Navigating economic uncertainties

Introduction

Although global energy prices have fallen from their peaks and the global services sector is showing a robust recovery, uncertainty remains high for South Asia. Monetary policy tightening needed to cool down inflation has raised borrowing rates, contributing to intensifying financial sector risks. Stress in the US and European financial sectors has further tightened financial conditions for South Asian economies, exacerbating pressure in the external sector. Amid the heightened uncertainty in the rest of the world, growth in South Asia is expected to slow in 2023. Weak consumption, fiscal consolidation, the still-fragile economic situations in Afghanistan and Sri Lanka, and worsening prospects in Pakistan will contribute to lackluster 5.6 percent annual growth. Growth is expected to pick up slightly to 5.9 percent in 2024, as inflation dies down, creating more favorable conditions for consumption to grow.

Amid the uncertainty and unfavorable macro-financial conditions, growth in private consumption will slow down and government consumption will contract due to fiscal consolidation. Investment growth is expected to stay robust, led especially by large infrastructure projects, and likely followed by private investments. Sectoral shifts toward the services sector which was battered during the pandemic, will come at the cost of weakened growth in the manufacturing sector.

Countries face uncertainties from economic outcomes in high-income countries, from the path of monetary tightening in the United States, from the trend in global commodity prices, and from deteriorating conditions in domestic financial sectors. Climate change-related risks, together with the narrow fiscal space of South Asian governments, will increase countries’ climate financing needs.

The chapter is divided as follows. Section 2.1 discusses the outlook for the region’s growth, including forecasts on the demand components, inflation, and poverty. Section 2.2 considers...
some scenarios to illustrate changes in the external environment. Section 2.3 is dedicated to a discussion of climate financing in South Asia.

### 2.1 Dimmed outlook amid continued external strains

South Asia’s economy is expected to grow by 5.6 percent in 2023 and 5.9 percent in 2024, as growth moderates after the initial post-pandemic recovery in 2021 (Table 2.1). The growth rate forecast for 2023 was revised down by 0.5 percentage point compared with the October 2022 forecast. The Indian economy is expected to grow by 6.3 percent in the fiscal year starting April 2023, a downward revision from both the October 2022 and the January 2023 forecasts driven by moderating consumption and ongoing fiscal consolidation. Sri Lanka’s economy will continue to contract in 2023, albeit at a slower pace than in 2022, even with the IMF program that will help close the country’s financing gap. The floods in Pakistan in the second half of 2022 continue to take a toll on the economy, just as the country faces a slew of economic challenges and uncertainties over the renewal of the IMF program. As a result, Pakistan’s GDP growth rates for the current and the next fiscal year are revised downward by more than 1 percentage point each. Nepal also saw downward revision to growth in the current fiscal year, which reflects the impacts from monetary policy tightening, import restriction measures and post-electoral political uncertainty. Bangladesh’s growth forecast is revised downward from October 2022 but kept unchanged from January 2023, as the forecast in January already incorporated the effects from the IMF program and related policy measures signed into effect at the end of January.

Although most regional countries face worsening growth prospects, there are important differences in the sources of the economic challenge. Only two countries in the region are currently reporting GDP figures on a calendar year basis: Maldives and Sri Lanka. No official forecast estimate is reported for Afghanistan, since official data collection halted in 2021.

- Afghanistan’s economy has settled around a fragile low-level equilibrium, supported by a partial resumption of aid and shipments of cash in US dollar. Under the baseline scenario where the economy continues to receive humanitarian and basic service support, the World Bank estimates that real GDP could move to a low-growth trajectory during 2023–2025 with annual growth of between 2 and 3 percent. Under this scenario, per capita income will not improve due to high population growth and poverty is likely to remain high. The regressive gender policies of the current regime...
could reduce external support and lead to a loss of human capital, adversely impacting future growth prospects of the economy. A stoppage of US dollar cash shipments, an inability to finance the current account deficit, and instability in the banking sector pose significant downside risks in the immediate term.

- **Maldives** is expected to grow by 6.6 percent in 2023 and 5.3 percent in 2024, supported by a robust tourism performance. The downward revisions in the growth rate forecasts for 2023 and 2024 compared with previous forecasts mainly reflect an adjustment in the 2021 growth rate. The return of tourists from China, together with arrivals from India and the Russian Federation will support increased tourist arrivals in the near term, while increased capacity in the tourism sector, including the expansion of Velana International Airport (expected completion by 2025) and investments

### Table 2.1. Growth in the region downgraded amid continuing pressures

<table>
<thead>
<tr>
<th>Country fiscal year</th>
<th>Real GDP growth at constant market prices (percent)</th>
<th>Revision to forecast from October 2022 (percentage point)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendar year basis</td>
<td>2021 2022 2023(f) 2024(f)</td>
<td>2023(f) 2024(f)</td>
</tr>
<tr>
<td>South Asia region (excluding Afghanistan) January to December</td>
<td>8.2 5.9 5.6 5.9</td>
<td>-0.5 0.0</td>
</tr>
<tr>
<td>Maldives January to December</td>
<td>41.7 12.3 6.6 5.3</td>
<td>-1.6 -2.8</td>
</tr>
<tr>
<td>Sri Lanka January to December</td>
<td>3.5 -7.8 -4.3 1.2</td>
<td>-0.1 0.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fiscal year basis</th>
<th>FY21/22 FY22/23(e) FY23/24(f) FY24/25(f) FY23/24(f) FY24/25(f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India April to March</td>
<td>9.1 6.9 6.3 6.4</td>
</tr>
<tr>
<td>FY20/21 FY21/22 FY22/23(e) FY23/24(f) FY22/23(f) FY23/24(f)</td>
<td></td>
</tr>
<tr>
<td>Bangladesh July to June</td>
<td>6.9 7.1 5.2 6.2</td>
</tr>
<tr>
<td>Bhutan July to June</td>
<td>-3.3 4.3 4.5 3.1</td>
</tr>
<tr>
<td>Nepal mid-July to mid-July</td>
<td>4.2 5.8 4.1 4.9</td>
</tr>
<tr>
<td>Pakistan* July to June</td>
<td>5.7 6.0 0.4 2.0</td>
</tr>
</tbody>
</table>

**Sources**: World Bank Macro Poverty Outlook and World Bank staff calculations.

**Note**: (e)=estimate, (f)=forecast. GDP measured in 2015 prices and market exchange rates. Pakistan (*) is reported at factor cost. Afghanistan is not producing national accounts statistics since August 2022, so its data are excluded from the table. To estimate regional aggregates in the calendar year, fiscal year data is converted to calendar year data by taking the average of two consecutive fiscal years for Bangladesh, Bhutan, Nepal, and Pakistan at 2015 constant US dollar, for which quarterly GDP data are not available. A new method is used for calculating calendar year South Asia GDP growth for the forecast years. The October 2022 forecasts of 2023 and 2024 GDP growth are updated using this new method.
in new resorts will boost the tourism sector going forward. Although the fiscal deficit is expected to narrow on the back of the recent goods and services tax (GST) rate hike, public debt levels remain high and debt-servicing costs are rising. Tourism-shrinking global shocks remain a potential downside risk, and high external debt and tightening global financing conditions pose risks to the fiscal and external accounts.

- Sri Lanka’s real GDP is expected to contract by 4.3 percent in 2023 following a sharp contraction in 2022, as its ongoing economic crisis continues. Starting 2024, real GDP is projected to expand slowly, growing by 1.2 percent in 2024, supported by upcoming debt restructuring and growth-enhancing structural reforms. Inflation is projected to come down from a high base as monetization of fiscal deficits is reined in. The fluid political situation and heightened fiscal, external, and financial sector imbalances will continue to make growth prospects uncertain. The acute impact of the crisis on poverty could worsen due to policy adjustments needed for stabilization, while rising non-performing loans (NPLs) in the financial sector and spillover from the public sector due to sovereign-bank linkages (Box 1.3) increase financial sector risks.

Bangladesh, Bhutan, and Pakistan report GDP in fiscal years that run from July 1 to June 30, while Nepal reports from mid-July to mid-July of the following year. This means that there is more certainty about the forecast for the fiscal year ending in mid-2023.

- In Bangladesh, real GDP growth is expected to decelerate to 5.2 percent in FY2022/23, as still-high inflation, tight financial conditions, disruptive import restrictions, and rising global economic uncertainty weigh on growth. Growth is projected to accelerate starting in FY2023/24, supported by an expected easing of inflationary pressures and anticipated acceleration of reform implementation. Exports are expected to sustain modest growth in FY2022/23 on the back of an increasing market share of ready-made garments, and growth is projected to slow over the next few years. Key downside risks include rising commodity prices, increasing external sector pressures, and a sharp global economic slowdown. The complex multiple exchange rate system (Box 1.2) may discourage exports and remittance inflows.

- Bhutan’s economy is expected to grow by 4.5 percent in FY2022/23, supported by the further reopening of borders in September 2022. However, tourist arrivals are expected to remain subdued because of slow global growth and the introduction of the new tourism levy. As a result, growth is expected to remain subdued in FY2023/24. Over the medium term, growth is expected to be supported by recoveries in non-hydro industry and the services sector, and by the commissioning of a new hydropower plant. Vulnerabilities in the country’s financial sector, which has tight links with the public sector, and delays in fiscal consolidation could impair the government’s ability to support a robust recovery.

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2 About 60 percent of assets of Bhutan’s financial sector are controlled by the country’s public sector.
• **Nepal**, real GDP growth is expected to decelerate to 4.1 percent in FY2022/23 before rising to 4.9 percent in FY2023/24. Slower growth in FY2022/23 reflects impacts from import restrictions during the first half of FY2022/23, monetary policy tightening, political turbulence related to elections and changes of government, and shrinking government expenditure due to lower revenue. Remittances—a major source of income and driver of growth—are expected to remain strong through FY2024/25 on the back of strong migration outflows. But the expected drop in oil prices and the growth slowdown in the Gulf countries will put downward pressure on remittance inflows (World Bank 2022a), while high reliance on remittances hinders the development of an export sector. Risks to the forecast tilt to the downside and include higher-than-expected inflation, which will dampen consumption and growth, continued political instability, and slow recovery in human capital loss during the pandemic.

• **Pakistan**, real GDP growth in FY2022/23 is downgraded to 0.4 percent, reflecting tighter fiscal policy, the impacts of the floods in the first half of the fiscal year, high energy prices and import controls. Agricultural output is expected to contract due to the floods—the first time in more than 20 years—while the industry sector is expected to shrink due to supply chain disruptions from energy and import shortages, deteriorating investor confidence due to increased economic uncertainty, and higher borrowing and input costs. Spillovers from the industry sector are expected to lead to sharply slower growth in the services sector. Growth is projected to recover but remain low at 2 percent in FY2023/24 as low foreign reserves curtail economic activities. The forecast assumes that the IMF program remains on track but is subject to substantial downside risk from non-completion. Additional downside risks include uncertainty in debt rollovers and external financing, political instability, and spillover of public sector risk to the financial sector due to the deepening sovereign-bank nexus (Box 1.3).

Finally, India’s current fiscal year (FY2023/24) runs from April 1, 2023, to March 31, 2024.

• India’s real GDP growth is projected to moderate to 6.3 percent in FY2023/24 and 6.4 percent in FY2024/25, as rising borrowing costs, slower income growth, and fiscal consolidation especially on the current spending side dampen consumption, while the global slowdown weighs on exports growth. Investment is expected to continue expanding at high rates, supported by the government’s capital expenditure and despite still-high input and borrowing costs. The planned withdrawal of food support and the shrinking of work programs in the Union Budget for FY2023/24 could worsen the situation for vulnerable households.
Real private consumption will be constrained by elevated inflation, rising borrowing costs, and slower income growth. Although falling global energy prices (Figure 1.1.1) will ease domestic inflationary pressure, global food prices remain elevated and are projected to decline only gradually. Accordingly, inflation will not fall as fast as previously forecast (Figure 2.1.2) and weakened consumer purchasing power will continue to weigh on private consumption growth. Rising borrowing costs as global financial conditions continue to tighten and slow the recovery in employment and income are other factors that are unfavorable for private consumption. Private consumption is expected to expand by 5.8 percent in 2023 (Table 2.2), which is a slight downward revision from the forecast in October 2022, and below the region’s pre-pandemic average growth of private consumption.\(^3\) Real import growth is expected to slow down in 2023 compared with the previous two years. Although a few countries have reduced or removed import restrictions implemented in 2022, restrictions in Pakistan and Sri Lanka, along with a shortage of foreign exchange, will constrain imports. Sri Lanka’s imports will contract by 3.9 percent in 2023, while in Pakistan import volumes are expected to shrink by 15.3 in the current fiscal year.

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Table 2.2. Private consumption impacted by still-high inflation, while investment outperforms expectation

<table>
<thead>
<tr>
<th>Calendar year basis</th>
<th>South Asia real GDP and demand component growth (percent)</th>
<th>Revision to forecast from October 2022 (percentage point)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>GDP (excluding Afghanistan)</td>
<td>8.2</td>
<td>5.9</td>
</tr>
<tr>
<td>Private consumption</td>
<td>10.9</td>
<td>7.1</td>
</tr>
<tr>
<td>Government consumption</td>
<td>7.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Investment</td>
<td>15.9</td>
<td>8.5</td>
</tr>
<tr>
<td>Exports</td>
<td>22.5</td>
<td>15.1</td>
</tr>
<tr>
<td>Imports</td>
<td>22.1</td>
<td>15.1</td>
</tr>
<tr>
<td>Net exports’ contribution to GDP growth (percentage points)</td>
<td>-0.9</td>
<td>-0.8</td>
</tr>
</tbody>
</table>

Source: World Bank Macro Poverty Outlook and World Bank staff calculations.

Note: (e)=estimate, (f)=forecast. South Asia GDP and its components are calculated using country-level fiscal year numbers converted to calendar year. Net exports’ contribution to GDP growth is calculated as change in net exports divided by lagged GDP. Afghanistan is not included in the regional aggregates. A new method is used for calculating calendar year South Asia GDP growth for the forecast years. The October 2022 forecasts of 2023 and 2024 GDP growth are updated using this new method.

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3 South Asia’s private consumption growth averaged 6.8 percent between 2015 and 2019.
**Growth in real government consumption will fall due to fiscal consolidation.** Government consumption is expected to shrink by 0.4 percent in 2023 due to fiscal consolidation. In India, the Union Budget for the fiscal year starting in April is set to shrink current expenditure, which will reduce government consumption by 1.1 percent in FY2023/24. For Pakistan, government consumption will shrink by 16.1 percent in FY2022/23 as the government undertakes fiscal consolidation to rein in the deficit. Sri Lanka’s newly signed IMF program will involve fiscal austerity, which will lead to a shrinking of government consumption. In contrast, Maldives is expected to increase government consumption by 11 percent in 2023, as the country faces large debt-servicing costs, and the success of fuel subsidy reform proposed for 2023—aimed to reduce the fiscal burden—is subject to political uncertainty.

**Real investment growth in the region is expected to remain strong amid capital expenditure increases in India and Maldives, despite high borrowing rates and unfavorable investor sentiment.** Ongoing and future monetary tightening and reduced investor risk appetite will keep borrowing rates high, which will dampen investment growth in countries with weak macro-financial conditions, such as Pakistan and Sri Lanka. In addition, Pakistan faces increased economic uncertainty from rising prices and rapid exchange rate depreciation, which will also dampen investment, especially in the tradable sector. In Sri Lanka, while investment is expected to contract in 2023, anticipated debt restructuring and reforms could boost investor confidence in 2024. Capital spending is expected to decline in Bhutan in FY2022/23 and further decline in FY2023/24 due to lower public investment in the first year of the new Five-Year Plan (FYP). In Bangladesh, declining subsidy expenditure is expected to create fiscal space to sustain public investment. Despite the unfavorable external conditions, capital expenditure on large infrastructure projects will help propel investment growth for the region as a whole. For example, India’s capital expenditure is expected to increase by 33 percent over last year’s budget estimates, with the allocation primarily going toward large infrastructure projects. Maldives’ airport expansion, along with other projects that boost connectivity, will contribute to the country’s projected 6.1 percent growth of investment in 2023. Large public investment could crowd in private investment in the short term through contracts assigned to the private sector, and in the medium term through improved infrastructure that helps connect businesses to larger markets. But public investment financed by the domestic financial sector could also crowd out private credit (Section 1.4).

**Overall fiscal deficit is projected to narrow for South Asian countries driven by fiscal consolidation** (Figure 2.1). Countries fall broadly into two groups. In Bangladesh and Nepal—two countries with relatively low fiscal deficits as a percentage of GDP—the fiscal deficit is expected to remain steady in FY2022/23. In the other countries, the fiscal consolidation is expected to lead to more dramatic narrowing of fiscal deficits. In Bhutan, fiscal deficit is expected to decline in FY2022/23 driven by lower capital spending, while measures to rationalize current expenditure and mobilize domestic revenues will support further declines
through FY2024/25. Much-needed fiscal consolidation in Sri Lanka will shrink the fiscal deficit considerably from 12 percent in 2021 to 7.8 percent in 2023 and 5 percent in 2025. Ongoing fiscal consolidation is expected to narrow Pakistan’s fiscal deficit in the current fiscal year, through reduced spending on subsidies and grants (see also Section 1.5) and increased revenue from GST hikes, and is projected to further reduce the fiscal deficit in the medium term. In India, while the government’s fiscal consolidation on current spending will contribute to narrowing fiscal deficits, the sustained capital expenditure push will limit the reduction in fiscal deficits in the near term, as the fiscal deficit is expected to stay in the 8 percent range from FY2023/24 to FY2025/26. Similarly in Maldives, while robust revenue growth due to a GST hike and increased economic activity are expected to narrow the fiscal deficit substantially in 2023, continued high levels of capital expenditure will keep the fiscal deficit at above 9 percent over the next three years.

The current account balance will improve gradually in 2023 and 2024 due to strong growth in services exports and improving terms of trade. Tourism is expected to support growth in services exports in Maldives, where investment in new resorts and the airport expansion will help accommodate and attract an increase in tourist arrivals. India’s service exports will be boosted by strong performances in business and IT services. Remittance inflows to Nepal and Bangladesh are expected to rise having experienced strong outflows of migrant workers. Higher import prices due to weaker currencies will continue to dampen imports in Pakistan and Sri Lanka. Improving terms of trade, as global commodity prices fall, will contribute to stronger growth of exports than imports by 2024. As a result, countries’ current account deficits will shrink or remain low. The exception is Maldives, where the current account deficit is expected to remain elevated due to necessary capital imports for infrastructure projects.
On the supply side, forecast growth of the industry sector has been downgraded and is mixed across countries, while services sector growth is expected to remain relatively robust (Figure 2.2). Growth of the manufacturing sector will be limited by elevated input costs and weak global demand for goods exports, contributing to a downgrade in the broader industry sector. In Pakistan and Sri Lanka, the industry sector will shrink in 2023, as import shortages will constrain production. Growth in the industry sector is expected to be strong in Bangladesh as demand for its goods exports has proven to be robust, but growth is expected to slow down in FY2022/23 compared with previous years, due to difficulties in importing inputs and disruptions in energy supply. In India, although the industry sector underperformed in FY2022/23, it is expected to return to a higher growth rate supported by growth of construction. In contrast to the industry sector, South Asia’s services sector will sustain robust growth in 2023 and 2024, contributing an increasing share to the overall GDP growth. Although weakness in the industry sector can spill over into services sub-sectors that support industry, such as wholesale and transportation services, the services sector as a whole is expected to be resilient. In Pakistan, where both agriculture and industry sectors are expected to shrink in FY2022/23, the services sector is expected to expand at an annual rate of around 2 percent in FY2022/23 and FY2023/24.

Inflation in South Asia is expected to have peaked in 2022, but the decline starting in 2023 will be slower than previously expected (Figure 2.3). As global commodity prices decline and consumption growth is expected to remain weak, domestic inflationary pressure will also ease in the region. The annual average inflation rate will fall to 8.9 percent in 2023 and
below 7 percent in 2024, after reaching 9.4 percent in 2022. Yet not all countries expect to see inflation fall in 2023, as weaker currencies, policy changes and natural disasters contribute to elevated inflation. In Maldives, the GST rate hike is expected to keep inflation high in 2023, while growth of consumption (mainly government consumption) will increase demand. Inflation is expected to peak in FY2022/23 in Bangladesh, as domestic inflation was driven up by increases in domestic energy prices as subsidies were reduced on gas and electricity prices in the first half of the fiscal year (July to December 2022, see also Section 1.5). A weaker currency, a post-flood scarcity of agricultural products, and a goods GST hike are contributing to higher inflation in Pakistan. Climate change will continue to bring more frequent extreme weather events and anomalies, which will contribute to higher prices. Box 2.1 estimates the impact of weather anomalies on countries’ price stability.

**Per capita real GDP is expected to grow at about half a percentage point slower in 2023 than previously expected.** Because of upward revisions to India’s official GDP for FY2020/21 and FY2021/22, the region’s real GDP growth for those years is also revised up.\(^4\) As a result, the region’s forecast of the 2023 real GDP level is slightly higher than previously forecast,

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\(^4\) India revised the official GDP growth rate for FY2020/21 from -6.6 to -5.8 percent, reflecting a smaller contraction from the pandemic, and the growth rate for FY2021/22 from 8.7 to 9.1 percent, reflecting sharper consumption growth on the demand side and higher manufacturing output than previously estimated. Maldives also revised upward the GDP growth for 2021 from 37 to 41.7 percent, as later released data capture a stronger recovery from the 2020 impact of the pandemic, although the revisions have a relatively small effect on the region’s GDP growth. Because of these revisions to historical GDP estimates, the region’s growth rate in 2020 is revised from -4.5 to -3.9 percent, and the growth rate in 2021 is revised from 7.8 to 8.2 percent.
Box 2.1. Weather extremes and price stability

Climate change matters for price stability. Climatic patterns can affect prices through several channels (Faccia et al. 2021). Global warming is associated with a greater incidence of damaging climatic events, such as windstorms, floods, and extremes of precipitation and temperature (IPCC 2018). Such events may impact specific prices, notably food prices (Faccia et al. 2021; Crofils et al. 2023), and hamper the implementation of macroeconomic policies. In addition, the net zero carbon emission transition is likely to involve sharp increases in the price of carbon. That in turn is likely to affect consumer prices directly through higher electricity, gas, and petrol prices, and indirectly through increased costs of production for firms across a broad range of sectors. In the long run, higher temperatures may reduce labor productivity and growth potential, leading to lower equilibrium interest rates and less space for conventional monetary policy.

This box focuses on extreme and unpredictable weather phenomena that could drive short-term price developments in several ways, including a fall in agricultural output and changes in energy demand (Mukherjee and Ouattara 2021). For example, in India, more erratic monsoon rains have translated into more volatile food prices, destabilizing households' inflation expectations, undermining the ability to forecast inflation, and muddling the formulation of monetary policy (Singh et al. 2022; Dilip and Kundu 2020). Food prices in Pakistan skyrocketed partly as a result of catastrophic floods last year, with certain food product prices increasing more than five times (Deutsche Welle 2022). Weather extremes may also lead to higher prices when there is an increased demand for energy, but also affect energy supply by reducing the productive efficiency of the infrastructure that produces the energy. Such an imbalance in energy demand and supply could lead to higher prices.

At a macro level, weather extremes could affect price stability. The following analysis considers the price responses to temperature anomalies. The potential effects of precipitation anomalies or weather-related natural disasters are left for future studies. The charts below show the impulse responses based on Jordà’s (2005) local projections method and Brandao-Marques et al.’s (2020) approach (see Appendix for more details).

Temperature anomalies play a negligible role in driving prices in the EMDEs sample (Figure 2.4, left panel). However, the impact is more significant in the economies with a higher share of food in the overall consumption basket. The agriculture sector is probably most vulnerable to fluctuations in weather conditions and has a relatively higher contribution to GDP in such economies, implying that weather extremes could have wider...
economic consequences (Mendelsohn 2009). Also, many small-scale farmers in developing countries have limited access to risk management tools, such as insurance and irrigation infrastructure, which makes them particularly vulnerable to exogenous shifts in weather conditions (Aragón et al. 2021). This could lead to disproportionate impacts on livelihoods and food security (Crofils et al. 2023). The results for South Asia indicate even stronger effects that remain significant for almost the whole year after the shock (Figure 2.4, right panel). The impact on food prices is initially higher but dissipates faster. The contemporaneous increase in headline and food prices could be explained by hot summers reducing food production, resulting in supply shortages (Faccia et al. 2021). Sectoral shocks entail relative price adjustments that could eventually contribute to headline inflation variability (Reis and Watson 2010). Extreme events affect local production, then local prices and, depending on the country’s engagement in global trade, potentially global prices. For example, in 2019, India experienced a heatwave, with temperatures reaching over 50 degrees Celsius in some areas. The heatwave affected many crops, including wheat, which is a staple food for millions of people in India. The reduced wheat production led to a 7-percent increase in the price of wheat flour, the ingredient in many other food products (The Hindu 2019).

It is critically important for policy makers to anticipate the potential effects of weather extremes and implement adequate stabilization policies. Importing agricultural

**Figure 2.4. Prices respond significantly to temperature anomalies in South Asia**

![Graph showing price response to temperature anomalies in EMDEs and SAR](image)

Source: Data from Brandao-Marques et al. (2020) and World Bank staff estimations.

Note: Results come from a local projection model (Jordà 2005) with Driscoll and Kraay (1998) standard errors that are robust to heteroskedasticity and to serial and spatial correlation. The unbalanced panel comprises monthly data from 2003 to 2017 for 40 EMDEs (the whole sample) and four South Asian economies (Bangladesh, India, Pakistan, and Sri Lanka). Dependent variables are the logarithms of the price levels, while temperature anomalies are defined as deviations from the respective monthly averages. Shaded areas show 68 and 90 percent confidence intervals.

expaNdiN g opportu Nities:t oward iN clusive growth
products from other regions could mitigate the detrimental effects (Crofils et al. 2023). For this to work better, it would be helpful if food prices and import quantities are market-determined rather than government-administered, such that prices signal to firms and suppliers when to import from other countries. Intra-regional trade can also help by ensuring a consistent supply of food. While intra-regional trade is small, it can contribute to reducing price volatility, increasing competition, and promoting specialization. In line with this, it will be necessary to identify crops and regions that are most weather-sensitive and diversify agricultural supply toward crops that are more resistant to droughts or flooded conditions. In addition, developing insurance and commodity derivatives markets could provide a strategy for hedging price risks in the face of uncertainty (Dilip and Kundu 2020). By dampening local fluctuations, such policies could be beneficial at a macroeconomic level, in particular for central bank efforts to maintain price stability. Of course, the credibility of the monetary policy regime remains one of the main factors that determine the impact of relative price adjustments, the associated temporary rise in actual inflation, and its influence on inflation expectations.

Figure 2.5. Per capita real GDP will grow at about half of a percentage point slower in 2023 than previously expected

![Graph showing per capita real GDP growth](image)

Source: World Bank Macro Poverty Outlook and World Bank staff calculations.

Note: Afghanistan is excluded from the calculation due to data availability issues since 2021. Because of upward revisions in India’s official GDP for FY20/21 and FY21/22, South Asia’s real GDP per capita for calendar years 2020 and 2021 are also revised upward.
Poverty in the region will not fall as quickly as previously expected, given that elevated inflation, a slow recovery of employment and incomes, and the withdrawal of pandemic-era food programs impact the poor the hardest. As global food prices are only expected to fall slowly, and weather anomalies and natural disasters will continue to reduce local-level food production, food prices are expected to remain high. Because of their large share of food consumption, the poor are hit the hardest by elevated food prices (see also Box 1.1). As recovery of employment and income remains slow, opportunities for the poor to escape from poverty will be limited. As Sri Lanka starts the necessary reforms and transition to correct external imbalances, poverty will likely rise initially, and better-targeted social assistance programs will be needed to limit the impact of reforms on poverty. In India, poverty is expected to decline, but the withdrawal of the additional free food transfers that were made available during the pandemic will increase the vulnerability of the poor and likely negatively impact poverty reduction, especially if food inflation remains elevated. In Pakistan, agricultural output is expected to contract due to the floods, and the industry sector will shrink due to input shortages, rising borrowing costs, and weak investor confidence. With limited fiscal space to provide social assistance, the economic contraction will worsen poverty, as the poverty rate is expected to rise in Pakistan in 2023. As a result, the number of poor in the region at the low-income threshold (US$2.15/day, 2017 PPP) will only fall below its 2019 level by 2024.

2.2 Outlook subject to risks and uncertainties

Risks to the outlook are tilted to the downside, and include both external and internal risks. External risks include lower-than-expected growth in high-income countries, higher commodity price inflation, and faster monetary tightening by the United States and other
advanced economies. Uncertainty in the global economy is on the rise. The turmoil in the US and European financial sectors that started in March 2023, although localized for now, could spill over into the broader financial market and adversely impact the global economy. But swift reactions by the US and European central banks could also avert the potential crisis and strengthen monitoring of the banking sector, which can create upside to the global economy. Internally, financial risks are on the rise, as a result of rising borrowing costs, increasing sovereign risks, and the slow recognition of non-performing assets. In addition, the outlook for Pakistan and Sri Lanka depends on their ability to secure foreign exchange funding and resolve balance-of-payments pressures.

Several alternative scenarios are considered to understand the scale of these risks and uncertainties for the South Asian economies. The simulations of these alternative scenarios are carried out using the World Bank’s Macro-Fiscal Model (MFMod). The model consists of 155 individual countries and allows South Asian countries to be impacted by other countries through various linkages, such as import-export, remittance flows, exchange rates, and commodity prices (Burns et al. 2019). Table 2.3 describes the scenarios and assumptions behind

<table>
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<tr>
<th>Scenario</th>
<th>Description</th>
<th>Assumption behind scenario relative to baseline forecasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Uncertainty about high-income country growth, with spillovers to South Asian countries</td>
<td>Monetary tightening, banking sector risks could dampen growth in high-income countries more than expected; yet, stabilizing global environment could lead to higher-than-expected growth.</td>
<td>Thirty-four high-income countries see growth at 0.25 percent lower (or higher) than baseline in 2023 and 2024. Declines in growth are distributed uniformly across high-income countries (generalized malaise). In 2025 no deviation from baseline growth is assumed.</td>
</tr>
<tr>
<td>(ii) Commodity prices remain high</td>
<td>Impact of higher oil and metal (China reopening) prices on South Asia construction, manufacturing, import and export.</td>
<td>Higher-than-expected prices of metal in 2023–2025, impacting construction sector. Ramp-up of energy prices during 2023–2025, as global economy recovers, impacting the manufacturing sector, and import and exports.</td>
</tr>
<tr>
<td>(iii) US monetary policy tightening</td>
<td>Impact of US monetary policy tightening on exports to four SAR countries, and in turn on consumption, investment and import for the whole region.</td>
<td>US policy rate increases by 25 basis points more than expected in 2023 and 2024, reducing and US dollar real exports.</td>
</tr>
<tr>
<td>(iv) Financial and banking sector crisis in select South Asian countries, with spillovers to the real sector and to other regional countries</td>
<td>Rise in loan delinquency and banking sector liquidity problems</td>
<td>NPL ratio increases by 2.5 or 5 percentage points in 2023 and 2024 in some SAR countries, dampening investment.</td>
</tr>
</tbody>
</table>

Source: World Bank staff using MFMod.
them. For each scenario, a shock is applied to the model that represents deviations in sectors or countries from the individual country’s baseline forecast presented in Section 2.1.

(i) Uncertainty about growth rates in high-income countries

This scenario looks at the impact of upside or downside surprises in the growth rates of 34 high-income countries. After a steady deceleration in 2022, the global economy stabilized in early 2023, aided by the reopening of the Chinese economy. But the shock to the US and European banking sector that started with the demise of Silicon Valley Bank in March 2023 injected further instability into the global economy. Given this backdrop, growth of high-income countries could surprise on either the upside or the downside. In this scenario, high-income country growth rates are assumed to be 25 basis points higher/lower than the baseline in 2023 and 2024, and there is no change from the baseline in 2025. To isolate the effect of growth rate deviations in high-income countries, commodity prices are held unchanged for this exercise; in other words, the price effect is shut down. The positive/negative shock would increase/decrease South Asia’s GDP growth in 2023 and 2024. The higher/lower growth rates would lead to a persistent effect on the GDP level, raising/lowering GDP by 0.07 percent in 2023, 0.13 percent in 2024 and 0.1 percent in 2025, compared with the baseline (Figure 2.7.A). The upside and downside risks together create a confidence band around the baseline forecast of South Asia GDP, with a width of up to 0.26 percent of GDP in 2024.

In the downside scenario, the slowdown in high-income growth would hit the exports sector the hardest, as weakened consumption in high-income countries reduces demand for South Asian exports. Real exports would be 0.17 percent lower in 2023 and about 0.3 percent lower in 2024 and 2025. Imports would be much less affected, as only imports of inputs for export production would be directly affected by the shrinking external demand, while imports for consumption would be only indirectly impacted. This would lead to deteriorating current account deficits, exacerbating the region’s external sector pressures. Investment and government consumption would also be impacted, although to a lesser extent, as lower production reduces investment needs and shrinks governments’ revenue collection.

Across countries, those with tighter links to the rest of the world or in more fragile macroeconomic conditions are impacted more severely by a slowdown in high-income country growth. The exports of Bangladesh, Sri Lanka, Pakistan, Maldives, and India would be most impacted by a slowdown in high-income countries. Bangladesh and Pakistan are major manufacturing exporters with Europe among the largest sources of export demand; Sri Lanka and Maldives receive tourists from Europe and are hence vulnerable to a negative demand

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5 By shutting off the price effect, the scenario does not allow growth-induced price effect, such as the impact of lower commodity prices on South Asia’s external balances. It also does not consider the potential changes in interest rate and exchange rate from a slowdown driven by either a financial sector crisis or a weak demand.
shock originating from Europe; and India is linked to the United States and Europe through exports of business and IT services. Overall, Maldives would experience the largest drop in real GDP because of its high dependence on the tourism sector.\(^6\) Sri Lanka would also see a sizable impact on GDP because of the effects on both investment and exports.

(ii) Commodity prices remain high

This scenario looks at the impact of higher energy and metal prices in 2023–2025. After peaking in 2022, energy (e.g., crude oil, coal) prices are expected to fall through 2025 in the baseline, and metal (e.g., aluminum and copper) prices are expected to stay high after falling slightly in 2023. The projections for energy prices represent a significant downward revision from forecasts in the fall of 2022, as a milder-than-expected winter in Europe and increased inventories helped relieve price pressures (World Bank 2023). But the geopolitical situation could shift quickly to increase pressures once again on energy, while the push for renewable energies could reduce supplies of non-renewable energy leading to higher energy prices in the short term. Metal prices could increase more than forecast, if China’s reopening generates more rapid economic recovery than expected, especially in construction, or if supply bottlenecks in certain metals affect global prices. To account for these possibilities, this scenario assumes that energy prices would be higher than the baseline by 10, 25, and 10 percent in 2023, 2024, and 2025, respectively, and key metal prices would be 10, 15, and 10 percent higher than baseline during the same years (shown by dotted lines in Figure 2.7.B). Similar

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\(^6\) Exports of goods and services represent 85 percent of Maldives’ economy in 2022.
to the last scenario, all other global factors are assumed to remain unchanged to isolate the impact of deviations in energy and metal prices. As such, the scenario does not account for spillovers of higher energy prices to the prices of food and fertilizers or the dampening effect of higher prices on countries outside of South Asia.

**Higher global energy and metal prices would lower South Asia’s GDP growth through lower consumption and investment.** South Asia’s GDP would be lower compared with the baseline, by 0.15 percent in 2023, 0.35 percent in 2024, and 0.1 percent in 2025 (Figure 2.7.B). The Indian economy would be the most heavily impacted, followed by Bhutan and Maldives. Both India and Maldives rely on energy imports, while Bhutan imports all fuel products. All three countries have large infrastructure projects that would be adversely impacted by higher metal prices, although metal exports from Bhutan and India could partially offset the impact. In India, the impact would be strongest on consumption (both private and public) and investment, as higher energy prices reduce consumption and higher metal prices could delay investments in infrastructure projects. In Bhutan and Maldives, because the infrastructure projects are linked to exports—hydropower exports for Bhutan and tourism for Maldives—the exports sector would see sizable impacts, while imports would also fall in response to higher prices.

**(iii) Faster tightening of US monetary policy**

This scenario studies the impact of faster-than-expected tightening of US monetary policy. Since the United States started increasing interest rates in 2022, borrowing rates have soared, investors have moved capital away from South Asia, and a strengthened US dollar has increased import prices for South Asian countries. Although global energy prices have fallen since late-2022, consumer inflation has been sticky in the United States and Europe, leading to more aggressive tightening. Although the recent financial sector turmoil could reduce the pace, the downside risk from more rapid tightening can be substantial for South Asian countries.

The scenario considers an unexpected shock where the United States would tighten monetary policy by 25 basis points more than expected in 2023 and 2024. Box 2.2 estimates the impact of US monetary policy on South Asian countries and isolates the effects through three different channels based on the reasons for tightening. In this scenario, it is assumed that more rapid tightening would be driven by a shift in the U.S. Federal Reserve’s reaction function toward more aggressive actions (the “reaction shock” identified in Box 2.2). Using estimates from Box 2.2, the shocks on real goods exports are constructed for India, Bangladesh, Pakistan and Sri Lanka (Figure 2.8 left panel), allowing more aggressive US monetary tightening to dampen demand for South Asian goods exports. Tighter US monetary policy would also lead to capital outflows from South Asian countries. While this effect is not directly modeled here, the impact on exports incorporates the effect of
the capital outflow on exchange rate and exports. The shocks on real total exports are then estimated by assuming a constant share of goods exports in total exports, using the average share over 2018–2021 for each country. The constructed shock is largest for Pakistan because of the large estimated impacts from US monetary tightening and its larger share of goods exports.

Although the initial shock is on the export sector, the effect spills over to all demand sectors in the impact countries and to smaller countries in the region. The shock on exports would reduce imports through input-output linkages, although the reduction of imports is much smaller, which leads to a reduced contribution of net exports to growth. Government and private consumption would be lower due to lower income from exports, while investment would be lower due to the impact of lower exports on investor sentiment. The impact on GDP would be largest for Pakistan, as the estimated export response is largest for the country. Among the other South Asian countries, Bhutan would be impacted the most through lower demand for its non-hydro exports from India. Overall, through the exports channel, the higher US policy rate shock in 2023 and 2024 would lower South Asia’s GDP by 1.3 and 1.1 percent in 2023 and 2024, respectively, compared with the baseline.

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7 The scenario only considers direct effect from the rest of the world on the four South Asian countries. The impact on South Asian countries is assumed to only go through spillover from these four direct-impact countries. A more comprehensive treatment that allows direct impact on other countries would likely yield sizeable impact on Maldives due to the country’s connection with the rest of the world through tourism. But the overall impact this more comprehensive approach on the region would be small due to the small size of Maldives’ economy.

8 All surplus electricity generated by Bhutan’s hydro plants is exported to India, and so Bhutan’s hydro exports are not linked to demand.
Box 2.2. Estimating the spillovers from US monetary policy

The U.S. Federal Reserve (the Fed) embarked in early 2022 on its steepest and fastest interest rate increases since the late 1980s (Figure 2.9.A). While higher interest rates generally affect all global economies given the role of the US economy in global activity and the US dollar in trade and finance, there is evidence that not all interest rate cycles are created equal (Arteta, Kamin, and Ruch 2022). That is, the underlying drivers of the increase in US interest rates matter for how these higher interest rates affect South Asian economies. Previous cycles that the Fed embarked on, starting in 2004 and 2015, were mainly driven by expectations of higher economic activity. The current interest rate cycle through 2022, however, was mainly driven by a shift in the Fed’s reaction function, pivoting toward more aggressive action to rein in inflation (Figure 2.9.B). When interest rates rise because of expectations of higher economic activity, they tend to have more benign consequences for South Asian economies as the economies benefit from more trade and milder shifts in risk tolerance. The current cycle will be particularly injurious to the region, however, as US import demand slows and shifts in global risk perceptions hammer these economies.

To study how different underlying drivers of US interest rate increases affect economies in South Asia, local projection models for Bangladesh, India, Pakistan, and Sri Lanka are estimated on monthly financial and economic data (see Appendix 2.2 for details). This box focuses on two underlying drivers of US interest rate moves: (i) “real shocks,” which are prompted by improved prospects for US economic activity; and (ii) “reaction shocks,” which reflect investors’ assessments that the Fed’s reaction function has become more hawkish.

South Asian countries face significant financial and economic spillovers from changes in US interest rates, but these differ depending on the countries integration into global financial markets and policy choices. The overall impact of real and reaction shocks, however, generally reflect detrimental impacts from reaction shocks and more benign outcomes from real shocks (Arteta, Kamin, and Ruch 2022).

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9 This is based on a decomposition of the two-year US bond yield in Arteta, Kamin, and Ruch (2022) into inflation shocks which are prompted by rising expectations of US inflation; reaction shocks which are prompted by investors’ assessments that the U.S. Federal Reserve has shifted toward a more hawkish stance; and real shocks which are prompted by anticipation of improving US economic activity.
Reaction shocks—which reflect investors’ assessments that the Fed’s reaction function has become more hawkish—tend to depreciate local currencies relative to the US dollar. Across South Asian countries, the impact is larger in India and Pakistan: a 25-basis point increase in the two-year US Treasury bond yields driven by a reaction shock is associated with about a 2-percent depreciation in the local currency in these two countries within one month (Figure 2.10.A). The larger impacts reflect closer ties with the rest of the world and more free-floating exchange rates, compared with other countries in the region. In Bangladesh and Sri Lanka, in contrast, the initial impact is much smaller, with currency depreciation of less than 1 percent for all periods. In these two countries, the currency is generally stabilized through market intervention. In Bangladesh, despite the small impact on the official exchange rate, its unofficial exchange rate experiences a statistically significant depreciation after two months, and the cumulative depreciation after six months is almost twice as large as that of

Sources: Arteta, Kamin, and Ruch (2022) and the Federal Reserve Bank of St. Louis.

Note: A. Based on monthly data of the effective federal fund rate. B. Shocks are estimated from a sign-restricted Bayesian vector autoregression (VAR) model with stochastic volatility. Figure shows cumulative change in underlying shocks and yields since January 2022. Inflation shocks are prompted by rising expectations of US inflation. Reaction shocks are prompted by investors’ assessments that the Federal Reserve has shifted toward a more hawkish stance. Real shocks are prompted by anticipation of improving US economic activity.

In another study published in the India Development Update (World Bank 2022b), it is found that a Fed policy shock (following Jarocinski and Karadi 2020), which is similar to the reaction shock here, leads to depreciation in India’s currency against the US dollar of a similar size.
In Sri Lanka, the limited response of the exchange rate reflects periods of intervention with the currency reflecting a crawl-like arrangement. Accordingly, declines in foreign exchange reserves in response to reaction shocks are most notable in Sri Lanka.
Equity prices in the region decrease in response to changes in US interest rates driven by a reaction shock, as monetary tightening in the United States leads to capital outflows from developing markets (Figure 2.10.C). Reaction shocks are associated with an average decrease of 6 percent in equity prices in the region, with Pakistan experiencing the largest declines. In contrast, an increase in the US interest rate due to improved economic activity in the United States (real shock) raise equity prices in the region, although the magnitude is smaller than responses from the reaction shock.

US interest rate moves also impact domestic economic activity. Real merchandise exports (in US dollars) significantly decline in response to reaction shocks (Figure 2.10.D), as perceived more aggressive monetary tightening by the United States decreases external demand for South Asian exports.11 In contrast, higher US interest rates driven by improved economic activity increase real exports in the region.

Most SAR economies tend to see a significant decrease in consumer inflation from reaction shocks in response to tightening global financial conditions and changes in inflation expectations, despite exchange rate depreciation. Real shocks, in contrast, raise consumer inflation.

In conclusion, the spillover impact from higher US interest rates depends on the perceived reason for the rate hike. Reaction shocks are detrimental to the financial and economic health of economies while real shocks provide some support to domestic activity through the trade channel. Countries more closely connected with the rest of the world, through trade or capital flows, tend to see larger impacts, while a country’s exchange rate regime matters for spillovers to the exchange rate and its foreign reserves.

(iv) Rising financial sector risk

This scenario studies the impact of a deterioration in financial market conditions in South Asia. As discussed in Section 1.4, several factors have increased financial sector stress in South Asia, including rising NPLs in certain sectors, reduced liquidity in the banking system, and rising sovereign-bank linkages and sovereign risk. But because of loan moratorium programs that started during the pandemic, asset quality issues are not yet fully realized. At the same time, global and local financial conditions have worsened, as monetary tightening leads to

11In analyses not shown here, reaction shocks are associated with a decrease in industrial production in India and Sri Lanka, and in tourist arrivals in Maldives.
rising borrowing rates. This scenario assumes that the NPL ratio would increase by 2.5 to 5 percentage points each year during 2023–2024, in Bangladesh, India, Pakistan and Sri Lanka. As of 2022Q3 (latest data), the NPL ratio is around 5 percent in India, 7.5 percent in Pakistan and around 10 percent in Bangladesh and Sri Lanka. A 2.5-percentage-point increase would push India and Pakistan close to the level in 2022Q3, and Bangladesh close to the 2019Q3 level. The impact of this shock on banks’ balance sheets would shrink credit and investment. The size of the impact on private investment depends on the elasticity of response, which is taken from the literature and in a range of between -0.233 and -0.9 (SenGupta 2020; Schnattinger 2021). Figure 2.11 shows the impact on GDP under the high impact (left panel) and low impact (right panel) scenarios for the largest and smallest impacts given the assumptions.¹²

**Figure 2.11. Impact of worsening financial sector conditions depends on size of shock and elasticity assumption**

As in the previous scenario, the initial shock would spill into other sectors of the impacted countries and affect other countries through trade. Lower private investment would lead to lower consumption due to lower total returns to investment. Imports would be lower both because of lower demand for consumption and lower capital imports due to lower investment. In turn, exports would also be lower compared with the baseline. Among the countries, Bangladesh and Sri Lanka would see the largest overall impacts, as the response of consumption to changes in investment is largest in these countries. Bhutan would again see sizable spillover effects from India through non-hydro exports. The overall impact on the region would be to reduce GDP by 0.07 (low impact) to 0.57 (high impact) percent in 2023 and 2024, relative to the baseline.

¹²The “high impact” scenario assumes a 5-percentage-point increase in the NPL ratios, and an elasticity of -0.9 for the investment response to rising of NPL ratios. The “low impact” scenario assumes a 2.5-percentage-point increase in NPL ratios, and a lower elasticity of -0.233.
2.3 Climate financing needs and opportunities

South Asian countries have come out of the pandemic with record public debt and tight fiscal space, and the tightening global financial conditions since 2022 have put additional pressure on governments’ budgets. Fiscal consolidation is needed to create conditions for robust long-term growth. At the same time, the region’s vulnerability to climate hazards and rising energy demand will require substantial investments to build climate resilience and accelerate the green transition in the coming years. These new challenges warrant further fiscal adjustments in three crucial directions: (i) more than in the past, fiscal buffers and insurance mechanisms must be put in place to prepare for future disasters; (ii) new infrastructure investment must be planned to make South Asia’s economies more resilient and greener, while the international community should mobilize more concessional finance; and (iii) taxes and subsidies must be adjusted to incentivize the private sector to invest in climate-adaptation solutions and in greener technologies.

Apart from the greening of taxes and subsidies, governments should improve the business climate, while ensuring that the greener technologies are accessible to the poorest and most vulnerable parts of the population. This section subsequently discusses these three adjustments.

2.3.1 The need for buffers and insurance

South Asia is one of the most vulnerable regions to climate risks and is regularly devastated by climate-related disasters (World Bank Group 2021a). The most recent major example is the 2022 Pakistan floods, which are estimated to have affected 33 million people, and caused more than 1,730 deaths and economic losses of US$15.2 billion (Government of Pakistan 2022). These impacts illustrate the imperative of preparation for future shocks. The primary climate-related risks in South Asia are extreme temperatures, extreme precipitation, and delays and weakening of the monsoon circulation, resulting in flood damage and food and water insecurity (IPCC 2022). The changing climate could sharply diminish living conditions for up to 800 million people in a region that already has some of the world’s poorest and most vulnerable populations (Mani et al. 2018). Projected losses from climate change in GDP per capita for South Asian countries are higher than the global average of about 7 percent, with Bhutan facing a potential loss of 18 percent, Nepal 13 percent, India 10 percent, and Pakistan 10 percent by 2100 (Kahn et al. 2021).

Disaster risk management requires fiscal buffers, for two reasons. First, funds are immediately needed after disasters. Second, Box 2.3 shows the importance of sound fiscal conditions during relief efforts. In the case of already fragile fiscal balances, disasters tend to exacerbate macroeconomic problems. Conditional finance could support the creation of buffers and insurance mechanism to ensure that the most vulnerable, who tend to be underinsured
by markets, are covered. Moreover, as the climate risks have been predominantly caused by high-income countries, there is a moral obligation to support South Asia in coping with intensified natural disasters. Financial risk management instruments (such as pooled investment funds, credit guarantees, public-private partnerships, or catastrophe bonds) can further create the necessary buffers.

A variety of financial risk management instruments for financing resilience have been successfully tested in South Asia. Climate and disaster risk insurance is a proven instrument that can mobilize private capital and protect households, firms, banks, and governments from climate-related and other natural hazards. Public-private partnerships are also an effective approach for developing climate risk insurance (World Bank Group 2022a). Regional insurance pools such as the Caribbean Catastrophe Risk Insurance Facility (CCRIF), the African Risk Capacity (ARC), and the Southeast Asia Disaster Risk Insurance Facility (SEADRIF) allow countries to pool their risks together and significantly reduce coverage costs. There is also the potential to scale up climate and disaster risk insurance in Bangladesh, Nepal, and Pakistan, due to the countries’ high vulnerability and low insurance penetration (World Bank Group 2022b; 2022c; 2022d). Exchange rate risk can be addressed via innovative mechanisms such as the Currency Exchange Fund (TCX), which provides borrowers with financing in their local currency via swaps or forward contracts, while shifting risks to TCX.13 Sovereign disaster risk finance instruments such as credits or loans with a catastrophe deferred drawdown option (CAT DDO) have been successfully developed and activated in Bhutan, Nepal, Maldives, and Sri Lanka. This instrument is usually embedded in broader frameworks for strengthening resilience and can increase governments’ capacity to respond quickly to shocks without undermining fiscal balances and development objectives, thereby contributing to enhance the adaptive capacity of countries and people.

2.3.2 The need for infrastructure investment

Tailored infrastructure investment in South Asia is key for adapting to climate change. These investments are in many cases public goods, to be provided by governments. This is in large part due to the non-monetary and localized nature of many resilience-building activities that make them less attractive to the private sector. Deficit spending for adaptation should be balanced between investing in resilience and avoiding the buildup of debt and maintaining fiscal flexibility in disaster situations. Similar to the case of disaster preparedness, there is a role for the international community to finance or even fund part of these investments.

Box 2.3. Fiscal space and disaster resilience

Fiscal management in South Asia is facing additional challenges due to climate change. Economic losses from more frequent and severe natural disasters may have adverse impacts, not only on investments and growth potential, but also government budgets and debt sustainability. Post-disaster relief and reconstruction spending entails fiscal costs that could limit fiscal space, emphasizing the need to supplement future fiscal assessments within the context of climate change (Heller 2020). Strengthening fiscal resilience is therefore essential. Larger fiscal space available before a disaster can support post-disaster recovery efforts through infrastructure rebuilding, social assistance, and demand stimulus, reducing potential scarring effects.

Numerous studies show that natural disasters have significant adverse effects on economic growth (Felbermayr and Groeschl 2014; Fomby et al. 2013; Klomp and Valckx 2014; Loayza et al. 2012; Rasmussen 2004). A fiscal response to address economic and distributional effects may lead to a debt increase, which carries downside risks of its own. Indeed, reduced economic activity shrinks fiscal revenues, while post-disaster response requires a rise in public expenditures, leading to an increase in government debt (Feyen et al. 2020; Koetsier 2017; Milivojevic 2023). Disaster episodes are also followed by lower sovereign credit ratings (Cevik and Jalles 2020a) and a higher probability of sovereign debt default (Klomp 2017; Cevik and Jalles 2020b).

Analysis by the World Bank (2021) looks at the marginal effects of pre-disaster fiscal balances on GDP growth rates in South Asia for each of the three years after the disaster. Estimates from the regression based on extreme disasters in the region from 1980 to 2019 show that more fiscal space helps boost GDP growth in the first year post-disaster. Although these point estimates should be interpreted cautiously, the exercise nevertheless demonstrates that countries with limited capacity to react may experience greater distress.

Modeling exercises can illustrate the importance of the relationship between climate and fiscal policy. The model used in this box explains the propagation mechanism of a natural disaster shock that affects agricultural productivity (see Milivojevic 2023 for more details). Based on Gallic and Vermandel (2020), it features farmers endowed with land with time-varying productivity subject to economic and weather conditions,

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14 A disaster is considered extreme when its economic costs exceed 1 percent of GDP.
with a more detailed government sector to account for fiscal implications. The model is calibrated to resemble the economy of Bangladesh, a country particularly sensitive to frequent weather-related natural disasters.

**Figure 2.12. Stronger fiscal response mitigates economic distress but puts pressure on public finance**

The stronger the government's stimulus to the economy, reflected in the higher value of the fiscal reaction parameter, the smaller the economic distress (Figure 2.12, left panel). However, the pressure on public finances could be elevated (Figure 2.12, right panel), emphasizing the need for the buildup of fiscal buffers in good times. In other words, the more fiscal space is available, the higher is the capacity of the government to mitigate the adverse effects of disaster episodes.

Model simulations can also illustrate the importance of building stronger resilience, for example, by investing in both “hard” policy measures (e.g., physical infrastructure) and “soft” measures such as establishing early warning systems (IMF 2019). The resulting impulse responses in Figure 2.13 suggest that both economic activity and public debt are less affected when land productivity is more resilient, that is, when the land sensitivity is lower, highlighting the need for adaptation policies.
Climate change is inevitable, but better policy management should help to cope with its consequences for public finance in particular and economic development in general (Feyen et al. 2020). Credible fiscal management and structural resilience should reduce economic and fiscal risks. Disaster-prone countries may be characterized by a limited capacity to respond to disasters and to build up the necessary structural resilience (Milivojevic 2023). In the World Economic Forum in Davos this year, Pakistan’s climate change minister Sherry Rehman warned of "recovery traps." Given that rebuilding takes time and money, Rehman says that, "by the time you do that, the next crisis is on you" (Parkin and Hodgson 2023). Without more international support that would complement country-specific climate-related efforts, developing countries could indeed become caught in a cycle of disasters and poverty.

At the same time, there is a need for the financing of investments in areas with climate mitigation and development synergies. Examples of such synergies are renewable energy investments to reduce air pollution and increase productivity. Total greenhouse gas (GHG) emissions in the region are rising rapidly, with 63 percent of regional GHG emissions coming from the energy sector (Chen 2022). The energy transition stands out among climate-smart financing opportunities that can at the same time reduce poverty, create jobs, cut emissions,
and boost resilience by reducing reliance on energy imports. Given that energy production in South Asia is still largely based on fossil fuels, transforming the energy sector will require phasing down coal power and retiring coal-fired power plants, while scaling up renewable energy. Part of these investments can be undertaken profitably by the private sector. Part are public goods to be provided by governments, while ensuring that this transition is just and protects affected communities and livelihoods.

South Asian countries estimate total climate financing needs of over US$5 trillion.\textsuperscript{15} According to data submitted by South Asian countries to the United Nations Framework Convention on Climate Change (UNFCCC), US$5.4 trillion is needed to achieve around 47.1 percent of self-reported climate needs in the region, comprising of planned activities, strategic directions, national priorities, and action plans (UNFCCC 2022, see Appendix 2.2).\textsuperscript{16} However, this self-reported estimate is inconsistent and incomplete, and countries have used different approaches to estimate financing needs. Furthermore, where data are available, they are usually not backed by transparent methodologies that would allow for verification.

Figure 2.14. Indicative estimation of total investment needs for climate-resilient and low-carbon development in Pakistan for up to 2030

\textbf{Note:} The detailed methodology is published in Annex 6 of the report.

\textsuperscript{15} This estimate is based on the methodology adopted by the United Nations Framework Convention on Climate Change (UNFCCC) Standing Committee on Finance that for the first-time compiled data from nine different types of reports submitted by Parties to the UNFCCC to determine the financing needs of developing country parties. UNFCCC Standing Committee on Finance. 2022. First Report on the Determination of the Needs of Developing Country Parties.

\textsuperscript{16} The reports submitted and analyzed include the following: Adaptation Communication (AC), Biennial Update Report (BUR), Low Emission Development Strategy (LEDS), National Adaptation Plan (NAP), National Adaptation Programme of Action (NAPA), National Communication (NC), Nationally Determined Contribution (NDC), Technology Action Plan (TAP), and Technology Needs Assessment (TNA). However, South Asian countries have only submitted 32 from a total possible number of 72 reports (9 reports per country); this low number of total reports submitted by countries is indicative of the incomplete nature of the data and resulting needs (see Appendix 2.2).
comparison, and analysis. Sectoral breakdowns are also often missing. The fact that more
than half of the needs identified have not been costed out confirms the importance of
improving the availability of data to credibly identify climate-investment needs. For exam-
ple, Pakistan self-reported between US$180 billion and US$320 billion of investment needs
(UNFCCC 2022) whereas the World Bank estimated that around US$348 billion will be needed
between 2023 and 2030 to comprehensively address climate and development challenges
(World Bank Group 2022d, see Figure 2.14). Again, it is paramount to distinguish between pub-
lic goods and investments that can profitably be undertaken by the private sector once taxes
and subsidies have created the relative prices that internalize environmental externalities.

**Sustainable debt instruments such as green bonds are still limited in South Asia but have significant additional potential.** A prominent recent example is India’s maiden green bond
sale, which raised INR80 billion (US$1 billion) in January 2023 for five- and 10-year debt. India
achieved a “greenium” of 6 basis points on these bonds, which means that the borrowing costs
were slightly lower than for comparable conventional bonds (Reed 2023). Pakistan launched the
first green bond in 2021 and has received a positive market response with US$500 million raised
to date. While these initial green bonds in Pakistan were launched to support hydropower gen-
eration, they could also be expanded to cover other sectors. This expansion has been facilitated
by the establishment of national guidelines for the issuance of green bonds by the Securities
and Exchange Commission of Pakistan (World Bank Group 2022d). Globally, the issuance of
green bonds increased by almost 50 percent during 2016–2021, with annual issuance expected
to exceed US$1 trillion by 2030 (World Bank Group 2021b). Sustainability-linked financing is
another innovative approach to reducing financing costs and attracting new investors by linking
financing terms to the achievement of climate or environmental targets (de la Orden and de
Calonje 2022). Uruguay, for instance, has recently issued bonds worth US$1.5 billion for which
interest rates will rise or fall depending on the achievement of forest protection and emission
reduction targets (Stewart and Caputo Silva 2022). The positive initial experience with green
bonds in South Asia combined with a very positive global market outlook for sustainable debt
instruments showcase the potential for further scaling up green bonds in the region.

### 2.3.3 The need for private investment

**There are many climate-smart investment opportunities.** Rising temperatures, lethal heat
waves, heat-related productivity losses and food losses make climate-smart cooling and
thermal comfort a key investment area. A recent World Bank study found that meeting the
space cooling needs of India will represent a US$1.6 trillion investment opportunity by 2040
(World Bank Group 2022e). This climate-smart investment has the potential to significantly
reduce GHG emissions and create nearly 3.7 million jobs. According to a 2017 IFC study, fully
meeting national climate commitments under the Paris Agreement in six countries in the
region—Bangladesh, Bhutan, India, Maldives, Nepal, and Sri Lanka—could unlock a total of
US$3.4 trillion in climate-smart investments. The two most promising sectors—green buildings and green transport (infrastructure and electric vehicles)—have an investment potential of US$1.5 trillion and over US$950 billion to 2030, respectively (IFC 2017).

The economic benefits from public climate investments significantly outweigh upfront costs. However, the cost-effectiveness of investments differs across sectors and types of investments. On the resilience side, the Global Commission on Adaptation estimated the overall rate of return on investments in improved resilience to range between 2:1 and 10:1. A 2019 World Bank study found that the average net benefit of investing US$1 in resilient infrastructure in low- and middle-income countries is US$4. On the mitigation side, the International Renewable Energy Agency (IRENA) calculated that replacing the costliest 500GW of coal capacity with solar and wind could reduce annual costs by up to US$23 billion and provide a US$940 billion or 1 percent of global GDP stimulus (IRENA 2019). While raising this level of investment is highly unlikely, public procurement—worth US$13 trillion or 12 percent of global GDP every year (Rattia 2022)—can play a major role in driving down the costs of critical technologies, such as solar PV and battery storage.

There are significant constraints to scaling up private investment in South Asia. Financial repression that is used to finance fiscal deficits, and often unconducive policy environments for the mobilization of private investments are the key challenges to enhancing private climate investments. Capacity constraints to access, implement, and monitor international climate finance, as well as a limited pipeline of investable projects, are additional challenges. Inefficient subsidies (e.g., for chemical fertilizers in Nepal and for fossil fuels in Bangladesh and Pakistan) could free up significant public resources for climate investment and improve incentives for the private sector (World Bank Group 2022b; 2022c; 2022d). Box 2.4 illustrates the potential benefits of a fossil fuel subsidy reform in the region. Introduction of a carbon tax could help mobilize resources and encourage climate-friendly investments. On the private sector side, a low-risk appetite due to a lack of awareness and a lack of available financing options for climate investment opportunities are the key challenges (World Bank Group 2022a). Foreign exchange risk is another constraint.

The financial sector has a key role to play in financing the climate transition in South Asia, but its potential remains largely untapped. Some of the key challenges include the lack of green taxonomies that guide sustainable investments and underdeveloped capital markets with limited products and investors (World Bank Group 2022b; 2022c; 2022d). The banking sectors are often weak and struggle to provide the private sector, and in particular SMEs, with access to affordable, long-term finance for green investments. While some initial policy steps have been taken to strengthen the banking sector and incorporate climate-related risks, regulatory and monitoring frameworks for such risks in the financial sector and their implementation tend to be weak.
Box 2.4. The turning point – fossil fuel subsidy reform in South Asia

Under-investment in climate infrastructure will likely persist without adequate pricing mechanisms for climate externalities. Governments should rely on regulations, taxation, and green subsidies to align incentives with climate objectives and ensure structural shifts in their economies. Climate policies, such as fossil fuel subsidy reform (FFSR) and carbon taxes, could mobilize significant domestic resources but also incentivize private investment in low-carbon technologies in South Asia (Mercer-Blackman, Milivojevic, and Mylonas 2023). A gradual phaseout of existing subsidies would be a first step in that direction and should be initiated already given that energy prices are falling, as many South Asian countries have done (Section 1.5).

Many countries in the region have some form of fossil fuel subsidy, either directly or on electricity and public transport, although there are tendencies to slowly move toward better-targeted cash transfers (World Bank 2022c). These subsidies are usually adjusted on a discretionary basis and take many forms, for example proportional subsidies on retail prices, regulated price caps, and subsidized energy import prices (World Bank 2022c). They are typically untargeted and benefit wealthy households more in absolute terms (Abdallah et al. 2015; Coady et al. 2015). They also constitute a direct burden or hidden liability on governments’ budgets, which could increase fiscal vulnerabilities going forward. Moreover, subsidies prevent volume adjustments of imported fuels and increase balance-of-payment pressures. Explicit subsidies, calculated as the difference between the consumer price and producer cost, in 2021...
averaged 0.8 percent of GDP in South Asia, varying from insignificant amounts in Nepal to 2.5 percent of GDP in Pakistan (Figure 2.15). Pakistan’s government is expected to reduce subsidies as a part of the IMF program, but the negotiations are in jeopardy due to the government’s recently proposed fuel subsidy scheme (Rana 2023).

The analysis in this box employs the Climate Policy Assessment Tool (CPAT) to illustrate the potential impact of the FFSR (see Mercer-Blackman, Milivojevic, and Mylonas 2023 for more details). The policy scenario assumes a gradual phaseout of producer and consumer fossil fuel subsidies and price controls by 2030. In addition, government revenues raised from the FFSR are equally distributed toward public investments in household infrastructure access, and targeted cash transfers to address distributional concerns and the political economy aspects of the reform. In terms of fiscal revenues, South Asia could free up an additional 1.1 percentage points of GDP, on average (Figure 2.16). The effects seem to be negligible in Nepal and Afghanistan, given minor direct fuel subsidies. Pakistan and the Maldives, both of which are considering a reduction in fossil fuel subsidies, see significant revenue gains by 2030.

**Figure 2.16. Fiscal revenues from the fossil fuel subsidy reform are significant in some countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Fiscal revenues raised by country, 2030 (Percent of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>0</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>0.5</td>
</tr>
<tr>
<td>India</td>
<td>2.0</td>
</tr>
<tr>
<td>Maldives</td>
<td>3.0</td>
</tr>
<tr>
<td>Nepal</td>
<td>1.5</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1.0</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>0.5</td>
</tr>
<tr>
<td>South Asia</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Source: Mercer-Blackman, Milivojevic, and Mylonas (2023) and World Bank staff calculations.
Note: The figure shows changes in fiscal revenues in percent of GDP for each country following the phaseout of fossil fuel subsidies (FFSR). The deviations are calculated relative to a business-as-usual (BAU) scenario where no new carbon tax or fossil fuel subsidy phaseout applies.

It is also possible to examine the impacts of the FFSR on the consumption-based Gini coefficient using data on the distribution of household consumption pre- vs. post-FFSR from Household Budget Surveys (HBS). FFSR effects seem to be progressive in selected countries in the region except for Nepal, which does not currently grant fossil
The largest opportunities to attract private investments are in the transitioning of the energy sector from fossil fuel-based sources to renewable energy. Energy demand in South Asia has increased by over 50 percent since 2000 and electricity demand is expected to double in this decade. Expanding energy access and reliable, affordable power is a key regional priority. The region is highly dependent on imported energy sources, and fossil fuels account for about 80 percent of total primary energy production. Recent energy price increases have driven concerns regarding energy security and interest in further expanding renewable energy sources, which would also help drive down regional GHG emissions.

The CPAT simulations show that gradual FFSR could free up additional public resources and also have positive distributional outcomes, given the appropriate use of the resources generated. Moreover, the FFSR could have positive overall welfare (e.g., due to improved health from reduced local air pollution) and economic growth effects (Mercer-Blackman, Milivojevic, and Mylonas 2023). Eliminating these subsidies, however, needs to be part of a broader policy package that includes infrastructure funding and compensation for the most vulnerable households. This could increase public support and political buy-in for the reforms, which is necessary for appropriate carbon pricing, improved private sector incentives, and climate-friendly investment generation.

**Figure 2.17.** The fossil fuel subsidy reform leads to progressive distributional outcomes

<table>
<thead>
<tr>
<th>Country</th>
<th>% change in consumption-based Gini from 50-50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>-3.5</td>
</tr>
<tr>
<td>India</td>
<td>-3.0</td>
</tr>
<tr>
<td>Nepal</td>
<td>-2.5</td>
</tr>
<tr>
<td>Pakistan</td>
<td>-2.0</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>-1.5</td>
</tr>
</tbody>
</table>

Source: Mercer-Blackman, Milivojevic, and Mylonas (2023) and World Bank staff calculations based on national HBSs.

Note: The figure shows percent changes in the household consumption-based Gini coefficient for each country following the FFSR. Percent changes are calculated relative to a business-as-usual (BAU) scenario where no new carbon tax or fossil fuel subsidy phaseout applies. Deviations in the consumption-based Gini coefficient are calculated assuming that all revenues are redistributed: (i) half in the form of public investment in water, sanitation, electricity, information and communication technology (ICT), and public transport infrastructure; and (ii) half in the form of targeted cash transfers to the bottom 70 percent of the household consumption distribution.
South Asian countries have made significant investments in renewable energy sources, including solar, hydro, and wind power, but scaled-up and more affordable financing is required to meet the energy mix needed to support regional development, growth, and decarbonization. Bhutan and Nepal rely on hydropower as their primary electricity source, although Bhutan’s and Nepal’s transportation sectors are still dependent on imported petroleum. India’s solar and wind markets have developed quickly, and all renewable energy sources (including hydro) now account for nearly 41 percent of installed generation capacity (Government of India 2021). India still depends heavily on coal, however, with almost 50 percent of installed capacity. Bangladesh and Pakistan have considerable solar potential (World Bank Group 2022b; 2022d), and India and Sri Lanka have strong solar and wind potential (Triyana and Li 2022). Renewable energy sources can reduce the costs of energy in the long term compared with fossil fuels because of their lower operating costs. The upfront investments in renewable energy and flexible and resilient grids, however, face high costs of capital. Financing is also needed for newer technologies such as battery storage systems, which allow renewable energy to be stored until customers need it.

Some countries in South Asia are highly dependent on coal power and will need financial support to manage the costs of retiring and repurposing coal power plants and closing coal mines. India is the second-largest global coal producer, importer, and consumer (IEA 2022). Accelerating the phase-down of coal power requires a just energy transition that accounts for the impacts on industries and jobs, and provides support for lost livelihoods and the development of alternative sources of employment. The costs of the coal transition in developing countries include between US$3 billion and US$35 billion per year of compensation for coal plant owners, US$60 billion per year for funds to address the social costs from closing coal power plants and mines, and US$100 billion per year in grant-equivalent financial support to increase the implementation of renewable energy projects to replace coal power generation (World Bank Group 2022f).

Governments have a key role in the power sector transition by creating the enabling regulatory environment that can increase access to and lower the costs of capital. Governments can consider reforming policies and regulations to open renewable energy markets, including power generation public-private partnerships and unbundling transmission and distribution networks. Direct government investments in distribution networks are warranted given the public-good nature of such networks. Governments can also use tools such as auctions to lower the cost to consumers of clean energy procurement. On the fiscal side, governments can consider repurposing costly fossil fuel subsidies, introducing effective carbon pricing mechanisms, and reforming state-owned enterprises that are critical to the power sector transition.
Governments, domestic and international investors, and multilateral development banks can work together to finance renewable energy investments to make long-tenor debt affordable and mitigate policy, political, and regulatory risks. For example, in India, the government, private financiers, and the World Bank Group have collaborated to scale up renewable energy in support of India’s NDC goal of having 50 percent of the country’s installed electric power capacity based on non-fossil-fuel-based resources. On the policy side, the Indian government improved the regulatory and fiscal environment to incentivize private investment by increasing the requirements for large-scale consumers to source renewable energy and raising taxes on coal-powered energy. One result of this collaboration and policy implementation is the establishment of a large-scale solar park project—the 750MW Rewa Solar Park—to channel domestic and international investment.

International public and philanthropic finance is needed to accelerate the power sector’s transition. Early coal power retirement will require development partner funds to address the social and financial costs of retiring assets and scaling renewable energy several years, if not decades, sooner than planned. International public finance is also needed to enable private investments by providing project preparation funds, and program and sector planning. Furthermore, crowding in private investment for scaled-up renewable energy and energy efficiency investments will require blended finance and credit enhancement solutions that improve the affordability of capital. International donors and multilateral development banks can also support the development of carbon markets to promote the power sector transition, which can in turn leverage private capital. Transparent and liquid carbon markets can provide revenue to improve the commercial viability and affordability of renewable energy and energy efficiency projects, and potentially mobilize funds for coal decommissioning.

In conclusion, the adjustment to climate hazards warrants changes in fiscal policies, but it requires more than additional government expenditure. It requires changes in taxes and subsidies, and thus changes in relative prices to incentivize green investments by the private sector. And both governments and the private sector should explore innovative sources for climate financing, such as results-based financing instruments (e.g., climate impact bonds or payment for ecosystem services) and debt instruments (e.g., green bonds and sustainability-linked loans and bonds), and include mature, emerging, or pilot approaches, depending on how well they are established for financing resilience globally and in South Asia (IISD 2023). Table 2.4 provides examples of several innovative financing instruments that address different fundamental challenges and therefore have different applications.
<table>
<thead>
<tr>
<th>Description</th>
<th>Structured Finance and EMDE (Closed-End) Fixed-Income Funds</th>
<th>Blended Finance for Infrastructure and Other Complex Projects</th>
<th>Outcome-Based Sustainable Debt Instruments</th>
<th>Private Finance for Public Sector Projects (“Pay for Success”)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Green bonds issued by EMDE banks (against green loans) are securitized into green bonds with the public sector providing credit risk reduction</td>
<td>MDBs or the public sector make an equity or mezzanine investment, or provide a guarantee to de-risk and crowd in private investors</td>
<td>Issuer receives a bonus (pays a penalty) if sustainability target agreed on in advance (based on clearly defined indicators) is met (missed)</td>
<td>Contract with a public sector authority that pays if predefined environmental outcomes are achieved</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Emerging markets with existing bank loans to green projects</td>
<td>New infrastructure projects (for example, in the energy sector); use of new types of technologies with potentially higher risks; agriculture</td>
<td>Support firm-level or government-level alignment with sustainability targets (such as GHG emission reductions)</td>
<td>Adaptation finance, non-bankable transition finance</td>
</tr>
<tr>
<td><strong>Examples</strong></td>
<td>Green bond funds: IFC-Amundi; Axa’s Blue Like an Orange (in progress)</td>
<td>Equity, mezzanine (first-loss) finance for infrastructure projects</td>
<td>Sustainability-linked instruments (bonds, loans, commercial paper, etc.)</td>
<td>Environmental impact “bonds”</td>
</tr>
<tr>
<td><strong>Fundamental challenges addressed</strong></td>
<td>Reduction in credit risk (through elevation to investment-grade finance), scaling, diversification, potential currency risk reduction through pooling</td>
<td>Mitigation of credit and political risks; mitigation of information asymmetry problems</td>
<td>Information asymmetry (“greenwashing”)</td>
<td>Capacity limits in developing complex green projects (such as in infrastructure); potential inefficiencies in public sector investment</td>
</tr>
<tr>
<td><strong>Targeted private investors</strong></td>
<td>Institutional investors, including pension funds and insurance companies</td>
<td>Specialist investors and investment funds; local investors</td>
<td>All</td>
<td>Specialized funds, donor funds, MDBs</td>
</tr>
<tr>
<td><strong>Public sector/ MDB involvement</strong></td>
<td>De-risking (purchase equity tranche; provide first-loss guarantee); technical assistance</td>
<td>Own resources for equity/mezzanine investment and guarantees; provide specialized expertise for project design</td>
<td>None. Sovereigns could issue to support market development and set standards</td>
<td>Direct investment; technical assistance</td>
</tr>
</tbody>
</table>
Table 2.4 Selected innovative financial instruments for climate financ (continued)

<table>
<thead>
<tr>
<th>Design/incentive issues</th>
<th>Structured Finance and EMDE (Closed-End) Fixed-Income Funds</th>
<th>Blended Finance for Infrastructure and Other Complex Projects</th>
<th>Outcome-Based Sustainable Debt Instruments</th>
<th>Private Finance for Public Sector Projects (“Pay for Success”)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Requires existing bank loans and technical assistance for banks to issue green bonds</td>
<td>Complex contractual agreements; extensive equity/mezzanine investment and guarantees can create moral hazard; limits the returns for other equity investors</td>
<td>Sustainability targets may not be sufficiently ambitious; penalties need to be high enough to motivate issuer to achieve target</td>
<td>High financial and political risks for private investors</td>
</tr>
<tr>
<td>Potential to scale up finance</td>
<td>High</td>
<td>Limited by public sector MDB resources</td>
<td>Limited by issuer characteristics</td>
<td>Limited by fiscal resources</td>
</tr>
</tbody>
</table>

Source: IMF (2022)
Appendix II

Appendix 2.1 Methodology for Box 2.1

The analysis in the box is based on Jordà’s (2005) local projections method and Brandao-Marques et al. (2020) approach and directly estimates the response of prices to temperature anomalies for each horizon $k$:

\[
p_{i,t+k} = \mu_{i,k} + \gamma_k \hat{\epsilon}_{it} F(e_{it}) + \gamma_{h} \hat{\epsilon}_{it} \left(1 - F(e_{it})\right) + \sum_{j=0}^{2} \beta_{1j} Z_{it-j} + \chi_{i} \lambda_{it}^{k} + \varepsilon_{it}
\]

where $p$ is the logarithm of price level in country $i$ at time $t$, $\gamma$ stands for the cumulative response of $p$ in each $k$ month after temperature deviation from the respective monthly average ($\hat{\epsilon}$), whereas $\mu$ stands for country fixed effects. The vector $Z$ includes contemporaneous and lagged values of output, prices, nominal exchange rates (all in logs), changes in policy rates, and lagged temperature anomalies. The vector $x$ contains global and country-specific controls, including the VIX, a commodity price index, the first principal component of the United States’, euro area’s, and Japan’s shadow policy rates, and country-level monthly precipitation anomalies. The control variables help to identify the sources of price fluctuations that are unrelated to the temperature and therefore isolate the effect of temperature anomalies. $F(e_i)$ is the smooth transition function\(^\text{17}\) that allows for the interaction with the continuum of states of the food weight in the consumption basket, based on Auerbach and Gorodnichenko (2012). Although price indices are I(1) processes, this should not be problematic given that we use lag-augmented local projections. Montiel Olea and Plagborg-Møller (2021) have found that lag-augmented local projections are asymptotically valid uniformly over both stationary and non-stationary data, as well as over different response horizons. To address the serial correlation in the error term due to the inclusion of lagged values of the dependent variable, we use Driscoll and Kraay (1998) standard errors robust to heteroskedasticity, autocorrelation and cross-sectional dependence.

\(^{17}\)Equals 1 in the benchmark case.
Appendix 2.2 Methodology for Box 2.2

The local projection model, following Jorda (2005), identifies impulse response functions through consecutive regression models at different horizons (h):

\[ y_{t+h} = \alpha_h + x_t \delta_{h} + \text{shock}_t \beta_{h} + \mu_{t+h} \]

where \( \alpha_h \) is a horizon-specific constant, \( x_t \) are a vector of control variables, and \( \text{shock}_t \) are the US interest rate shocks. The models are estimated six months ahead on monthly data from as far back as June 2001 to September 2022. The variables by country vary depending on availability but generally include short- and long-term interest rates, equity prices, exchange rate to the US dollar, real exports, consumer inflation, and foreign exchange reserves. Models include four lags, a dummy for the global financial crisis (January 2008 to December 2009), and a dummy for the COVID-19 pandemic.

Movements in the two-year US interest rate is decomposed into different types of shocks using a sign-restricted Bayesian vector autoregressive (VAR) model with stochastic volatility. Three potential drivers of rising US interest rates are identified. “Real shocks” are prompted by improved prospects for US economic activity. “Inflation shocks” reflect expectations of rising US inflation. “Reaction shocks” reflect investors’ assessments that the U.S. Federal Reserve’s reaction function has become more hawkish. See Arteta, Kamin, and Ruch (2022) for details.
### Table A.2.1. Summary of key data on financial needs contained in South Asian countries' national reports submitted as part of the UNFCCC

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of reports submitted</th>
<th>Number of needs identified</th>
<th>Number of needs quantified</th>
<th>Total expressed amount as needs (in US$ billion)</th>
<th>Low range</th>
<th>High range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>4</td>
<td>99</td>
<td>99</td>
<td>22.866</td>
<td>22.866</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>5</td>
<td>360</td>
<td>283</td>
<td>151.904</td>
<td>160.464</td>
<td></td>
</tr>
<tr>
<td>Bhutan</td>
<td>5</td>
<td>301</td>
<td>111</td>
<td>0.946</td>
<td>0.946</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>3</td>
<td>338</td>
<td>177</td>
<td>5,000</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Maldives</td>
<td>4</td>
<td>114</td>
<td>12</td>
<td>0.108</td>
<td>0.108</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td>3</td>
<td>184</td>
<td>122</td>
<td>26.095</td>
<td>26.095</td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>4</td>
<td>219</td>
<td>74</td>
<td>180.318</td>
<td>320.318</td>
<td></td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>4</td>
<td>855</td>
<td>286</td>
<td>10.901</td>
<td>10.901</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>2,470</strong></td>
<td><strong>1,164</strong></td>
<td><strong>5,393.138</strong></td>
<td><strong>5,541.698</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: UNFCCC (2022).
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IPCC (Intergovernmental Panel on Climate Change). 2018. Global warming of 1.5° C. Geneva, Switzerland: IPCC.


Mukherjee, K., and Bazoumana Ouattara. 2021. “Climate and monetary policy: do temperature shocks lead to inflationary pressures?” Climate Change 167 (3).


