widening wealth and gender gaps, with the most vulnerable groups (youth, low-skilled workers, and women) disproportionately affected. Rising inequalities also tend to increase the risk of social unrest and may harm growth potential further. The pandemic-induced loss of learning from school closures could have long-lasting effects on future earnings and productivity in Asia, home to the largest share of the world's schoolchildren.

Economic losses may be magnified further by rising delinquencies when credit support

Figure 2.6. Medium-Term GDP Loss: Difference in Cumulative Growth Rates (2020–25)

(Current projection relative to pre-COVID-19 forecast, in percentage points; weighted average)



Sources: IMF World Economic Outlook Database; and IMF staff calculations.
Note: Current projections are based on WEO October 2021 and April 2021 vintage. AE = advanced economy; EMDE = emerging market and developing economy; LAC = Latin America and the Caribbean; ME&CA = Middle East and Central Asia; SSA = sub-Saharan Africa; WEO = World Economic Outlook.

measures are scaled back, potentially raising financial stability concerns. Debt-servicing risks are highest in industries hit harder by lockdowns and dependent on market financing (India), in leveraged real estate (China), and tradable sectors squeezed by dwindling profit margins (ASEAN).

Because public spending and debt are likely to keep rising for some years, considering weaker growth, realistic projections of debt trajectories are essential (Estefania Flores and others 2021). History gives numerous episodes of abrupt upticks in rollover costs once market expectations shift (Chamon and Ostry 2021), which puts a premium on building credible fiscal anchors and staying well clear of perceived debt distress levels.

Policies for a Lasting and Equitable Recovery

Supporting recoveries by accelerating vaccine deployment and health-related spending remains the first priority. Where pandemic outbreaks linger and output gaps are persistent, more generalized fiscal stimulus should be maintained as policy space allows. The longer the pandemic lasts, the more fiscal space constraints will bind, so lifelines and transfers will need to become increasingly targeted to the worst affected.

To anchor expectations, near-term fiscal measures need to be set within credible medium-term frameworks. Most Asian countries adhered to some form of fiscal rule or expenditure framework before the pandemic, and they should revert to rules-based frameworks as part of their exit strategy (see October 2021 *Fiscal Monitor,* Chapter 2). Detailed fiscal frameworks underpinned by concrete tax and subsidy reforms (such as those that Indonesia announced recently) can help. Strengthening countercyclical policies by the automatic activation of spending measures linked to the state of the economy (for example, the unemployment rate), such as Australia's Disaster Payment Program and New Zealand's contingency measures, could reduce uncertainty to the vulnerable. Finalizing an agreement on a global minimum for corporate taxes and avoiding a race to the bottom will help bolster public finances to fund critical investments in Asian emerging market and developing economies with shallow tax bases. Once activity normalizes, as determined by specific metrics such as health care system spare capacity (see October *World Economic Outlook,* Chapter 1*),* governments should gradually pare back sectoral support programs while scaling up training and job search programs to facilitate labor reallocation and adaptation to the green and digital economy. Financing such initiatives could draw, in part, on the IMF's recent special drawing rights allocation and concessional resources for financially constrained emerging market and developing economies, for which the allocation could also help ease external payment obligations and domestic spending needs. Where a debt treatment is needed, eligible countries should pursue debt restructuring options, including under the Common Framework endorsed by the Group of Twenty nations.

Securing a lasting recovery calls for continued monetary accommodation in countries where inflation is projected to remain below or within target bands, though tapering of asset purchases and of monetary financing should proceed where warranted by inflation prospects and risks to central bank independence. A cautious approach to policy normalization is warranted in most Asian emerging market and developing economies, given weakening recovery paths, if external stability and inflation expectations continue to remain well anchored.

Regarding financial stability risks, real estate price acceleration has already triggered policy measures to cool the market in some countries (China, New Zealand). Available tools—including foreign exchange intervention and micro and macroprudential policies—should be deployed to safeguard stability in response to global shocks, with tools matched to the nature of the shock and country characteristics as proposed by the Integrated Policy Framework. Balance sheet vulnerabilities in some sectors could exacerbate rising financing costs and underscore the need for strong frameworks to expedite the resolution of debt overhangs and flatten the insolvency curve, while encouraging the exit of nonviable "zombie" firms (see the October 2021 *Global Financial Stability Report*). Financial sector measures to fortify bank balance sheets in India, along with ongoing efforts to address high corporate leverage and phasing out implicit guarantees through regulatory strengthening in China (including cross-agencies measures), should help safeguard financial stability.

A reinvigorated structural reform drive is needed to boost output potential and alleviate human, physical, and digital infrastructure bottlenecks. Reversing the pandemic-induced setback to human capital accumulation will require a variety of strategies, including greater time in school and expanding vocational training programs and digital curricula and platforms for jobs in the post-pandemic world. Expanding social safety nets in Asian economies with large informal sectors and inadequate coverage (for example, China, Thailand, and Vietnam) would reduce households' structural needs for accumulating high precautionary savings. In addition to recent initiatives to support a greener economy, trade reforms could help reignite medium-term productivity growth. Reducing nontariff barriers within Asia, where GVC intensity is high, would yield sizable dividends for Asian emerging and developing economies. Building on Asia's global leadership in digital money and financial technology adoption is another avenue for boosting financial inclusion and productivity. China's experience with e-CNY (its digital currency) could hold useful lessons for those considering issuing central bank digital currencies, as long as these are backed by prudential safeguards. The rapid growth in financial technology activities, including crypto assets, poses new financial-stability risks: a balance needs to be struck between regulatory activism and fostering innovation (see October 2021 *Global Financial Stability Report,* Chapter 2).

To avert catastrophic climate change, policies must be geared to support reallocations toward greener and more inclusive sectors. Laying the foundation for green growth will require a flexible, pragmatic, and equitable approach to establishing minimum carbon prices that considers historical contributions to emissions and levels of economic development. The region is home to four of the world's six largest emitters. A significant reduction in global CO_2 emissions will require Asian leadership and a variety of different instruments in addition to carbon pricing (see Dabla-Norris and others 2021a). These would include regulations, feebates, and sector-specific instruments (for example, a coal tax), at least to internalize political economy imperatives (Furceri, Ganslmeier, and Ostry 2021). The goal of achieving carbon net neutrality will require stronger efforts to rebalance away from investment-heavy to consumption-led growth in China and, for the entire region, better-articulated country-level climate strategies.

Table 2.1. Asia: Real GDP
(Year-over-year change, percent)

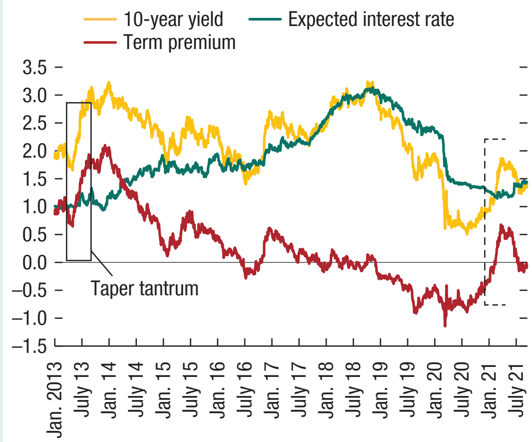
	Actuals and Latest Projections					Difference from April 2021 *World Economic Outlook*		
	2019	2020	2021	2022	2023	2021	2022	2023
Asia	**4.4**	**–1.3**	**6.5**	**5.7**	**5.0**	**–1.1**	**0.4**	**0.0**
Advanced economies (AEs)	**1.0**	**–2.7**	**3.7**	**3.4**	**2.1**	**–0.1**	**0.6**	**0.2**
Australia	1.9	–2.4	3.5	4.1	2.6	–1.0	1.4	0.3
New Zealand	2.4	–2.1	5.1	3.3	1.7	1.0	0.1	–1.0
Japan	0.0	–4.6	2.4	3.2	1.4	–0.9	0.7	0.2
Hong Kong SAR	–1.7	–6.1	6.4	3.5	3.1	2.1	–0.3	0.3
Korea	2.2	–0.9	4.3	3.3	2.8	0.7	0.5	0.3
Taiwan Province of China	3.0	3.1	5.9	3.3	2.6	1.1	0.3	0.1
Singapore	1.3	–5.4	6.0	3.2	2.7	0.8	0.0	0.0
Emerging markets and developing economies (EMDEs)[1]	**5.4**	**–0.8**	**7.2**	**6.3**	**5.7**	**–1.3**	**0.3**	**–0.1**
Bangladesh	8.2	3.5	4.6	6.5	7.2	–0.4	–0.9	–0.1
Brunei Darussalam	3.9	1.1	2.0	2.6	2.4	0.3	0.0	0.1
Cambodia	7.1	–3.1	1.9	5.7	6.4	–2.2	–0.3	0.1
China	6.0	2.3	8.0	5.6	5.3	–0.4	0.0	–0.2
India[2]	4.0	–7.3	9.5	8.5	6.6	–3.0	1.6	–0.2
Indonesia	5.0	–2.1	3.2	5.9	6.4	–1.1	0.1	0.7
Lao P.D.R.	4.7	–0.4	2.1	4.2	4.5	–2.6	–1.4	–1.3
Malaysia	4.4	–5.6	3.5	6.0	5.7	–3.0	0.0	0.0
Myanmar	6.8	3.2	–17.9	–0.1	2.5	–9.0	–1.5	–2.2
Mongolia	5.2	–5.3	5.2	7.5	6.5	0.2	0.0	0.5
Nepal	6.7	–2.1	1.8	4.4	6.3	–1.1	0.2	0.3
Philippines	6.1	–9.6	3.2	6.3	7.0	–3.7	–0.2	0.5
Sri Lanka	2.3	–3.6	3.6	3.3	3.9	–0.4	–0.8	–0.2
Thailand	2.3	–6.1	1.0	4.5	4.0	–1.6	–1.2	0.3
Vietnam	7.2	2.9	3.8	6.6	6.8	–2.7	0.6	–0.2
Pacific island countries and other small states	**4.3**	**–8.5**	**2.0**	**5.5**	**5.6**	**–2.5**	**–0.8**	**0.6**
Bhutan	4.3	–0.8	–1.9	4.2	5.7	0.0	–1.5	0.1
Fiji	–0.4	–15.7	–4.0	6.2	8.3	–9.0	–2.8	1.8
Kiribati	3.9	–0.5	1.8	2.5	2.3	0.0	0.0	0.0
Maldives	7.0	–32.0	18.9	13.2	12.1	0.0	–0.2	–0.6
Marshall Islands	6.8	–2.4	–1.5	3.5	2.5	0.0	0.0	0.0
Micronesia	1.2	–1.8	–3.2	0.6	3.2	0.5	–2.2	1.2
Nauru	1.0	0.7	1.6	0.9	0.8	0.0	0.0	0.0
Palau	–0.7	–8.7	–19.7	14.9	14.8	–8.8	4.5	0.7
Papua New Guinea	5.9	–3.9	1.2	4.0	3.4	–2.3	–0.2	0.9
Samoa	3.5	–5.0	–1.5	–1.6	–1.7	–2.0	–2.1	–2.2
Solomon Islands	1.2	–4.3	1.2	4.4	4.5	–0.3	–0.1	0.2
Timor-Leste	1.8	–7.6	1.8	3.8	2.6	–0.9	–1.1	0.0
Tonga[3]	0.7	0.7	–2.0	2.9	3.7	0.4	0.4	0.2
Tuvalu	13.9	1.0	2.5	3.5	3.8	0.1	0.0	0.1
Vanuatu	3.9	–6.8	1.2	3.0	4.1	–1.9	–1.6	0.2
ASEAN[4]	**4.7**	**–3.3**	**2.6**	**5.5**	**5.7**	**–1.9**	**–0.3**	**0.3**
ASEAN-5[5]	**4.3**	**–4.5**	**3.1**	**5.5**	**5.7**	**–1.6**	**–0.2**	**0.4**
EMDEs excluding China and India	**5.2**	**–2.5**	**2.6**	**5.7**	**6.0**	**–1.9**	**–0.3**	**0.3**

Sources: IMF, World Economic Outlook database; and IMF staff estimates and projections.
Note: ASEAN = Association of Southeast Asian Nations.
[1]EMDEs excluding Pacific island countries and other small states.
[2]India's data are reported on a fiscal year basis. Its fiscal year starts from April 1 and ends on March 31.
[3]Tonga's data are reported on a fiscal year basis. Its fiscal year starts from July 1 and ends June 30.
[4]ASEAN comprises Brunei Darussalam, Cambodia, Indonesia, Lao P.D.R., Malaysia, Myanmar, the Philippines, and Singapore.
[5]ASEAN-5 comprises Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Box 2.1. How Damaging Would Faster US-Interest-Rate Normalization Be for the Asia and Pacific Region?

A faster-than-anticipated normalization in US monetary policy could weaken economic activity and increase downside risks to growth in many Asian economies, especially emerging market and developing economies. Spillovers are likely to be amplified, given weaker cyclical positions and relatively stretched corporate and public sector balance sheets in the region. Spillovers may also increase divergences caused by the COVID-19 shock, with larger effects on smaller and more leveraged firms.

Box Figure 2.1.1. Decomposition of 10-Year US Bond Yield: Expected Interest Rate and Term Premium
(Percent)



Source: Federal Reserve Bank of New York.
Note: Expected interest rate captures the expected average level of short-term Treasury yields over the next 10 years.

Long-term interest rates in the US have been volatile over the past year, and there is concern about the implications of a faster-than-anticipated normalization in US monetary policy (Box Figure 2.1.1). How likely is a replay of 2013's taper tantrum episode to occur in 2021–22? The spillover effect of higher US interest rates could be positive if the increase in interest rates is driven by better economic conditions (see April 2021 *World Economic Outlook*, Chapter 4; Ostry 2021; Adrian and others 2021).[1] However, changes in interest rates that are not driven by better economic conditions (for example, because of higher inflation or inflation expectations in the US reflecting supply-side pressures) have historically been associated with sizable negative spillovers, especially in emerging market and developing economies. This box assesses the potential magnitude of such spillovers.

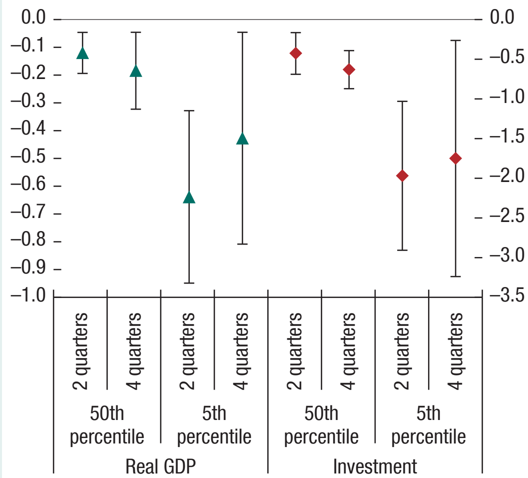
Spillovers through downside risks. Estimates of spillovers typically focus on the expected average impact of exogenous US monetary policy shocks, but there could also be effects on the distribution of risks. Changes in financial conditions associated with US interest rate changes can affect downside risks through financial frictions playing an amplifying role, similar to the findings by Adrian and others (2019). Financial frictions could be amplified further in emerging market and developing economies, reflecting stronger reliance on capital flows and external borrowing. Exchange rate movements and foreign currency liabilities could also add to large balance sheet effects.[1] Jordá's (2005) local projection method, along with a panel quantile regression framework, is used to estimate the dynamic effects of exogenous US monetary policy shocks for a sample of 62 advanced and emerging market economies. Results suggest that tightening US monetary policy shocks have significant negative spillovers, with larger effects on the lower percentiles of the distribution of real GDP growth and investment (fifth percentile) than on the median, pointing to sizable downside risks (Box Figure 2.1.2). The estimated median impact of a 100-basis-point exogenous shock increase in US interest rates is –0.2 and –0.6 percent for output and investment, respectively, after four quarters, and the impact at the same horizon for the fifth percentile is significantly larger at –0.4 and –1.8 percent, respectively.

The role of the business cycle. Although economic recovery is under way in the region, there is still significant slack, with output well below potential in all countries. Estimates suggest that the medium-term effects of US monetary policy shocks are larger when economic conditions are weaker (–0.1 percent versus

[1]See the October 2019 *Regional Economic Outlook: Asia and Pacific* and Ostry and others (2012) for a discussion of the economic effects of capital flow and exchange rate volatility in Asia and policy responses to manage risks from capital flows.

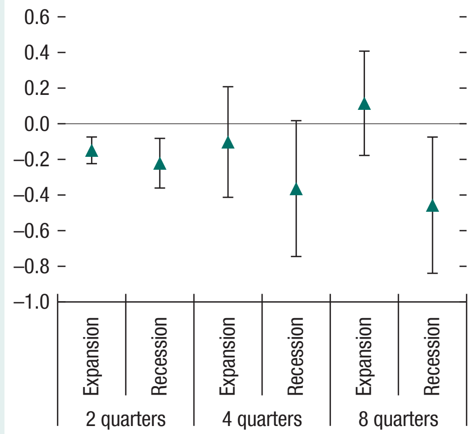
Box 2.1 *(continued)*

Box Figure 2.1.2. Response of Real GDP and Investment
(Impulse responses at 2 and 4 quarters; LHS: percent change in real GDP; RHS: percent change in real investment)



Sources: Haver Analytics; International Financial Statistics; World Economic Outlook; and IMF staff calculations.
Note: Estimations are based on panel quantile regressions and show the impact of a 100-basis-points exogenous US monetary policy shock. Standard errors are bootstrapped using blocks of four quarters. Error bars denote the +/– two standard deviations. LHS = left-hand scale; RHS = right-hand scale.

Box Figure 2.1.3. State Dependence of Spillovers, Response of Real GDP
(Impulse responses at 2, 4, and 8 quarters; percent change in real GDP)



Sources: Haver Analytics; International Financial Statistics; World Economic Outlook; and IMF staff calculations.
Note: Estimations are based on panel quantile regressions and show the impact of a 100-basis-points exogenous US monetary policy shock for different states of the business cycle. The state of the business cycle depends on the four-quarter moving average of real GDP growth relative to its long-term trend and follow the smooth transition local projection models in Auerbach and Gorodnichenko (2011) and Tenreyno and Thwaites (2016). Standard errors are bootstrapped using blocks of four quarters. Error bars denote the +/– two standard deviations.

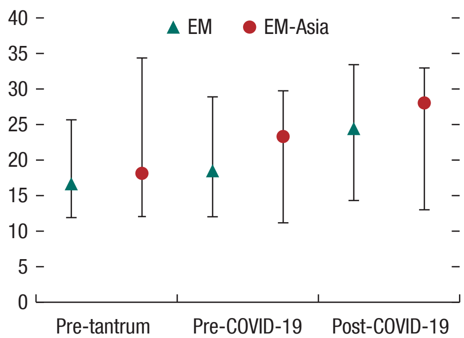
–0.4 percent after four quarters during weaker economic conditions; Box Figure 2.1.3). This partly reflects the higher sensitivity of capital flows and risk premiums to changes in US interest rates when economic conditions are weak in the domestic economy and there is reduced domestic monetary and fiscal policy space during downturns (Arbatli-Saxegaard and others 2021).

Macroeconomic fundamentals and vulnerabilities. Macroeconomic fundamentals can also bear importantly on the magnitude of spillovers. The COVID-19 shock had a significant impact on public sector indebtedness, which can increase the sensitivity of country risk premiums to changes in US interest rates, leading to more stringent tightening in financial conditions and lower fiscal policy space. However, external buffers increased across many countries in the region—though with significant variation across countries—providing scope to dampen the impact of capital flow volatility on financial conditions and the exchange rate (Box Figure 2.1.4). Estimates suggest an important role for macroeconomic fundamentals, with larger spillovers in countries with lower reserves, higher external debt, and higher public debt.

Heterogeneity in spillovers. Changes in US interest rates can affect firms differently, depending on their exposure to spillover channels. For example, firms that depend more on external finance or with weaker balance sheets could face financing constraints when US interest rates increase. Exchange rate fluctuations associated with US monetary policy shocks could affect firms with higher exposure to foreign currency debt, and firms that rely more on exports could be affected through changes in foreign demand and exchange rate movements. To shed light on the role of firm characteristics, firm-level quarterly data is used to estimate the

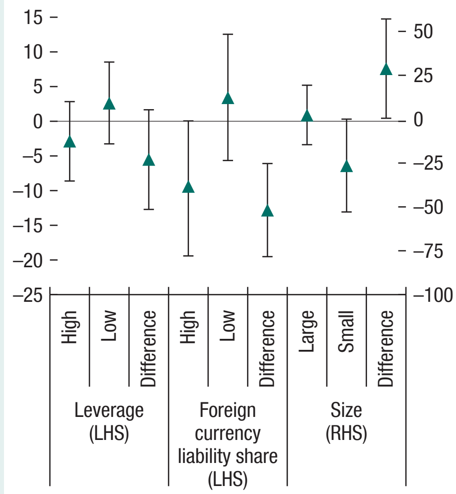
Box 2.1 *(continued)*

Box Figure 2.1.4. Reserves
(Percent of GDP)



Sources: IMF World Economic Outlook; and IMF staff calculations.
Note: Scatter points represent the median of the distribution. Error bars upper/lower represent the 25th/75th percentiles. Values for pre-tantrum reflect 2012, pre-COVID-19 reflect 2019, and post-COVID-19 reflect 2020. EM = emerging market.

Box Figure 2.1.5. Heterogeneous Investment Response across Firms
(Cumulative impulse responses at 8 quarters, percent change in firm investment ratio)



Sources: S&P Capital IQ; and IMF staff calculations.
Note: Estimates show the response-of-firm investment ratio (capital expenditure to fixed capital) to a 100-basis-points exogenous shock to US interest rate. Estimations are based on semiparametric approach with firm and country-industry-time fixed effects. Standard errors are clustered at firm level. Error bars denote the confidence intervals for 90 percent significance. LHS = left-hand scale; RHS = right-hand scale.

effects of exogenous US monetary policy shocks.[2] Estimates suggest that a tightening in US monetary policy is associated with lower investment and revenue across all firms, on average. However, the impact is larger among more leveraged firms and firms with a higher foreign currency liability share, consistent with financial frictions and balance sheet effects playing an amplifying role—a cumulative difference in impact over eight quarters on investment of 5 percentage points for higher-leverage firms and 13 percentage points for firms with higher foreign currency debt (Box Figure 2.1.5). Smaller firms are also more affected. These results suggest that a firm's balance sheet strength is an important driver of spillovers, and countries that are coming out of the COVID-19 shock with stretched corporate sector balance sheets may experience a heavier drag on investment.[3] Furthermore, higher US interest rates can amplify the divergences caused by the COVID-19 shock in Asia, affecting those Asian firms with higher debt-servicing risks concentrated in sectors that were affected disproportionally by the COVID-19 shock.

[2]The analysis uses S&P Capital IQ as its data source. The sample covers 63 countries for the period from the third quarter of 1996 through the third quarter of 2016 and mainly listed firms. The sample includes 15 countries from the Asia and Pacific region.
[3]Bauer and others (2021) find that the COVID-19 shock increased the financial fragility of Asia and Pacific firms, with small and medium enterprises experiencing greater financial stress.

3. Leveraging Opportunities from COVID-19 Vaccines: Early Lessons from Asia

This section uses novel daily data to examine the determinants of COVID-19 vaccine rollouts and quantify the effects of vaccinations on health and economic outcomes and how they vary during the pandemic cycle. Based on cross-country evidence, it shows that the extent of vaccine deployment is driven primarily by the severity of the COVID-19 waves in 2020, procurement strategies, local production of vaccines, the quality of the health infrastructure, and vaccine acceptance. The chapter provides new empirical evidence that the swift and broad administration of vaccines can provide a significant boost in economic activity, with the effect increasing over time and when a larger share of population gets vaccinated. Improvements in health outcomes are more visible when a country is in the middle of a significant outbreak and containment measures are in place. The chapter also quantifies that cross-country health and economic spillovers from COVID-19 infections and vaccine rollouts are sizable, highlighting that the pandemic will not be over anywhere until it is over everywhere, thus putting a premium on broad access to vaccines.

Vaccine Deployment: Uneven Pace and Access across Regions

The deployment of COVID-19 vaccines has diverged significantly across countries and regions. By mid-2021, Europe and North America held the lead, having already vaccinated a large share of their populations (Figure 3.1, panel 1). Asian countries lagged, having administered vaccines at a slower pace. With some exceptions (Bhutan, Maldives, Singapore), most countries in Asia started their vaccine rollouts slowly, with an average vaccination rate of less than 3 percent of the population by the first quarter of 2021. Vaccine deployment increased only around late April 2021, with Asian advanced economies outpacing Asian emerging market and developing economies, on average (Figure 3.1, panel 2), although some emerging market and developing economies saw relatively quick rollouts (China, Mongolia). Pacific island countries and small states, helped by vaccine donations and relatively small populations that simplified logistics, had swifter rollouts than advanced economies and emerging market and developing economies, on average. Among the Pacific island countries and small states, Bhutan and Maldives began their vaccination campaigns early and had vaccinated more than half of their populations by April 2021, and Nauru and Tuvalu followed soon after.

The empirical analysis uses cross-sectional variation in vaccination rates (as of July 2021) to assess which demand and supply factors are correlated with the extent of vaccine rollouts (Deb and others 2021a). The results suggest that the severity of the COVID-19 waves in 2020 had the largest impact (Figure 3.2, panel 1)—higher number of cases in 2020 (for example, the US) is associated with higher vaccination rates in the first half of 2021. The population's willingness to receive the vaccine is also important because vaccine hesitancy is a significant impediment to rollouts (De Figueiredo and others 2020; Dabla-Norris and others 2021b). For instance, the difference in hesitancy between Singapore (an Asian country in the sample with high vaccine acceptance) and the Philippines (a country with relatively high hesitancy in January 2021) is associated with a 2.3-percentage-points difference in vaccination rates.

Supply-side factors, such as early procurement, also played an important role in explaining the pace of the subsequent vaccination rollout. The difference in procured vaccines (confirmed and potential deals) in January 2021 between countries that acted early (for example, Israel) and others where negotiations were more protracted (for example, Germany) is associated with a 4-percentage-point difference in vaccination rates. Domestic production of vaccines also matters and is associated with higher and faster vaccination rates. This reflects the ability of producing

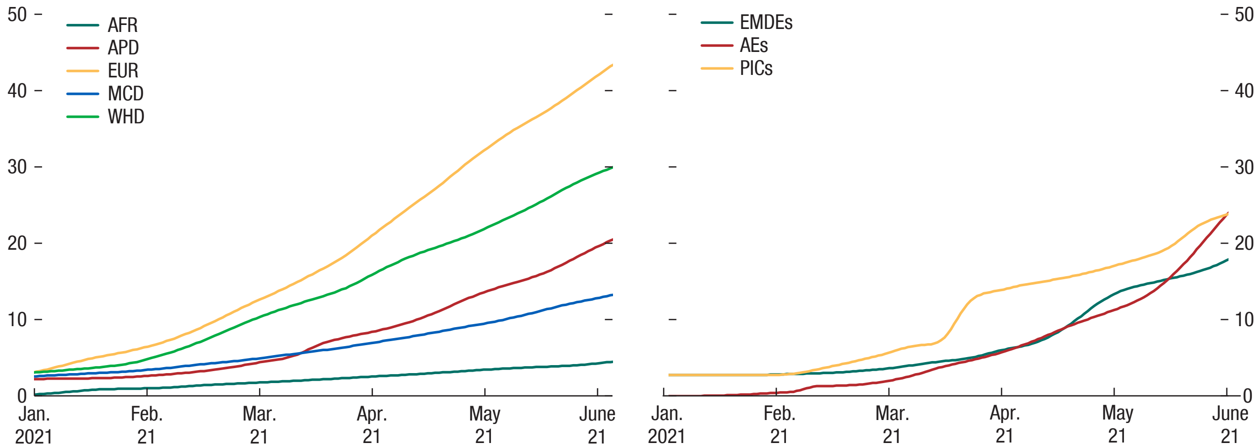
Figure 3.1. Vaccine Deployment in Asia

Vaccine deployment initially lagged in Asia ...

1. Vaccinations across Regions
(Per 100 population, simple average)

... but has picked up significantly since April 2021.

2. Vaccines Administered in Asia
(Per 100 population, simple average)



Source: Our World in Data Coronavirus Pandemic (COVID-19) Database.
Note: The figure shows vaccines administered per region as a simple average, per 100 population. AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

Source: Our World in Data Coronavirus Pandemic (COVID-19) Database.
Note: The figure shows the share of the population which has received at least one vaccine dose for each income group. AE = advanced economy; EMDE = emerging market and developing economy; PICs = Pacific island countries.

countries like China to secure a larger vaccine supply and administer doses more speedily. Finally, country health infrastructure and preparedness—number of hospitals, medical facilities, and doctors per capita—also contributed to the speed of vaccine rollout.

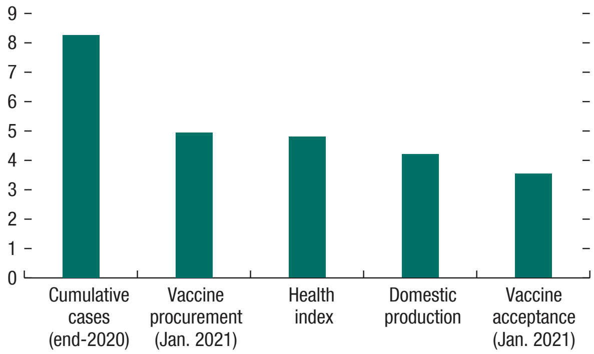
Looking closely at Asia, the severity of the pandemic in 2020 is the main factor explaining the slow vaccination pace in the region. Given successful containment policies in 2020, Asian countries were much less affected during the first wave compared with Europe and North America (Figure 3.2, panel 2). This influenced the pace of vaccine rollouts, with many countries in Asia—especially advanced economies—having slower vaccine rollouts in the first half of 2021 compared with European and North American peers (Australia, Korea, New Zealand). In addition, vaccine procurement was slow in Asia compared with other regions in early 2020 (Figure 3.2, panel 3), although it picked up significantly toward the end of 2020 (outpacing European economies). However, there is significant heterogeneity in procurement strategies. Although many Asian advanced economies had procured enough vaccines to cover their populations by January 2021 (Figure 3.2, panel 4), coverage for Asian emerging market and developing economies was barely enough to cover one-quarter of their populations in early 2021.

Asia scores well in vaccine acceptance compared with other regions. Data from Facebook highlights that vaccine acceptance is higher than in other regions, with surveys indicating that 75 percent of people interviewed across the region in January 2021 were willing to take COVID-19 vaccines (Figure 3.2, panel 5). Finally, the quality of health infrastructure in Asia is similar to that of other regions (excluding Africa). However, while advanced economies score highest on health preparedness, the health infrastructure index is significantly lower for Asian emerging and developing economies, lower-income countries, and for Pacific island countries (Figure 3.2, panel 6).

Figure 3.2. Determinants of Vaccine Rollouts

Empirical analysis shows the severity of the first COVID-19 waves as being the main driver of vaccine deployment ...

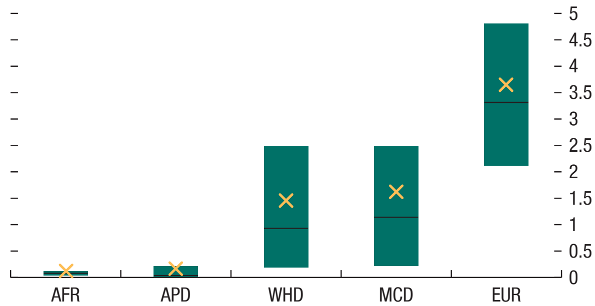
1. Factors Affecting Vaccine Rollouts
(Impact of one standard deviation change in factor on vaccinations per 100 population)



Source: Deb and others 2021a.
Note: The figure reports the impact of one standard deviation change in different factors that may explain vaccine rollouts on the share of population that is vaccinated with at least one dose. Vaccine procurement deals include confirmed and potential orders by January 2021.

... where Asia was affected little in 2020 because of successful containment measures.

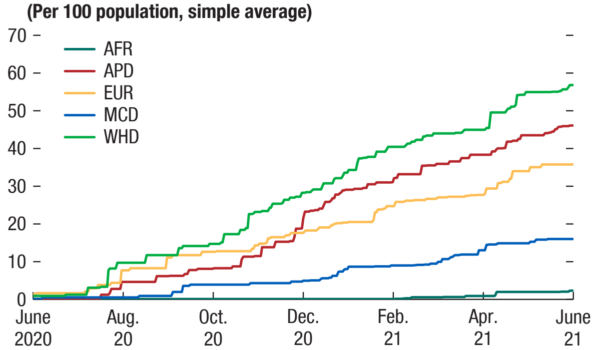
2. Cumulative COVID-19 Cases by the End of 2020
(Per 100 population, simple average)



Source: Our World in Data Coronavirus Pandemic (COVID-19) Database.
Note: The chart shows the cumulative number of COVID-19 cases per region at the end of 2020. The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles, respectively. The × is the mean. AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

Procurement also played an important role ...

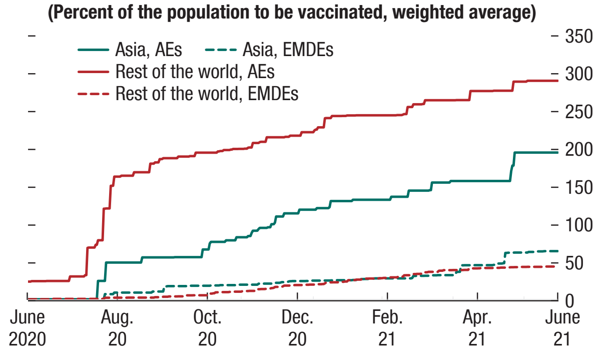
3. Vaccine Procurement per Region
(Per 100 population, simple average)



Source: Duke University Health Innovation Center.
Note: The figure shows the confirmed vaccine orders, potential procurement deals, and donations per region, per 100 population. Incomplete country coverage for all countries in the sample may lead to reduced accuracy in procurement estimates. AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

... with Asian emerging market and developing economies notably procuring less vaccines for their populations compared with advanced economies.

4. Vaccine Procurement per Income Group
(Percent of the population to be vaccinated, weighted average)



Source: Duke University Health Innovation Center.
Note: The figure shows the percent of the population to be vaccinated based on confirmed and potential procurement deals and donations. Countries are grouped per income level and weighted by population. AE = advanced economy; EMDE = emerging market and developing economy.

Vaccine Outcomes: A Means to Ending the Health and Economic Crises

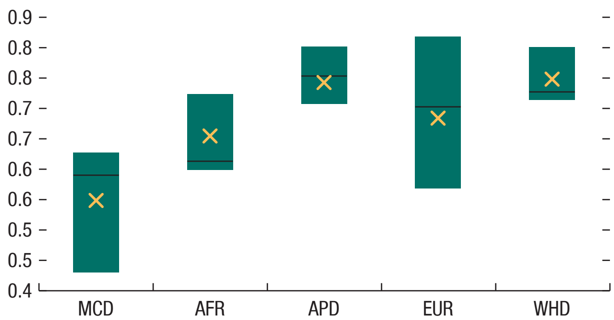
The analysis quantifies the effects of vaccines per capita on health and economic outcomes using real-time data for a large sample of countries (Deb and others 2021a, 2021b). Daily data on the number of new COVID-19 infections, fatalities, and intensive care unit (ICU) admissions are used, along with novel high-frequency indicators of economic activity, such as the daily level of nitrogen dioxide (NO_2) emissions.

The results suggest that COVID-19 vaccines have been effective in reducing infections, fatalities, and ICU admissions, (Figure 3.3, panel 1), consistent with epidemiological studies (see Dagan

Figure 3.2. Determinants of Vaccine Rollouts *(continued)*

Vaccine acceptance is high across Asia, which can facilitate vaccine rollout ...

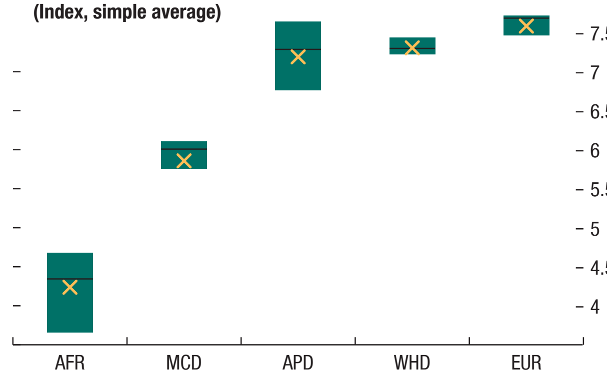
5. Vaccine Acceptance per Region
(Simple average, per 100 population)



Source: The University of Maryland Social Data Science Center Global COVID-19 Trends and Impact Survey, in partnership with Facebook.
Note: The chart shows the average vaccine acceptance response per region in January 2021. The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles, respectively. The × is the mean. AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

... as can the relatively well-developed health care infrastructure.

6. Health Infrastructure Index per Region
(Index, simple average)



Source: World Economic Forum.
Note: The chart shows the average Health Infrastructure Index per region in 2020. The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles, respectively. The × is the mean. AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

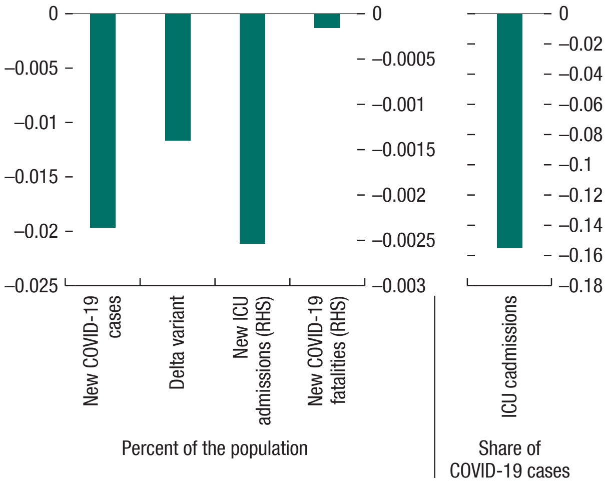
and others [2021] and Hall and others [2021], among others). A 20-percentage-point increase in the administration of the first vaccine dose per capita (similar to the rollout in Singapore between February and early April 2021) is associated with a reduction in daily new cases as a share of population by about one standard deviation after 21 days. The health effects of vaccines also increase after their administration, with the cumulative effect of vaccination on new cases peaking after 30 days. Within a month, a 20-percentage-point increase in first dose vaccination is associated with a cumulative decline of new cases by –0.5 percentage point of the population. The second dose contributes to flattening the pandemic curve further by reducing the virus reproduction rate. In addition, an increase in vaccination per capita reduces the number of COVID-19-related ICU patients as a share of confirmed COVID-19 cases significantly after 21 days. There is also tentative evidence that the effectiveness of vaccines varies depending on the dominant COVID-19 variant. Vaccines appear to retain efficacy against the highly infectious Delta variant but have a lower marginal impact compared with other strains. An increase in vaccination rates reduces infections by only half as much when the Delta strain is dominant compared with when other strains are dominant (Figure 3.3, panel 1).

Vaccine rollouts boost economic activity, resulting in better macroeconomic outcomes (Figure 3.3, panel 2). The analysis shows that higher vaccination outcomes (both for a first and second dose per capita) are associated with an increase in NO_2 emissions (a proxy for economic activity). These effects increase over time and with higher vaccination rates (Figure 3.3, panel 3), consistent with the notion that as a larger share of the population gains greater protection from the virus over time, the risk of infection diminishes, and confidence improves. To address concerns regarding endogeneity, the analysis is extended using *surprises* in vaccines administered per capita, measured as the difference between actual vaccinations and the expected rollout (Deb and others 2021b). The results also hold when using subnational data, which controls for unobserved heterogeneity at the subnational level and time-varying factors at the country level (Deb and others 2021).

Figure 3.3. Effect of COVID-19 Vaccines on Health and Economic Outcomes

COVID-19 vaccines are effective in improving health outcomes ...

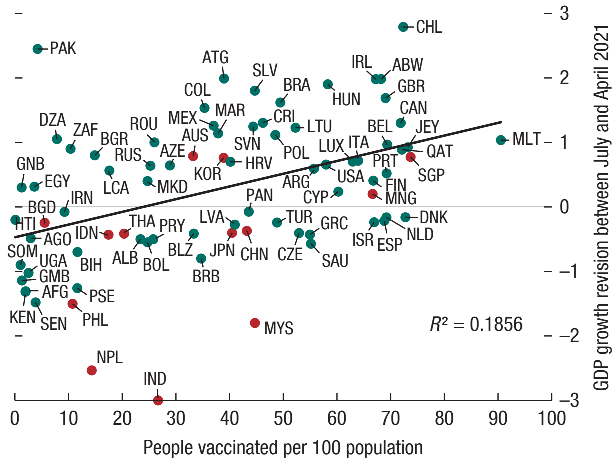
1. Effect of COVID-19 Vaccines on Health Outcomes
(Percent of the population, share of COVID-19 cases)



Source: Deb and others 2021a.
Note: The chart shows the daily effect of a 20-percentage-point increase in the administration of a first COVID-19 dose per capita on health outcomes per capita (COVID-19 cases) 21 days after their administration. Delta variant is the impact of vaccines on new cases when the Delta variant is dominant. RHS = right-hand scale.

... and increased vaccine rollout is correlated with higher country growth outcomes.

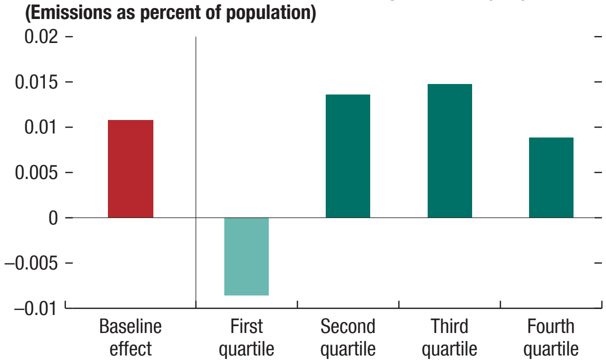
2. GDP Growth Revisions and Vaccines Administered as of the End of July 2021
(Percent of the population, percentage points [y-axis])



Sources: IMF World Economic Outlook; and Our World in Data Coronavirus Pandemic (COVID-19) Database.
Note: The chart shows the revisions in growth forecasts versus the percent of people in the country who are vaccinated. Country abbreviations are International Organization for Standardization country codes.

Vaccines lead to an increase in high-frequency indicators of economic activity, particularly at high vaccination rates ...

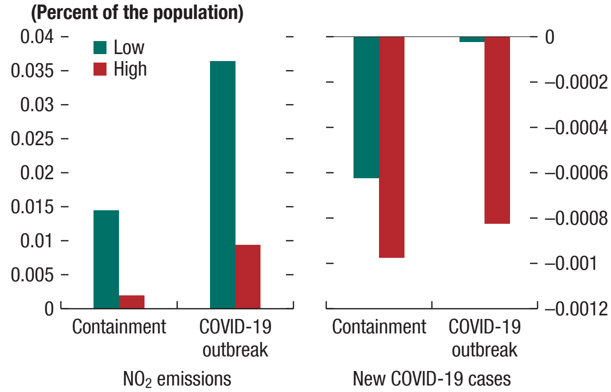
3. Effect of COVID-19 Vaccine Surprises on Nitrogen Dioxide (NO_2) Emissions
(Emissions as percent of population)



Source: Deb and others 2021b.
Note: The bar shows the impact after one day of vaccine surprises per capita on NO_2 emissions. The red bar shows the average effect of vaccine surprises, and the other bar charts denote the impact of vaccine surprises at different quartiles. The lighter shade indicates that the effect is not statistically significant at the 90 percent level.

... but containment measures and outbreaks can affect the impact of vaccines on health and economic outcomes.

4. Role of a Country's Initial Conditions
(Percent of the population)



Source: Deb and others 2021a, 2021b.
Note: LHS: the red (green) bars show the impact of vaccine surprises after one day on NO_2 emissions when containment measures or the severity of the outbreak are high (low). RHS: the red (green) bars show the impact of vaccines after 21 days on new COVID-19 cases when containment measures or the severity of the outbreak are (high) low. LHS = left-hand scale; NO_2 = nitrogen dioxide; RHS = right-hand scale.

The average effects of rollouts on health and economic outcomes, however, mask significant heterogeneity across countries. Vaccine rollouts are associated with a greater reduction in new COVID-19 infections when they are complemented by containment measures (as in Hong Kong SAR and Korea) because containment measures allow for continued effective social distancing as vaccination rollouts proceed. However, stringent containment measures and reduced social distancing limit the increase in economic activity after vaccine rollouts (Figure 3.3, panel 4). In addition, the impact of vaccines in reducing new COVID-19 infections is greater if a country is in the middle of a significant outbreak: when new cases are high to begin with, the administration of vaccines leads to a bigger decline in infections because it effectively tackles the risk of virus transmission across agents. Given the larger health gains in countries with severe outbreaks and diminishing returns to vaccine rollout where the pandemic is milder, there is obviously scope for countries to share their excess supplies with other countries once domestic infections are under control. However, the impact of vaccines on economic activity is dampened when there is a severe outbreak because people are likely to voluntarily socially distance until cases come down significantly. These trade-offs between economic and health outcomes are particularly relevant for many Asian countries (for example, Indonesia and Malaysia) that have locked down their economies and ramped up vaccinations to fight current COVID-19 outbreaks caused by the Delta variant. Although costly in the short term, the containment measures, coupled with broader vaccinations, can lay the foundation for the recovery (October 2020 *Regional Economic Outlook: Asia and Pacific*) and medium-term growth (Barro, Ursúa, and Weng 2020).

Vaccine Spillovers: Ensuring a Fair Shot for All

The mutation of the coronavirus into more transmittable strains such as the Delta variant suggests that no country is safe, even if it achieves high vaccination outcomes. Indeed, the rapid spread of the Delta variant from India to neighboring countries highlights the risks from protracted waves across borders. For instance, the Delta variant became the dominant coronavirus in ASEAN countries and in North America over one to three months after becoming the dominant variant in India (Figure 3.4, panel 1).

To shed light on spillovers from COVID-19 cases and vaccines on a country's health and economic outcomes, the empirical analysis constructs daily proxies of "foreign" COVID-19 cases and vaccines in neighboring countries, based on geographic proximity and trade links (Deb and others 2021a, 2021b). The results suggest that new COVID-19 cases in countries with close regional proximity can lead to an increase in a country's own infections (Figure 3.4, panel 2), as movements across borders increase transmissions. However, there are positive health spillovers from increased vaccinations in neighboring countries, with foreign vaccine rollouts reducing new COVID-19 cases domestically as virus spread diminishes near borders and from travel. Economic spillovers from neighbors' COVID-19 cases and vaccines are also tangible, reflecting both confidence effects associated with health spillovers and economic effects through trade links. Macro-epidemiological model simulations also emphasize the global benefits of more equitable vaccination to reduce (re)infections from abroad and achieve better economic outputs, including through cross-country economic spillovers via trade links (Engler and others, forthcoming).

These spillovers from neighboring countries provide compelling evidence for ramping up vaccine production and ensuring adequate distribution to all countries, including by sharing excess doses. Distributing vaccines to countries facing severe outbreaks can be especially helpful, not just to save domestic lives but to limit COVID-19 spillovers to foreign countries and foster global economic gains as more of the world population is vaccinated. Agarwal and Gopinath (2021) stress the importance of vaccinating a large share of the world's population quickly, noting that the pandemic is not over anywhere until it is over everywhere.

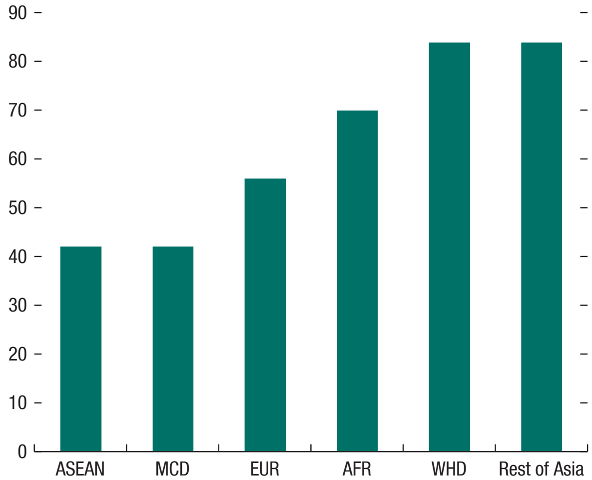
Conclusion

After a slow start—partly reflecting lesser urgency in the initial rollout given the earlier success in controlling the first waves—countries in Asia

Figure 3.4. Equitable Access to Vaccines

The Delta variant spread rapidly to neighboring regions ...

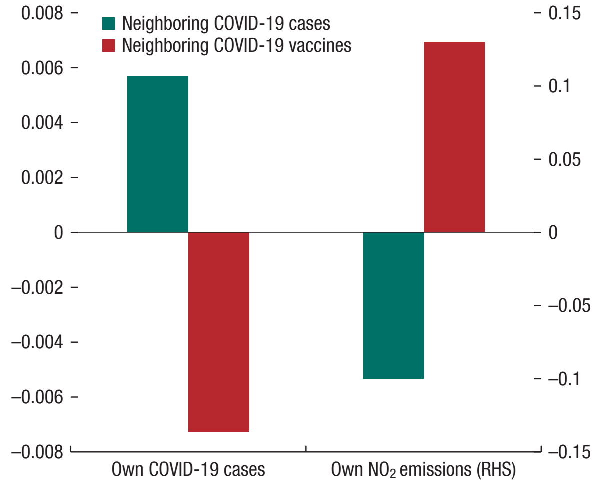
1. Days Elapsed until Delta Variant Reached 50 Percent of COVID-19 Cases
(Number of days)



Source: GISAID, CoVariants.org.
Note: The chart computes the number of days elapsed since Delta variant cases reached 50 percent of all COVID-19 cases in regions, since the date that Delta variant reached 50 percent of cases in India (April 19 2021). Rest of Asia includes Australia, Bangladesh, China, Hong Kong SAR, Japan, Korea, Nepal, New Zealand, and Sri Lanka. AFR = Africa; APD = Asia and Pacific; ASEAN = Association of Southeast Asian Nations; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

... and analysis suggests spillovers from COVID-19 cases and vaccines can occur through physical proximity and economic links.

2. Effect of Neighboring COVID-19 Cases and Vaccines on a Country's Health and Economic Outcomes
(Percent of population; emissions as percent of population [RHS])



Source: Deb and others 2021a, 2021b.
Note: The green bars denote the impact of neighboring COVID-19 cases per capita on a country's own COVID-19 cases per capita and on a country's NO_2 emissions per capita, after 7 and 30 days, respectively. The red bar denotes the effect of neighboring COVID-19 vaccines on a country's own COVID-19 cases per capita and on a country's own NO_2 emissions per capita, after seven and 30 days, respectively. NO_2 = nitrogen dioxide; RHS = right-hand scale.

have significantly ramped up their vaccination campaigns. This chapter's key findings make a strong case for a broader and faster vaccine rollout in Asia and elsewhere. First, accelerating vaccine rollout has significant health effects, particularly in countries where the pandemic is not under control and infections are pervasive. Second, vaccination reduces the number of ICU patients per infected person, thereby enhancing the health system's resilience to cope with the spread of the virus and potentially reducing the need for very strict and broad-based containment. Third, vaccination is found to enhance the containment effects of social distancing measures, implying that measures may need to remain in place for a shorter period, all else equal, thereby allowing the economy to reopen faster. Fourth, vaccination has a significant and persistent effect on economic activity, but these effects increase with the share of population vaccinated, highlighting the importance of continuous progress in vaccination. Finally, the chapter highlights important health and economic spillovers from vaccinations. It suggests that more equitable access to vaccination—by sharing excess vaccine doses, together with ramped-up vaccine production and adequate vaccine distribution across counties—is welfare enhancing for *all*.

4. Reigniting Asia's Growth Engine through Trade Liberalization

Trade openness and global value chain (GVC) integration have stalled in Asia since the global financial crisis, partly reflecting a slower pace of trade liberalization. This chapter uses a novel index of trade restrictions to assess the potential gains from reducing nontariff barriers (NTBs), which remain high in many Asian emerging markets and developing economies. Empirical estimates and model-based simulations indicate significant macroeconomic benefits from reducing such barriers, with GDP increasing by about 1.6 percent five years after a major reform effort. Thus, a renewed push to liberalize trade can invigorate durable growth and minimize post-pandemic scarring, although policies to mitigate the impact of trade reforms on inequality may be needed.

The Pre-Pandemic Landscape: Declining Trade, Stagnating Reforms

International trade has been a powerful driver of growth and poverty alleviation in Asia, allowing countries to exploit economies of scale by specializing in activities in which they have a comparative advantage. Trade has also helped boost investment and productivity by allowing for the faster spread of technology, including through links formed when participating in GVCs—trade in intermediate inputs.

Trade openness (defined as the share of goods and services trade in GDP) in Asia increased in the decades leading up to the global financial crisis but has recently fallen (Figure 4.1, panel 1). A similar trend is seen with respect to GVCs, despite Asia being at the forefront of integration and global manufacturing, with backward linkages in Asia second only to Europe (Figure 4.1, panel 2).[1] These trends are problematic for Asia's manufacturing sector, particularly high-tech manufacturing (such as electrical and machinery, transport equipment, and metals), which has traditionally been a critical regional growth driver with important intraregional spillovers (about half of GVC trade in Asia is conducted within the region).

Several factors are responsible for the decline in trade openness. The overall weakness in global economic activity and investment, including the rebalancing of some Asian economies like China, has surely contributed (October 2016 *World Economic Outlook*, Chapter 2). At the same time, stagnation in trade openness has coincided with a slower pace of trade reforms. Average tariffs in Asia declined sharply from more than 50 percent in the 1970s to single digits in the 2000s, boosting trade (Figure 4.1, panel 3). However, such momentum has stalled in recent years, partly because tariffs are now at a relatively low level (median of 6 percent), and NTBs loom much larger in driving protection in the region.

Indeed, NTBs remain a significant impediment to trade but have received less attention because of data constraints. This chapter uses a novel and comprehensive trade restrictions index (the NTB index [NTBI]) compiled by Estefania Flores and others (forthcoming), covering up to 157 countries going as far back as 1949. The NTBI is constructed by using a narrative approach, exploiting detailed information on various types of trade restrictions as recorded in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions.* It combines information on restrictions on exports and imports (payment restrictions, licensing requirements, and so on), multiple currency practices, and restrictions on payments on invisibles. The NTBI varies from 0 to 20, with lower levels indicating fewer trade restrictions.

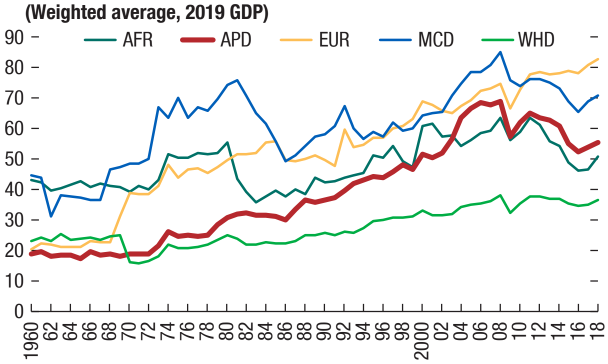
The NTBI shows a trend similar to tariffs, with the headline index for Asia declining from close to 20 in the 1960s to about 15 by 1995, with little change since then (Figure 4.1, panel 4). Unlike tariffs, NTBs remain relatively high—the average NTBI for emerging market and developing economies in Asia is the highest across all global regions (Figure 1, panel 6). Low-income developing countries in Asia have particularly high NTBs (Bangladesh, Myanmar, Nepal), as do some large Asian emerging markets (China, India), suggesting significant scope for reform. When looking at subcomponents of the NTBI, Asia has done relatively well in liberalizing multiple currency practices, but the region continues to have some of the highest levels of restrictions on exports, imports, and invisible payments. Other measures of trade restrictiveness also suggest high

[1]Backward linkages (foreign value-added) refers to the use of imported value-added as inputs in the production of exports. Forward linkages (indirect value-added) refers to the domestic value-added exported as intermediate goods and then used by foreign countries in their export production. Manufacturing exporters tend to have higher backward linkages, while commodity exporters tend to have higher forward linkages.

Figure 4.1. The Pre-Pandemic Trade Landscape

Trade openness in Asia has declined in recent years ...

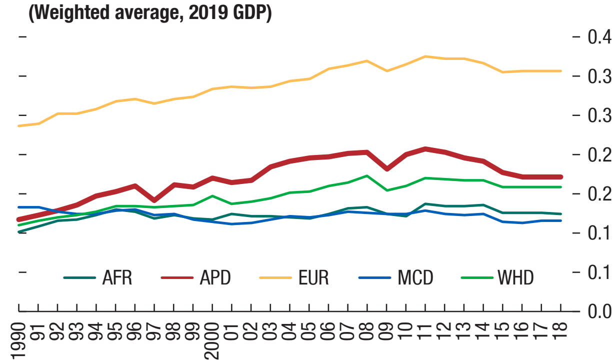
1. Trade as Share of GDP
(Weighted average, 2019 GDP)



Sources: World Bank, World Development Indicators; and IMF staff calculations.
Note: AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

... as has GVC participation ...

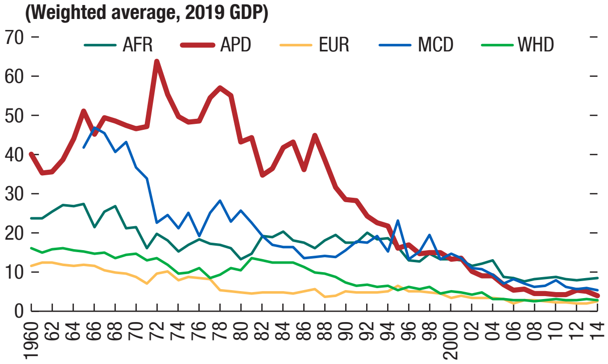
2. Backward Linkages to Exports
(Weighted average, 2019 GDP)



Sources: UNCTAD-Eora Global Value Chain Database; and IMF staff calculations.
Note: AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; UNCTAD = United Nations Conference on Trade and Development; WHD = Western Hemisphere.

... driven by a stalling of reforms since the 2000s after tariffs were generally liberalized ...

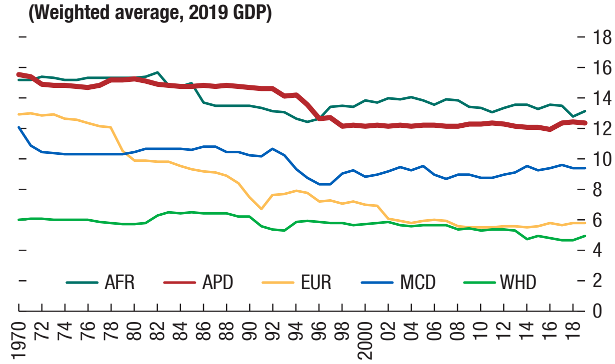
3. Tariff Barriers
(Weighted average, 2019 GDP)



Sources: Furceri and others 2019; and IMF staff calculations.
Note: AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

... but NTBs and other restrictions have remained high.

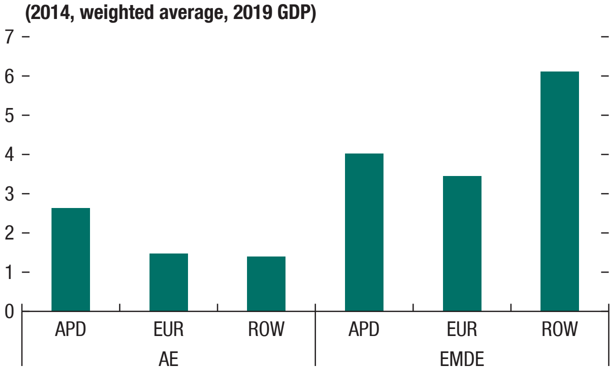
4. Nontariff Barriers Index
(Weighted average, 2019 GDP)



Sources: Estefania Flores and others, forthcoming; and IMF staff calculations.
Note: AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

Tariffs in Asian emerging market and developing economies are low in absolute terms ...

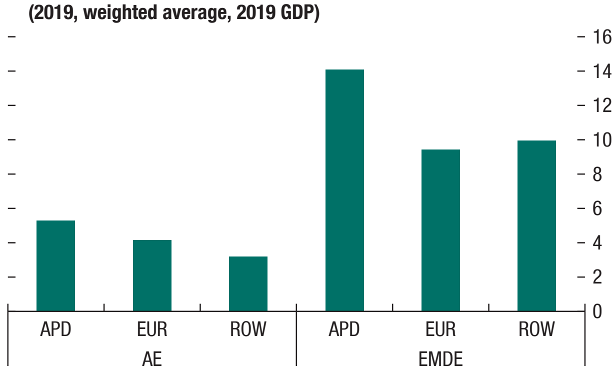
5. Tariff Barriers
(2014, weighted average, 2019 GDP)



Sources: Furceri and others 2019; and IMF staff calculations.
Note: Pacific island countries are excluded from APD-EMDE aggregate. AE = advanced economy; APD = Asia and Pacific; EMDE = emerging market and developing economy; ROW = rest of the world.

... but the average NTBs in Asia are the highest among all regions.

6. Nontariff Barriers Index
(2019, weighted average, 2019 GDP)



Sources: Estefania Flores and others, forthcoming; and IMF staff calculations.
Note: Pacific island countries are excluded from APD-EMDE aggregate. AE = advanced economy; APD = Asia and Pacific; EMDE = emerging market and developing economy; ROW = rest of the world.

NTBs in the region. For example, temporary trade barriers in the form of antidumping, countervailing, and safeguard measures have increased steadily since the early 1990s, covering a larger share of global and Asian trade.

The Uneven Impact of the Pandemic on Trade

The pandemic has resulted in unprecedented output losses in the Asia and Pacific region (Chapter 2). Total Asian exports declined significantly in 2020, particularly for emerging market and developing economies, where export growth fell by more than it did during the global financial crisis. However, a large part of the slowdown was because of a collapse in services exports, particularly tourism, with goods exports in 2020 falling by less than they did during the global financial crisis (Figure 4.2, panel 1). There is considerable heterogeneity across countries and sectors. Asia was well positioned to benefit from the increased demand for pharmaceutical and medical goods, with such exports increasing in 2020. Similarly, electrical and electronic exports held up well compared with other products, supported by higher demand for computer and electronic equipment because of changes in work practices (Figure 4.2, panel 2). These sectoral trends were most visible in China, where production disruptions were minimized after the first COVID-19 outbreak was brought under control.

The pandemic's medium-term impact on trade patterns, including GVCs, remains uncertain. New estimates based on data from past recessions suggest that large global growth slowdowns are likely to have a significant and persistent impact on GVCs. The COVID-19 pandemic could decrease backward linkages by about 1 percentage point in the medium term, which is equivalent to reversing about 12 percent of the gains in backward linkages in Asia between 1990 and 2008 (Figure 4.2, panel 3). However, the actual impact may differ from historical patterns. For instance, the pandemic's impact across sectors will surely be different (with services suffering more than manufacturing), and the length of the crisis remains uncertain because of virus developments. Beyond the effect of output contractions on trade, and in line with the experience from past recessions, there is preliminary evidence of a significant increase in the use of trade restrictions during the COVID-19 pandemic, particularly in curtailing exports of medical goods, which could have lasting effects on supply chains as countries aim to move production back to domestic shores (Figure 2, panel 4; IMF 2021).

Reigniting Asia's Growth Engine through Trade Liberalization

Liberalizing NTBs in Asian emerging market and developing economies could help reignite durable growth across the region (October 2018 *Regional Economic Outlook: Asia and Pacific*). This section takes two approaches to quantify the potential benefits of trade liberalization. First, it conducts an empirical investigation of the short- and medium-term macroeconomic benefits of reducing NTBs, focusing on the role of GVCs as a key channel through which output and productivity gains materialize. Second, it uses a structural model with rich GVC links to assess the potential long-term effects of lowering NTBs.

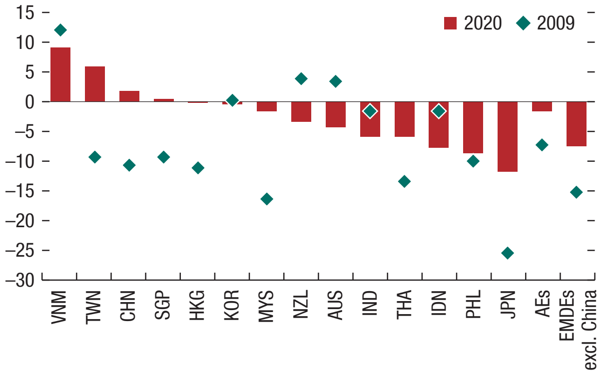
Empirical Analysis

The NTBI's broad coverage allows for a comprehensive empirical investigation and suggests that reducing NTBs has historically been associated with positive economic outcomes. A significant decrease in trade barriers (equivalent to a two-standard-deviation change in the indicator as achieved, for example, with Sri Lanka's trade reforms in the early 1990s) is associated with GDP increasing by about 1.6 percent in the medium term (five years after the reform). The gains occur through a significant rise in investment and productivity, highlighting the potential role of technology transfer and the reallocation of resources to more productive firms in response

Figure 4.2. Impact of Pandemic and Past Recessions

The pandemic has hit Asian exports, though goods exports have fallen less than during the global financial crisis ...

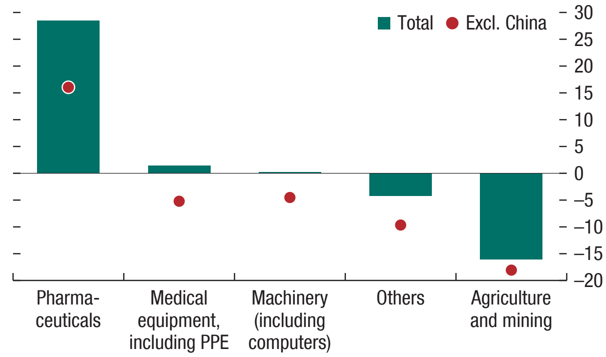
1. Export Growth Goods: GFC versus COVID-19
(Percent, constant prices)



Sources: World Economic Outlook; and IMF staff calculations.
Note: Country abbreviations are International Organization for Standardization country codes. AE = advanced economy; EMDE = emerging market and developing economy.

Sectors have seen differentiated effects, with exports remaining resilient in pharmaceuticals and electrical equipment.

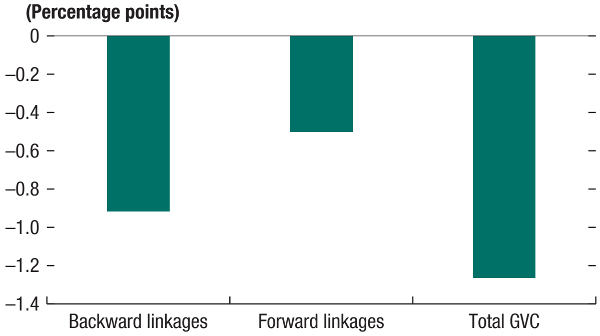
2. Export Growth in REO14 by Sectors
(Percent, weighted average)



Source: UN Comtrade database.
Note: REO14 is a grouping of the 14 biggest Asia and Pacific region economies. It includes Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan Province of China, Thailand, and Vietnam. PPE = personal protective equipment.

Recessions (in partner countries) have a large and persistent impact on GVCs.

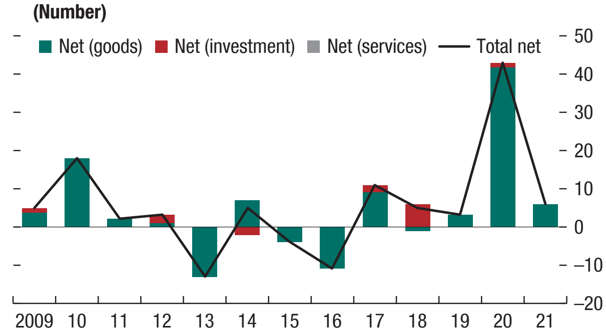
3. Potential Impact of Pandemic on Global Value Chains
(Percentage points)



Source: IMF staff calculations.
Note: Figure corresponds to the impulse response function to a 6-percentage-points decline in partner country growth (equivalent to the decline in global growth in 2020) at the five-year horizon. All variables measured as a percent of total exports. Standard errors are clustered at the country level. GVC = global value chain.

An increase in trade restrictions could affect supply chains.

4. New Export Restrictions (Net), Asia
(Number)



Sources: Global Trade Alerts; and IMF staff calculations.
Note: The data includes credible announcement of a meaningful and unilateral change in the relative treatment of foreign versus domestic commercial interests. Border closures, which affect travel service exports and imports, are not included as restrictions. Global Trade Alerts is an NGO, a charitable organization that compiles the data used for this chart.

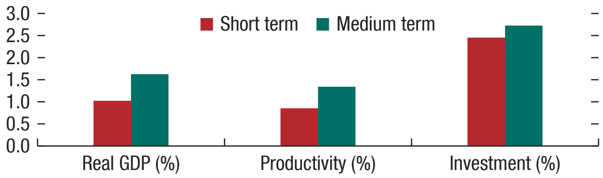
to trade liberalization (Figure 4.3, panel 1). A major reduction in NTBs is associated with an increase in both goods and services trade and an increase in GVCs as a share of exports (Figure 3, panel 2).[2] Increasing GVCs is an important channel through which lower NTBs spur growth. Higher GVC participation, particularly through backward linkages, is, in turn, associated with significant gains in labor productivity, though with heterogeneous effects across sectors. High-tech manufacturing gains the most from greater GVC integration (reflecting greater reliance on global technology and cooperation), and services

[2]Data on GVCs is more limited and starts only from the 1990s. Hence, all analysis of GVCs is done on a restricted sample and has lower power. The addition of time fixed effects makes the results statistically insignificant because a large part of the variation in tariffs and NTBs from the 1990s has occurred on a multilateral basis, which gets captured by time fixed effects.

Figure 4.3. Trade and the Asian Miracle

Reduction in NTBs is historically associated with positive economic outcomes ...

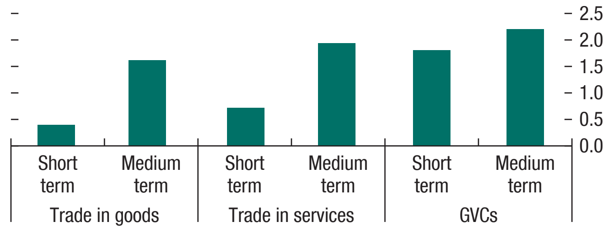
1. Effect of Reducing NTBs
(Percent)



Source: Estefania Flores and others, forthcoming.
Note: Figure corresponds to the impulse response function to a two-standard-deviation decrease in NTB index at the first (short term) and fifth (medium term) horizons. Light shaded bars indicate that results are not significant at 90 percent confidence interval. Standard errors are calculated using Driscoll-Kraay. NTB = nontariff barrier.

... often working through a GVC channel, with reduction in NTBs resulting in higher GVC participation.

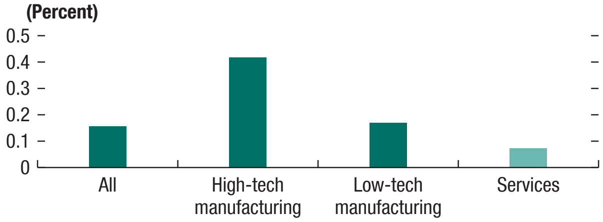
2. Effect of Reduction in NTB on GVCs and Trade
(Percentage points)



Source: IMF staff calculations.
Note: Figure corresponds to the impulse response function to two-standard-deviation increase in NTBs at the first (short term) and fifth (medium term) horizons. Light shaded bars indicate that results are not significant at 90 percent confidence interval. Standard errors are clustered at the country level. GVC = global value chain; NTB = nontariff barrier.

GVCs, in turn, raise productivity, driven by the manufacturing sector, especially high-tech manufacturing.

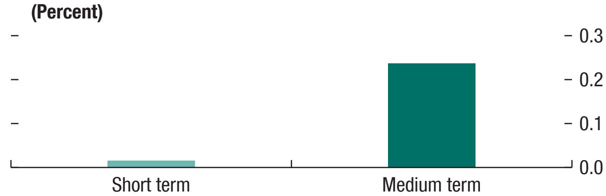
3. Impact of Backward Linkages on Sectoral Labor Productivity
(Percent)



Source: IMF staff calculations.
Note: The figure corresponds to the impact of a one percent increase in backward linkages, from a panel regression at the sectoral level, controlling for country-industry effects. Standard errors are clustered at the country level.

However, policies may be needed to offset the effects of trade liberalization on inequality.

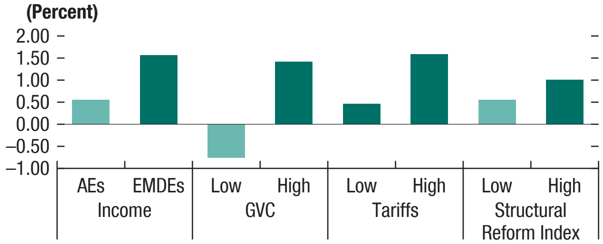
4. Effect of Reducing NTBs on Inequality
(Percent)



Source: Estefania Flores and others, forthcoming.
Note: Figure corresponds to the impulse response function to one-standard-deviation decrease in NTB index at the first (short term) and fifth (medium term) horizons. Light shaded bars indicate that results are not significant at 90 percent confidence interval. Standard errors are calculated using Driscoll-Kraay. NTB = nontariff barrier.

NTBs have heterogeneous effects across countries

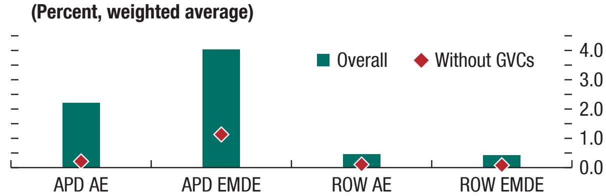
5. Effect of Reducing NTBs on GDP
(Percent)



Sources: Estefania Flores and others, forthcoming; World Bank; UNCTAD Eora; and IMF staff calculations.
Note: Figure corresponds to the impulse response function to a two-standard-deviation increase in NTB index at the fifth (medium term) horizon. Structural Reform Index is an average between labor, financial, and product market reforms index. Heterogenous effects for income and tariffs are calculated using the interaction of the income/tariffs dummy above and below median with the NTB index. For GVC and Structural Reforms Index, smooth transition function is used. Light shaded bars indicate that results are not significant at 90 percent confidence interval. Standard errors are calculated using Driscoll-Kraay. GVC = global value chain; NTB = nontariff barrier.

Model simulations suggest that reducing NTBs for Asian emerging market and developing economies to the level of European emerging market and developing economies can lead to significant gains in GDP.

6. Effect of Reducing NTBs in Asian EMDEs on GDP
(Percent, weighted average)



Source: IMF staff calculations.
Note: Based on simulations from a general equilibrium model with input-output links (Caliendo and others 2017). Effect corresponds to a scenario where NTBs in APD EMDEs are reduced to the level of EUR EMDEs (if APD EMDE restrictions are above EU EMDE average). AE = advanced economy; EMDE = emerging market and developing economy; GVC = global value chain; NTB = nontariff barrier; ROW = rest of the world.

see fewer gains (reflecting low GVC intensity to begin with; Figure 4.3, panel 3). However, trade liberalization does come with potentially adverse distributional consequences because the resource reallocation associated with reforms invariably generates both winners and losers, with the already better-off well positioned to benefit more. Therefore, it is essential to accompany trade reforms with offsetting policies to mitigate the impact on inequality (Figure 4.3, panel 4).

The benefits from reducing NTBs mask significant heterogeneity across countries (Figure 4.3, panel 5), with larger benefits for emerging market and developing economies likely reflecting larger gains from technology transfers. NTB reductions have larger effects on real GDP and productivity in countries that are more integrated in value chains, suggesting potentially large gains for several GVC-intensive Asian countries that still have relatively high NTBs (Malaysia, Vietnam). The results also indicate that gains from reducing NTBs are larger when tariffs are high to begin with. Finally, gains from reducing NTBs are larger in countries with more liberalized domestic product and financial markets and less stringent job protection legislation. This suggests that reforms in other areas are key to removing binding constraints to growth and amplifying the effect of trade liberalization.

Model-Based Results

The empirical estimates for gains from liberalization are complemented with simulation results from a sectoral, computable, general equilibrium model with input-output links (Caliendo and others 2017). The model has two key benefits in assessing the gains from reducing NTBs, compared with the empirical analysis: (1) it allows for quantification of long-term gains from liberalization, once the effects of reforms on the economy have played out fully; and (2) it can provide specific estimates of potential gains for the Asian region, accounting for Asia's current position in global trade and value chains.

The model captures two key features of international trade: (1) firms within each sector are heterogeneous in their productivity, with trade liberalization potentially leading to the reallocation of resources to more productive firms; and (2) input-output relationships have increasingly developed across borders, with intermediate goods dominating world trade flows. Production in each sector requires intermediate inputs from all other sectors, which generates an amplification mechanism because reduction in NTBs reverberates across domestic and foreign production value chains.

The simulations assume that NTBs in Asian emerging market and developing economies are lowered to the level of European emerging market and developing economies—equivalent to a decrease in NTBs of about four standard deviations, similar in size to Australia's reforms in the early 1980s. The results suggest that Asian emerging market and developing economies could see GDP increases of about 4 percent in the long term in response to such reductions in NTBs (Figure 4.3, panel 6). Although NTBs are reduced only in Asian emerging market and developing economies in this experiment, other countries would benefit through trade links. Asian advanced economies would experience the largest spillovers, given close trade links, with their GDP increasing by about 2 percent.

As with the empirical analysis, GVCs constitute a key channel through which NTB reductions boost growth in the model. Results suggest that without this channel, the long-term growth gains from a major reform push in Asian emerging market and developing economies could be much smaller, only about 1 percent (compared with 4 percent with the GVC channel), with very limited spillovers to other countries in the region and to the rest of the world.

Conclusion

Trade in Asia, especially GVC trade, has stalled recently, partly because of still-high nontariff barriers in the region, notwithstanding welcome recent regional initiatives to boost trade, such as the Regional Comprehensive Economic Partnership. This is of great concern for a region where trade has been a powerful driver of growth and poverty alleviation for decades. Given that the pandemic has already resulted in unprecedented output losses in the Asia and Pacific region, with potential for significant medium-term scarring, an urgent and renewed structural reform drive is needed to boost productivity and output potential. Reducing NTBs can be an especially potent tool to boost medium-term productivity in Asia because there is significant scope for such reforms in Asian emerging market and developing economies, where large economic gains would accrue, especially for GVC-intensive manufacturers and their trade partners.

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