Annex 1. Case Studies

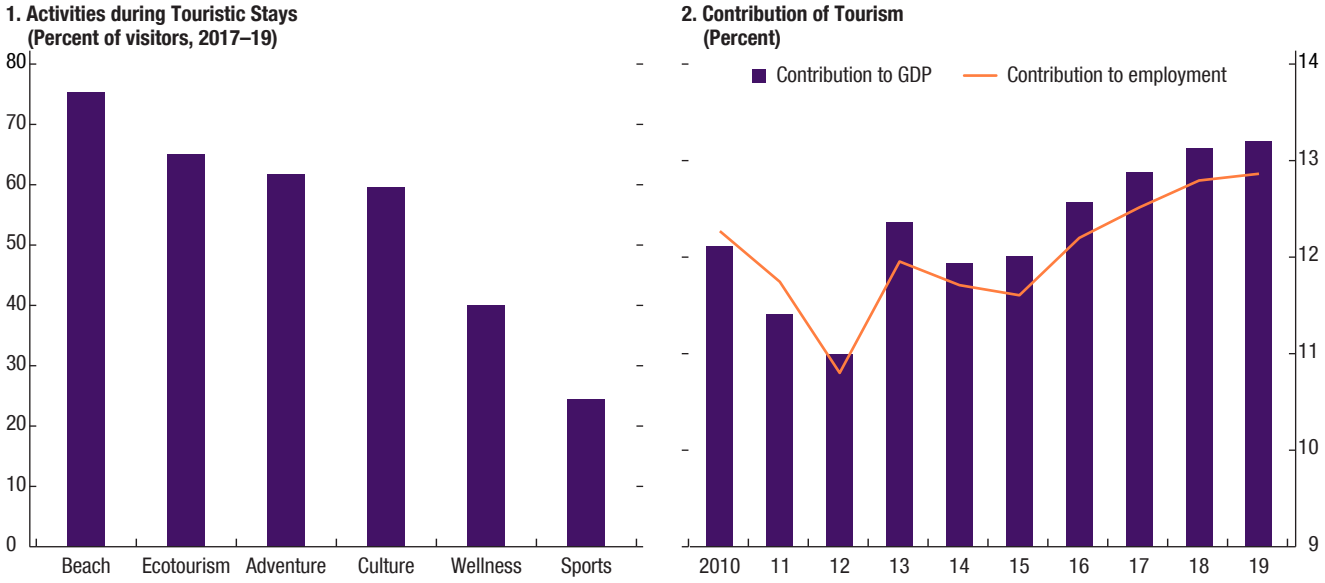
Costa Rica: Tourism in the Post-COVID-19 Normal

Background

Since the late 1980s, Costa Rica has established itself as a prime destination for green and sustainable tourism. Many tourists are drawn to Costa Rica's varied national parks and protected areas—which cover about 25 percent of the national landmass—and provide opportunities for a wide range of activities, including beach holidays, ecotourism, and adventure trips (Annex Figure 1.1). In 2019 the country attracted more than 3 million international visitors, mainly from North America (53.1 percent), Central America (22.3 percent), and Europe (15.9 percent). While leisure accounts for the largest share of tourism revenues (66 percent), tourism for health (13.4 percent), business (12.7 percent), and education purposes (7.7 percent) also play an important role, according to 2016 survey data.

Tourism contributes significantly to employment and economic activity. The tourism sector is a leading source of jobs and—directly and indirectly—supported an estimated 12.9 percent of total employment in Costa Rica in 2019. Informal employment in the tourism sector has been increasing, accounting for 59 percent of all jobs in 2019 (compared to about 46 percent in other sectors of the economy). More than half of the sector's employees are women. Tourism's direct and indirect contribution to GDP has increased over the past decade, from 12.1 percent of GDP in 2010 to an estimated 13.2 percent in 2019 (Annex Figure 1.1). It is also a large component of trade, accounting for about 20 percent of the country's exports.

Annex Figure 1.1. Costa Rica: Type of Tourism and Contribution to Economic Activity



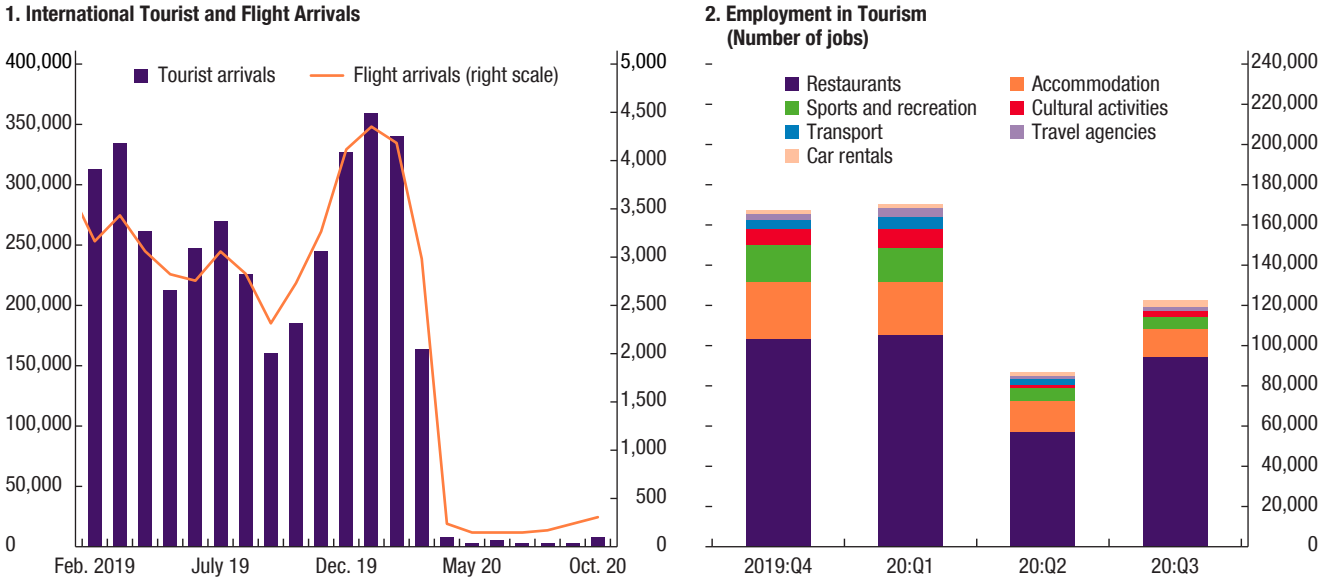
Sources: Banco Central de Costa Rica; Instituto Costarricense del Turismo; World Travel and Tourism Council; and IMF staff estimates.

The Impact of COVID-19 on the Tourism Sector

The COVID-19 pandemic and necessary containment measures have caused an unprecedented decline in tourism activity. International tourist arrivals dropped by 98.7 percent year over year in the third quarter of 2020. As a result, direct employment in the tourism sector declined by 28.0 percent year over year (up from a decline of 51.6 percent year over year in the second quarter 2020), driven by restaurants and hotels, which generate the largest share of jobs in the sector (Annex Figure 1.2). Overall, economic activity in the tourism sector is estimated to decline by 40 percent in nominal terms in 2020.

Costa Rica has begun to open its borders to international visitors, but restrictions remain in place. Following the closure of its borders in March 2020 to contain the spread of the virus, Costa Rica has since August 2020 gradually relaxed entry restrictions for foreign visitors. As of November 2020, tourists from 44 countries, including from the United States, have been authorized to visit. While entry requirements—such as health insurance coverage from local or international providers—as well as domestic containment measures remain in place, quarantine restrictions have been removed to support the tourism sector.

Annex Figure 1.2. Costa Rica: Impact of the Pandemic on the Tourism Sector



Sources: Banco Central de Costa Rica; FlightRadar24; Instituto Costarricense del Turismo; and IMF staff estimates.

Policy Responses to Support the Tourism Sector

Costa Rica's tourism sector is well-positioned to accommodate new travel habits and protocols. Considerable natural attractions and accommodation in resort destinations—rather than urban centers—provide an opportunity to attract visitors with preferences for outdoor activities and social distancing. Costa Rica's growing high-end ecotourism and wellness niche can benefit from post-COVID-19 travel habits favoring outdoor activities and increasing demand for sustainable travel. In this context, the country has been able to create crucial synergies between its efforts to preserve forests to promote climate change mitigation and adaptation and the ecotourism sector. Another factor that might draw tourists to Costa Rica, compared to other destinations in the tropics, is its high-quality healthcare system, which can cater to visitors in need of medical assistance and thereby partly mitigate health concerns during the pandemic.

Costa Rica has launched a roadmap to reactivate the sector and adjust to the new normal. The roadmap contains several initiatives to restore travelers' confidence and attract visitors:

- The Costa Rican Tourism Institute (ICT), in collaboration with the private sector, has launched 16 health and hygiene protocols for tourism-related activities. Adopting these protocols allowed Costa Rica to earn the World

Travel and Tourism Council's Safe Travels Seal in July. The ICT has also provided tourists with good practice guides and a mobile app to share relevant information and enhance contact tracing on a voluntary basis.

- To initiate the reactivation of the sector, the ICT launched national and international campaigns. The national campaign Vamos a Turistear (let's go sightseeing) aims at incentivizing domestic tourism through attractive offers, discounts, and financing options until the end of December 2020. In July 2020, Congress also approved a law that moved several national holidays to Mondays to extend weekends during 2020–24, thereby boosting domestic tourism. To promote international tourism, Costa Rica launched its campaigns Only the Essentials in the United States and Canada, and in Costa Rica Un Sanctuaire de Vie (a sanctuary of life) in France, embodying the country's pura vida or "full of life" mindset.
- Other measures concentrate on improving the tourism experience, for example, through offering services for small groups with a mandatory local guide and a focus on sustainable tourism. In addition, the roadmap reinforces efforts to attract foreign direct investment in the tourism sector, transform the Guanacaste area into a tourism hub, and promote maritime tourism.

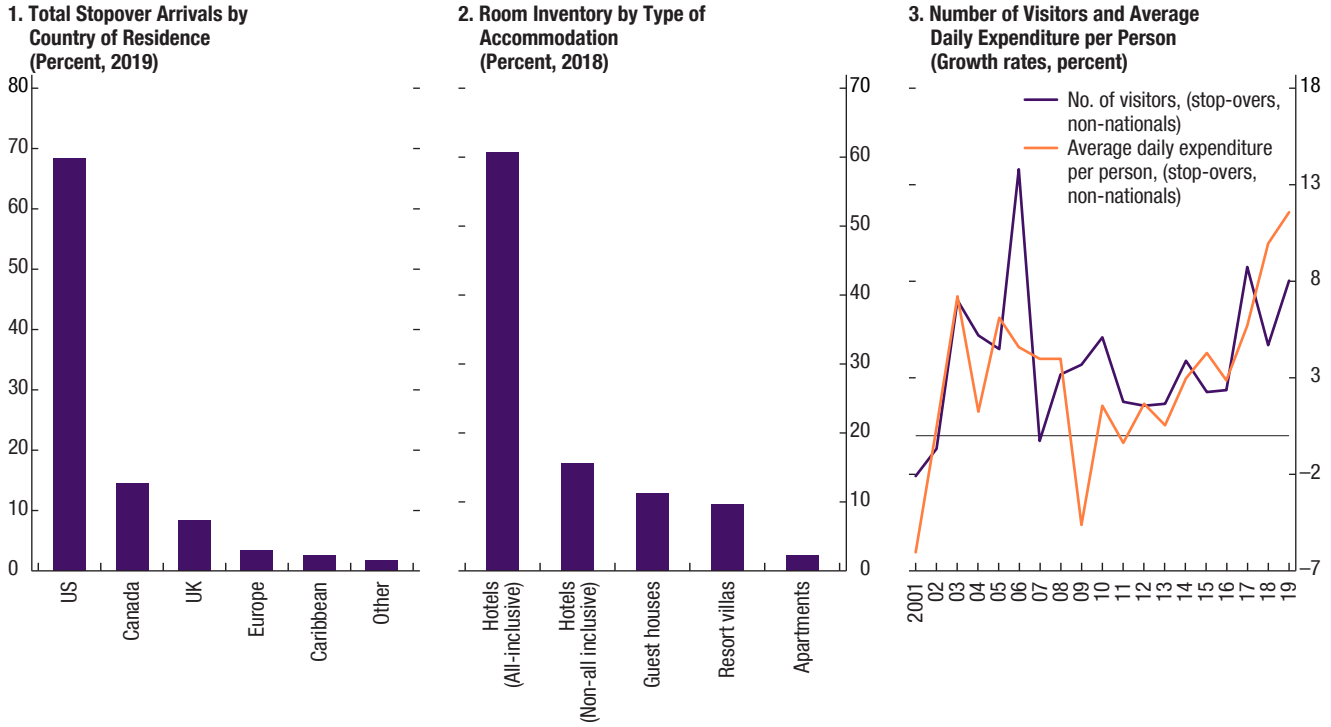
Jamaica: Tourism in the Post-COVID-19 Normal

Background

Jamaica's successful "all-inclusive" "sun, sand, and sea" tourism model has flourished, especially among North American tourists (Annex Figure 1.3). Nearly 80 percent of foreign nationals visiting Jamaica are leisure and holiday travelers, predominantly from three English-speaking countries (Canada, United Kingdom, United States). About one-third of Jamaica's tourists are older than 50, with relatively higher levels of disposable income. Jamaica has thus excelled in the all-inclusive tourism model, with all-inclusive hotels representing 60 percent of the total accommodation infrastructure. Stopover visitors and the average per-person daily expenditure have grown by an annual average of 3.9 percent and 3 percent, respectively, over the last 20 years, in spite of Jamaica's relatively low-price competitiveness based on the 2019 Travel and Tourism Competitiveness Index (T&TCI).

Tourism, a critical driver of the Jamaican economy, has long benefited from active prioritization by the government. According to the World Tourism and Travel Council, tourism and travel together represented 31 percent of GDP in 2019. Net tourism receipts account for 56 percent to total exports and are a critical source of foreign exchange. The share of employment in sectors with direct or indirect interlinkages to tourism is more than 30 per-

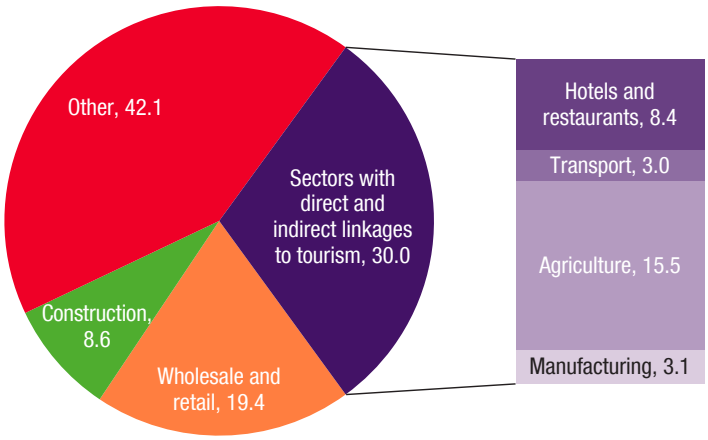
Annex Figure 1.3. Jamaica: Tourism Model and Tourist Flows



Sources: Jamaica Tourist Board; and IMF staff calculations.

cent (Annex Figure 1.4). Tourism and entertainment sectors constitute 7 percent of the commercial banks' loans portfolio. The 2019 T&TCI ranks Jamaica second globally in terms of the government's prioritization of the sector in its policy matrix. Key initiatives include the worldwide marketing campaign by the Jamaica Tourist Board, the tourism sector plan included in the Vision 2030 National Development Plan, a national strategy to stimulate community-based

Annex Figure 1.4. Jamaica—Average Share of Employment by Sector, 2012–20
(Percent of total labor force)



Sources: Statistical Institute of Jamaica; and IMF staff calculations.
Note: Labor data are only available until January 2020; Figures for transport and manufacturing estimate the direct linkages between those sectors and tourism.

tourism, the establishment of tourism linkages network, and the lower VAT rate relative to other sectors.

The Impact of COVID-19 on the Tourism Sector

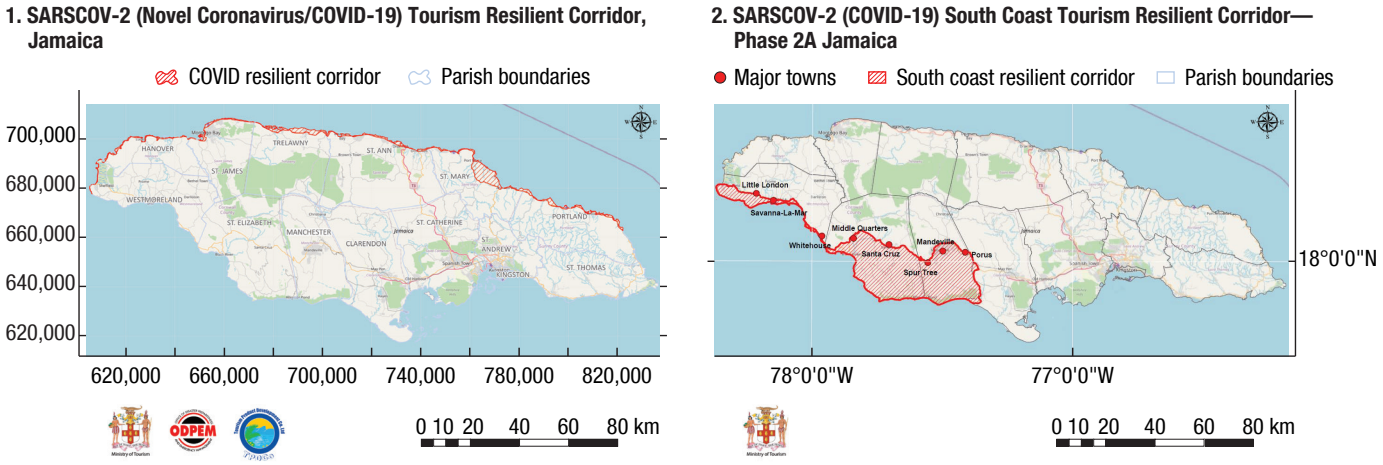
The COVID-19 pandemic has significantly impacted Jamaica's tourism sector. A near-total shutdown of the sector between April and June 2020, largely associated with the halt in North American travel, led to a 66 percent decline in tourist arrivals as of the end of October 2020. As a result, the real value added of the hotels and restaurants sector declined by 14 percent in the first quarter of 2020, by 86 percent in the second quarter of 2020, and by 65.2 percent in the third quarter of 2020. The output of the recreational activities sector has also significantly contracted due to the drop in foreign tourist arrivals, while the transport sector has been impacted by the sharp reduction in air flights and absence of cruise passenger arrivals. The closure of hotels has negatively affected the agricultural sector, especially sales of coffee and cocoa, as well as food processing, manufacturing, and air transport.

Policy Responses to Support the Tourism Sector

The Jamaica authorities' COVID-19 response has aimed at limiting the economic fallout and ensuring that Jamaica remains a safe tourism destination:

- The Government of Jamaica reopened its borders to all international travelers on June 15, 2020. COVID-19 travel protocols, that include prior-to-departure travel authorization for international visitors, followed by the risk-based quarantines and movement limitations, received the World Travel and Tourism Council (WTTC) Safe Travels stamp of approval. The authorities have established two Resilient Corridors—special zones in which tourism operators have been trained and certified for adherence to COVID–19 protocols—where all tourists assessed as low risk are required to stay. The two Resilient Corridors cover the most popular tourism destinations within Jamaica on the north and south coasts Motivated by the successful implementation of COVID-19 protocols by the tourism sector, the Jamaica Hotel and Tourism Association launched training for local communities, to help prevent the spread of the virus. Despite the travel restrictions, Jamaica staged virtually its premier tourism industry marketplace, JAPEX, attracting a record number of participants. The Jamaican authorities leveraged the lower tourism arrival numbers to increase skills and qualifications of 10,000 tourism workers, via free online training certification classes. In November 2020, the authorities also introduced a first-of-its-kind traveler protection and emergency service program,

Annex Figure 1.5. Jamaica—Resilient Corridors



Source: Jamaica Tourism Board: https://www.visitjamaica.com/travelauthorization/resilient-corridors.

Jamaica Cases, that includes field rescue and repatriation for medical emergencies, including COVID-19 and natural disasters.

- The Jamaican authorities also implemented policies to avoid bankruptcies and sustain jobs in the tourism sector. These include programs to help retain tourism workers through temporary cash transfers and safety nets for lower earning dismissed workers as well as grants for smaller tourism operators and informal businesses supporting the sector. In parallel, the Jamaica Tourist Board's Rediscover Jamaica campaign is encouraging discounted domestic travel, although, according to the WTTC, domestic spending contributed to only 21 percent of total tourism and travel spending in 2019. In addition, commercial banks have provided temporary moratoria on loan repayments to tourism operators.

The recovery of the Jamaica's tourism sector could be complicated by a shift in preferences, and key pre-existing factors. The older-age profile of Jamaica's tourists could result in a slower recovery in arrivals as travelers rebuild confidence only gradually in international travel. The concentration of room capacity in large hotels, the high crime and weak infrastructure outside the resorts, and low-price competitiveness may reduce Jamaica's attractiveness to North American travelers who will be demanding more competitive and social-distancing friendly destinations.

The post-COVID-19 new normal in tourism presents opportunities to increase resilience and boost inclusive economic growth. According to the Compete Caribbean-Caribbean Tourism Organization, 79 percent of US tourists are interested in community-based tourism (CBT). The Jamaican

authorities announced a plan to encourage the development of CBT with a special focus on rural communities, including the establishment of a special Community Tourism Unit within the Ministry of Tourism. Developing Jamaica's CBT—as envisioned in the authorities' 2015 National Community Tourism Policy and Strategy—would usefully complement Jamaica's dominant beach tourism and increase the resilience of the sector by allowing the health- and wellness-minded tourist to leverage Jamaica's rich and unique culture and varied geographical features. Moreover, CBT would also allow for greater community participation, generating new employment opportunities across a broader segment of the population. However, this will require addressing structural challenges, including the high level of crime and poor road and water infrastructure, to make remote communities accessible to tourists.

Fiji and Vanuatu: Tourism in the Post-COVID-19 Normal

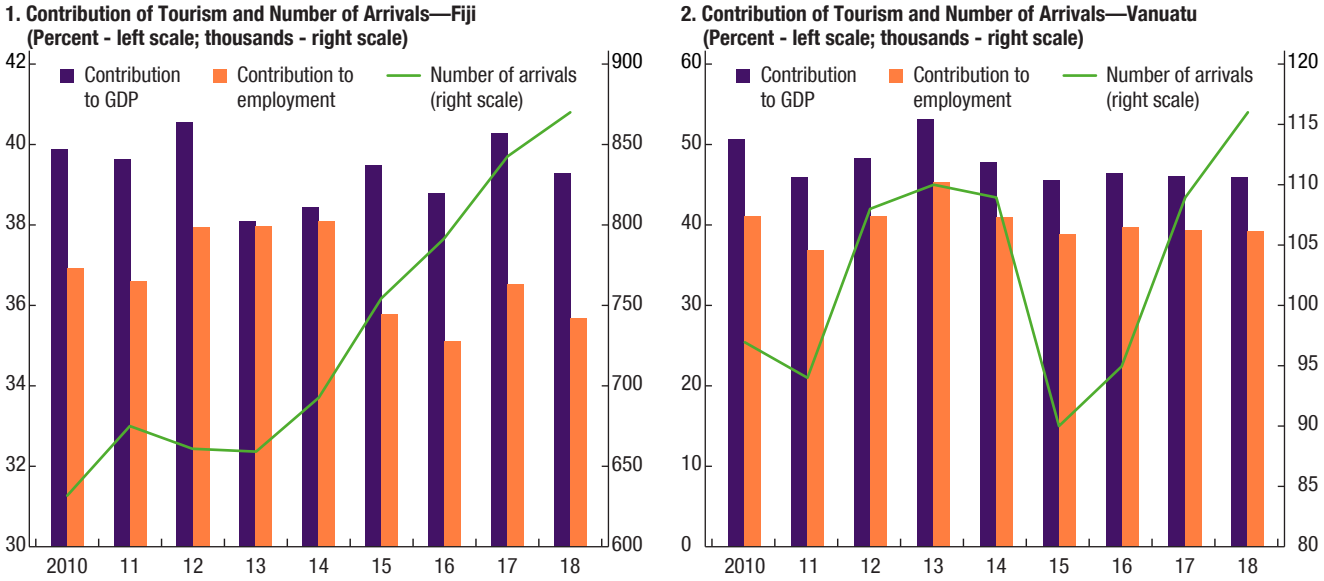
Background

Fiji and Vanuatu are two Pacific island countries heavily dependent on tourism. In 2019, Fiji and Vanuatu received about 900,000 and 120,000 visitors by air, respectively, with tourism contributing to more than a third of GDP and employment in both countries (Annex Figure 1.6). About 70 percent of visitors to both countries come from Australia and New Zealand, predominantly for leisure. While Fiji offers mid-range to luxury tourism, Vanuatu relies more on mass tourism at the mid-range:

- Fiji consists of 333 islands, with tourism concentrated on the largest two, Viti Levu and Vanua Levu. Fiji is known for its beautiful beaches, friendly people, and year-round warm climate. Attractions include lagoons, coral coasts and ancient archeological sites.
- Vanuatu consists of 83 islands, with tourism concentrated on Efate with the capital Port Vila, along with unique islands such as Tanna (volcano), Espiritu Santo (wreck diving), Pentecost (cultural experience), and Aneitym (cruise ships).

Both countries are highly vulnerable to shocks impacting tourism, including natural disasters. For example, tourism arrivals in Fiji fell during 2012–13 due to Tropical Cyclone (TC) Evan and tourism plunged in Vanuatu in 2015 due to TC Pam. Most recently, Fiji and Vanuatu were hit by TC Harold in April 2020.

Annex Figure 1.6. Tourism Contribution to the Economy



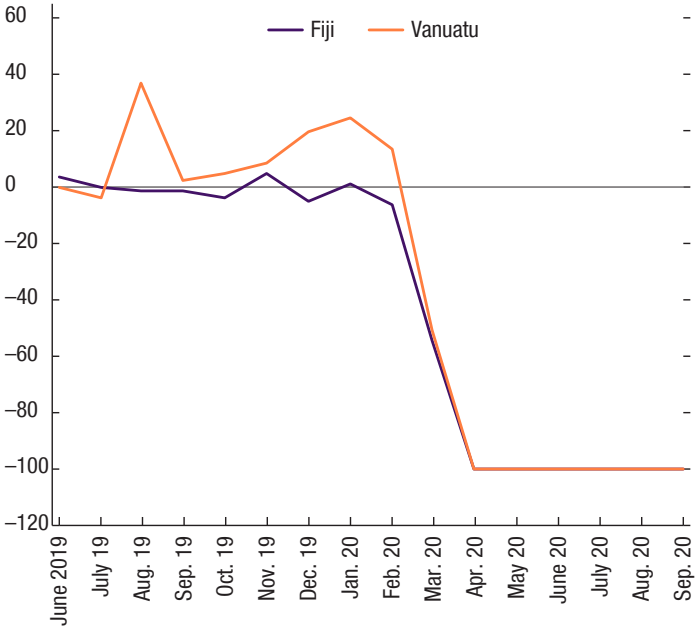
Source: UN World Tourism Organization, *Yearbook of Tourism Statistics*.

The Impact of COVID-19 on the Tourism Sector

In response to the COVID-19 pandemic, both countries enacted strict border controls in late March and remain closed to most international travel. These stringent measures have enabled both countries to keep COVID-19 at bay, with only 38 confirmed cases recorded in Fiji and one in Vanuatu as of November 2020. Nonetheless, the suspension of commercial air travel has decimated the tourism sector (Annex Figure 1.7). Since April 2020, Fiji's tourism revenue has been minimal. Vanuatu has received no revenue from foreign visitors, with 70 percent of employees in its tourism sector estimated to have lost their jobs by May 2020. Real GDP is estimated to have contracted by 19 percent (Fiji) and 9.2 percent (Vanuatu) in 2020.

Cruise ships are a significant source of revenue for both countries. In 2018, Fiji received 188,000 cruise arrivals while Vanuatu had 235,000 cruise arrivals, with average passenger spending estimated at US$44 and US$85, respectively. With the COVID-19 pandemic and border closures, there have been no cruise ship landings since March. The recovery of the cruise industry is likely to be protracted, clouding Vanuatu's and Fiji's prospects for a recovery in tourism as well, especially for small private businesses that cater to visitors from cruise ships.

Annex Figure 1.7. Visitor Arrivals
(12-month percent change)



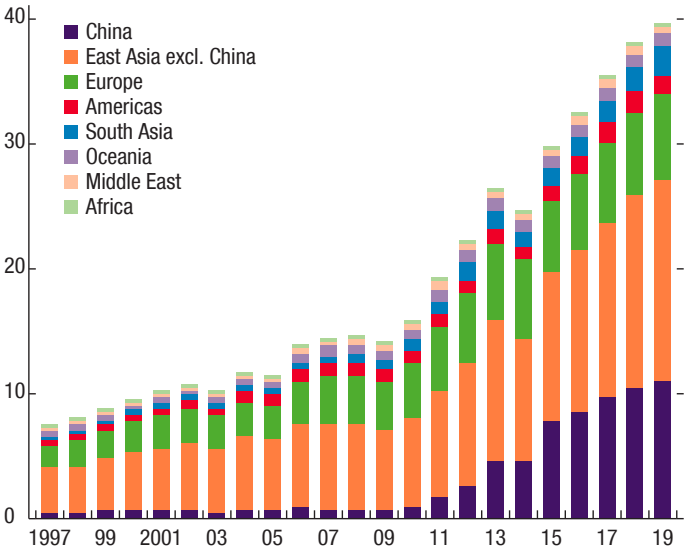
Sources: Country authorities; and IMF staff estimates.

Policy Responses to Support the Tourism Sector

Both governments have implemented bold fiscal stimulus measures to support their tourism industries and position them for an eventual recovery. Fiji's fiscal support includes tax cuts, transfer payments, and a subsidy to Fiji Airways to incentivize the first 150,000 tourists in the new fiscal year. Vanuatu's package included reimbursing registered employers 30,000 vatu per employee (US$266) for four months to help retain their workforce, along with some business tax relief and SME grants, with the tourism industry being a prime target of all the measures. Both countries have also drawn on their national pension funds to support affected households in all sectors of the economy, but at the cost of reducing future retirement income. The Fiji National Provident Fund (NPF) paid out an estimated US$24 million (0.5 percent of GDP) to its members by early July while the Vanuatu NPF paid out US$12.5 million (1.5 percent of GDP). However, with the borders still largely closed and fiscal space limited, it is increasingly challenging for businesses to survive and for workers to support their families.

Both Fiji and Vanuatu are eager to join travel bubbles, but none have yet materialized. Initially, when Australia and New Zealand were discussing a potential Trans-Tasman travel bubble, Fiji and Vanuatu expressed interest to join. Fiji tried launching its own Bula bubble and Vanuatu proposed a Tamtam bubble that would allow for entry of tourists from some countries with limited restrictions. However, with local outbreaks in key source countries, Australia and New Zealand have delayed the prospects for a functioning international travel bubble. In August 2020, Fiji launched a Blue Lanes initiative that allows yachts to berth in its marinas after meeting strict quarantine and testing requirements. Fiji has received more than 90 yachts through this initiative.

Annex Figure 1.8. Thailand: Tourist Arrivals by Country
(Millions of persons)



Sources: Haver Analytics; and Ministry of Tourism and Sports.

Fiji and Vanuatu are well positioned to cater to new tourism demands, with some forms of tourism having more potential than others. Having successfully kept the virus in check, both countries could benefit from the diversion of visitors that would otherwise travel to other destinations, such as the United States or the ASEAN region. Moreover, many tourists from key sources countries would prefer to remain within their region in the near term due to accessibility and familiarity. Both Vanuatu and Fiji have direct flights to Australia and New Zealand, mostly within four hours. Bubbles could be set up to enable tourism without significant risk of outbreaks in the islands. Over the medium term, island nations such as Fiji and Vanuatu may be better placed than others in offering socially distanced vacations. For example, Vanuatu offers an off-the-beaten-path experience with low-density tourism where families can find it easier to isolate in nature. It also has the potential to expand on ecotourism to attract more visitors.

Potential challenges to a recovery of tourism in Fiji and Vanuatu relate to their remoteness and relatively weak health infrastructure. Both countries have their own national airlines, which have been hard hit by the COVID-19 crisis. This may also be true of international air carriers from Australia and New Zealand and international cruise lines. Even if tourists are ready to return, there may be limited access, given the severe disruption to airline and cruise operations. Another potential challenge is that health considerations may gain in importance for potential visitors in the wake of the pandemic. In the Global Health Security Index, Fiji and Vanuatu rank in bottom quartile, which could hold back some visitors in the future.

Thailand: Tourism in the Post-COVID-19 Normal

Background

Tourism has grown to play a pivotal role in Thailand's externally oriented economy. Thailand is a leading global tourist destination, ranking ninth for tourist arrivals and fourth for tourism receipts in 2018 (UNWTO 2019). At the end of 2019, tourism comprised 12 percent of Thailand's GDP, and nearly a fifth of the economy, once accounting for related services. Supported by investment in accommodation and transportation infrastructure, Bangkok is now one of the world's most visited cities, and a gateway point tourist hub in Thailand, including tropical beaches (such as Phuket, Samui, and Pattaya) as well as cultural heritage sites.

The tourism industry employees are about 15 percent of Thailand's total employment, though the number is likely larger once accounting for seasonal and informal workers. In addition, it is estimated that nearly a fifth of workers in the tourist industry are rural domestic migrants who return to farms once the tourist season is over. As real wages have risen in Thailand, the tourism industry has also increasingly employed migrant workers from neighboring countries (Cambodia, Lao PDR, Myanmar, Vietnam), estimated at 5 percent of total workers, though given the high degree of informality suggests this number may be larger. Women comprise 65 percent of employment in the accommodation and food services sector, earning about 80 percent of men's wages in the sector, a larger wage gap compared to the rest of the economy (where women's wages are 99.5 percent of that of men).

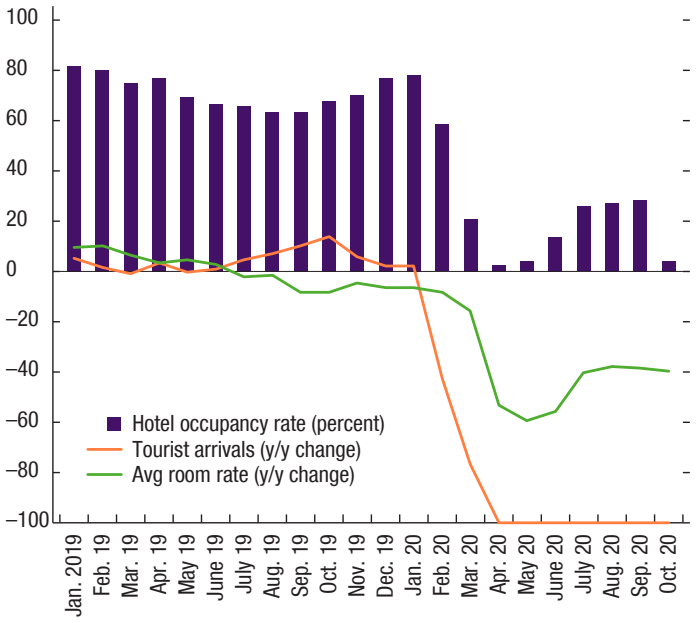
Incoming tourists are mainly mass-market tourists, with smaller luxury component. Nearly 40 million tourists visited Thailand in 2019, mainly for leisure, followed by business and conferences, and a growing market for medical and wellness tourism (of which Thailand is 4th ranked globally). Most tourists are mass-market tourists (historically supported by a favorable exchange rate), as the average spend per tourist in Thailand remains below countries with higher or similar arrivals numbers, though the luxury market has been growing. International tourists come mainly from China, ASEAN, and Russia; the domestic tourism market has generally been small by both trip size and value. The main tourist centers are Bangkok (with a large retail centers and cultural sites), the beach resort areas (Phuket, Samui), and more recently, mountainous areas.

The tourist sector is closely linked to the retail sector. In addition to the accommodation and transportation sectors, the tourist sector is closely linked to several high-end shopping malls, real estate (particularly for long staying and/or frequent tourists), entertainment, and dining. The tourist sector also

supports intracountry remittances from seasonal workers to rural areas.

The Impact of COVID-19 on the Tourism Sector

Annex Figure 1.9. COVID-19 Impact on Tourist Arrivals and Accommodation



Sources: Haver Analytics; and Ministry of Tourism and Sports.

The tourism sector has faced a collapse from the unprecedented COVID-19 shock. Thailand was the first country outside of China to register a COVID–19 case, and the country was adversely affected in the outbreak's early stages due to restrictions on Chinese tourists. Once the pandemic spread, the authorities quickly declared a state of emergency, putting in place stringent containment measures and strict travel restrictions. As a result, tourist arrivals, hotel occupancy, and average room rates have fallen dramatically – tourist arrivals are expected to decline to just 6.7 million tourists by the end of 2020.

There was a large dislocation in labor markets. In the first quarter of 2020, there were 139,000 job losses related to the tourism sector, and the Thai Chamber of Commerce estimates up to 6 million could be lose employment by the end of the year given ongoing restrictions. Given the high rate of informality, informal and migrant workers, particularly women, are likely to suffer disproportionately, as they are unlikely to have access to safety nets if they to fall ill or lose employment. As a result, the shock can exacerbate already rising poverty rates and inequality. The Thai authorities have also closed borders to neighboring countries to prevent infections, which contributed to slowing external migrant flows and outward remittances. The shock has also financially strained airlines in the region, including Thai Airways, the country's leading carrier, as well as several budget airlines.

Nevertheless, the infections curve was quickly flattened, particularly when compared with other countries in the region, in part due to strin-

gent lockdown measures, followed by a cautious reopening in the backdrop of a robust and integrated public health response. Cases plateaued by April 2020, and Google-based mobility indicators suggest foot traffic has quickly recovered as the economy reopened. Although this would support the resumption of tourism, including through confidence effects, the authorities have remained generally cautious about the risk of a second wave of infections, which materialized in late December 2020.

Policy Responses to Support the Tourism Sector

Thailand can be thought of having several comparative advantages prior to COVID-19. According to the World Economic Forum Global Competitiveness Index, Thailand scores well in the quality and availability of infrastructure, has a high quality of medical facilities and a pre-existing reputation for medical tourism, has available capacity for high end tourists, and has experience in prior epidemic outbreaks, such as SARS. The sector has also proved resilient in the past, weathering episodes of political unrest and natural disasters. It is also supported by longstanding accommodative visa policies, a well-connected airport hub, and strong strategic oversight through the Tourism Authority of Thailand (TAT) under the Ministry of Tourism and Sports.

The Thai authorities have taken proactive measures to support the tourism sector. Together with a program of providing soft financing to tour operators of US$3 million, as part of their COVID-19 fiscal package response, in the near term, these centered on:

- **Promoting domestic tourism**. In June 2020, following the easing of lockdown restrictions, the government swiftly approved three programs worth US$700 million (about 0.14 percent of GDP) to support domestic tourism. These include funds for: subsidizing travel for healthcare workers, subsidizing accommodation, food and other travel expenditures for qualifying domestic tourists, and subsidizing transportation costs for long distance domestic trips. The incentives covered domestic travel undertaken between July and October.
- **Phased reopening for international tourists**. The authorities have considered several ways to resume international tourist arrivals:
  - **Travel bubbles** involve exclusive travel between countries that have COVID-19 infections under control. However, reciprocal market size is an important consideration. Travel bubbles, aimed for Summer 2020, were postponed after second wave breakouts in several candidate countries (Australia, Vietnam), while designing the needed travel insurance policy to support it remains elusive.

  - **Long-term stay with mobility restrictions** have been rolled out, with the Thailand Special Tourist Visa (STV) for long-stay visitors, introduced and made effective in October 2020. This scheme requires visitors from countries with low COVID-19-incidence, with adequate medical insurance and proof of accommodation for the visit period, to be quarantined for 14 days upon arrival at a certified quarantine facility, and upon completion of the quarantine, receive a negative COVID-19 test, and they must have a mobile phone app to use an application that tracks their location during their stay. The scheme is valid for stays up to 90 days and renewable twice. As of the end of November 2020, the scheme drew 825 visitors from 29 different countries (mainly China). In early December 2020, the authorities approved the expansion of the STV to visitors from every country.

- **Encouraging mixed use of physical and human resources**. Some hotels have switched to provide quarantine facilities and accommodation for medical workers, though occupancy rates still remain at historically low levels.

With an eye toward the post-pandemic new normal while alleviating the extent of economic scarring due to the shock, the authorities are also exploring other areas to support a more robust tourist sector, including:

- *Shift from mass tourism to low-density high-end tourism.* This is in line with the authorities' intended long-term goal of promoting more sustainable tourism with a lower ecological footprint.
- *Further strengthening the healthcare system*, for rapid and responsive prevention, detection, and treatment, including via access for tourists.
- *Investments in digital/mobile resources and connectivity* to support touchless service delivery (hotel check-ins, temperature monitoring). In addition, with the spread of the coronavirus pandemic, digital technologies have become more crucial than ever before. The travel industry and various tech companies are increasingly experimenting with ways to use virtual reality tourism to give people the same basic experience of tourism. In addition, technology can facilitate a shift toward digitally self-guided tourism, that does not require group travel and is therefore consistent with social distancing norms that are likely to persist for a long period.

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Annex 2. Applying A Gravity Model to Predict Post-Pandemic Tourism Flows

The gravity model framework is widely used in the economic literature to analyze the patterns of international trade and capital movements, as well as migration and tourism flows (Anderson and van Wincoop 2003; Bergstrand and Egger 2007; Gil-Pareja, Llorca-Vivero, and Martínez-Serrano 2007; Head and Ries 2008; Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2010). But there is scarce research on modeling bilateral tourist movements in a gravity framework, especially taking into account the effect of infectious diseases. Most studies in this context look at the impact of disease outbreaks, such as the SARS and avian flu epidemics, on tourism in a specific country or region over a short period of time (Zeng, Carter, and De Lacey 2005; Cooper 2006; Wilder-Smith 2006; Kuo and others 2008). Using dummy variables infectious diseases, Roselló, Santana-Gallego, and Awan (2017) show that the eradication of infectious diseases benefits countries in terms of tourism flows and revenues. More recently, using a data set of 38,184 pairs of countries over the period 1995–2017, Cevik (2020) finds strong evidence that infectious diseases have a significant negative effect on international tourism flows.

The empirical analysis is based on an unbalanced panel of annual observations for 38,184 pairs of countries during the period 1995–2017. Bilateral tourism flows for 172 countries of origin and 222 countries of destination are taken from the WTO database, yielding a data set of more than 261,488 observations over the sample period. The main explanatory variable of interest is the number of confirmed infectious-disease cases, including Ebola, malaria, SARS, and yellow fever, which is obtained from the WHO database. Following the literature, real GDP, population and the real effective exchange rate (REER) are introduced as control variables, drawn from the IMF World Economic Outlook (WEO) database and the World Bank World Development Indicators (WDI) database.

Standard gravity variables such as bilateral distance between countries, common official language, colonial history, and geographical contiguity are taken from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) database, as presented in Mayer and Zignago (2011). Geographic distance is measured as the great-circle distance in kilometers between the capital cities of each country pair. Binary variables for language, colonial history and geographical contiguity are assigned a value of 1 if a country pair share a common official language, a colonial tie, and an adjacent border and a value of 0 otherwise.

Bilateral flows between two countries tend to increase with per capita income and decline with transportation costs as proxied by physical distance between the countries. This gives a simple gravity model, in which the number of tourists traveling in one direction between two countries depends on the economic sizes of the countries and the geographical distance between them. Building on Santos Silva and Tenreyro (2006), the baseline gravity specification takes the following form in a panel data context:

$$ln(T_{ijt}) = \beta + \alpha\, ln(GDP_{it}) + \gamma\, ln(GDP_{jt}) + \vartheta\, ln(Dist_{ij}) + \eta_i + \varphi_j + \mu_t + \varepsilon_{ijt} \quad (1)$$

in which T_{ij} denotes international tourist flows between countries i (origin) and j (destination); GDP is the level of per capita income in origin and destination country, respectively; $Dist_{ij}$ is the physical distance between countries i (origin) and j (destination); thenη_i, φ_j and μ_t coefficients designate the country fixed effects capturing all time-invariant factors in origin and destination country and the time fixed effects controlling for common shocks that may affect international tourism across all countries in a given year, respectively. ε_{ijt} is an idiosyncratic error term that meets the standard assumptions of zero mean and constant variance.

Since the objective is to understand the effect of infectious diseases on international tourism, the parsimonious gravity model is augmented with additional control variables along with the number of confirmed infectious-disease cases:

$$ln(T_{ijt}) = \beta + \alpha ln(GDP_{it}) + \gamma ln(GDP_{jt}) + \vartheta ln(Dist_{ij}) + \delta X_{ijt} + \varphi \ln(Vir_{ijt}) + \eta_i + \varphi_j + \mu_t + \varepsilon_{ijt} \quad (2)$$

where X_{ijt} denotes a vector of control variables, including the logarithm of population in origin and destination countries, the REER in destination

country, binary variables for common language, colonial history and geographical contiguity, and life expectancy and government effectiveness in destination countries; Vir_{ijt} denotes the number of confirmed cases of Ebola, malaria, SARS, and yellow fever scaled by population in origin and destination countries. To account for possible heteroskedasticity, robust standard errors are clustered at the country-pair level.[1]

We compare the out-of-sample forecasting performance of alternative gravity models of bilateral tourism flows by partitioning the original sample period (1995–2017) into two subsamples: (1) the estimation sample (1995–2014) and the forecasting sample (2015–17). To evaluate forecast accuracy of these alternative models, the mean absolute error (MAE), the root mean squared error (RMSE) and the Theil Inequality Coefficient (U-Theil), the most commonly used metrics in the literature, are employed as defined by the following equations:

$$MAE = \frac{1}{n}\sum_{t=1}^{n} |\hat{A}_{t,c} - A_{t,c}| \tag{3}$$

$$RMSE = \sqrt{\frac{1}{n}\sum_{t=1}^{n} (\hat{A}_{t,c} - A_{t,c})^2} \tag{4}$$

$$U - Theil = \frac{\sqrt{\frac{1}{n}\sum_{t=1}^{n} (\hat{A}_{t,c} - A_{t,c})^2}}{\sqrt{\frac{1}{n}\sum_{t=1}^{n} (\hat{A}_{t,c})^2} + \sqrt{\frac{1}{n}\sum_{t=1}^{n} (\hat{A}_{t,c})^2}} \tag{5}$$

in which $\hat{A}_{t,c}$ and $A_{t,c}$ are the predicted and actual bilateral tourism flows at time t, respectively, and n is the number of observations in the sample. The model with the lowest MAE, RMSE, and U-Theil values is considered to better forecast accuracy. These computations, presented in Annex Table 2.4, confirm the relevance of infectious-disease episodes in several out-of-sample forecasting exercises—lowering the RMSE of bilateral tourism flow forecasts by as much as 7 percent compared to the standard model without the number of infectious-disease cases.

[1]The results remain broadly unchanged when standard errors are clustered at the country level.

Annex Table 2.1. Infectious Diseases and International Tourism—PPML Estimations

(Dependent variable: Bilateral tourism flows)

	[1]	[2]	[3]	[4]	[5]
Real GDP, origin	0.129***	0.127***	0.127***	0.127***	0.131***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
Real GDP, destination	0.129***	0.129***	0.129***	0.129***	0.132***
	[0.007]	[0.008]	[0.008]	[0.008]	[0.008]
Distance	−0.228***	−0.232***	−0.231***	−0.232***	−0.229***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Common language	0.176***	0.174***	0.174***	0.174***	0.180***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
Colonial history	0.080***	0.083***	0.083***	0.083**	0.076***
	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]
Geographical contiguity	0.034	0.035	0.035	0.035	0.031
	[0.019]	[0.016]	[0.016]	[0.016]	[0.016]
Population, origin	0.063***	0.065***	0.059***	0.063***	0.066***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Population, destination	0.080***	0.078***	0.082***	0.078***	0.084***
	[0.012]	[0.012]	[0.012]	[0.013]	[0.012]
REER, destination	0.000***	0.000***	0.000***	0.000***	0.000***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Life expectancy, destination	0.097	0.103	0.113	0.091	0.088
	[0.043]	[0.043]	[0.044]	[0.044]	[0.043]
Ebola					
Origin		−0.013***			
		[0.001]			
Destination		−0.010***			
		[0.002]			
Malaria					
Origin			0.001		
			[0.000]		
Destination			−0.001		
			[0.000]		
SARS					
Origin				−0.003***	
				[0.02]	
Destination				−0.040***	
				[0.02]	
Yellow fever					
Origin					0.003
					[0.000]
Destination					−0.001
					[0.001]
Number of observations	224,019	215,589	215,589	215,589	219,132
Origin FE	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.77	0.84	0.80	0.83	0.80

Note: The dependent variable is bilateral tourism flows (in log form). Robust standard errors, clustered at the country level, are reported in brackets. A constant is included in each regression, but not shown in the table. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Annex Table 2.2. Infectious Diseases and International Tourism—2SLS-IV Estimations

(Dependent variable: Bilateral tourism flows)				
	[1]	[2]	[3]	[4]
Real GDP, origin	0.933***	0.935***	0.959***	0.957***
	[0.012]	[0.012]	[0.014]	[0.012]
Real GDP, destination	0.865***	0.856***	0.861***	0.896***
	[0.013]	[0.013]	[0.015]	[0.013]
Distance	−1.717***	−1.717***	−1.716***	−1.717***
	[0.015]	[0.015]	[0.015]	[0.015]
Common language	1.241***	1.241***	1.241***	1.272***
	[0.034]	[0.034]	[0.034]	[0.034]
Colonial history	0.849***	0.850***	0.850***	0.832***
	[0.086]	[0.086]	[0.086]	[0.084]
Geographical contiguity	1.210***	1.207***	1.208***	1.163***
	[0.067]	[0.067]	[0.067]	[0.066]
Population, origin	0.523***	0.517***	0.514***	0.498***
	[0.022]	[0.023]	[0.023]	[0.022]
Population, destination	0.526***	0.562***	0.514***	0.576***
	[0.023]	[0.024]	[0.024]	[0.022]
REER, destination	0.001***	0.001***	0.001***	0.001***
	[0.000]	[0.000]	[0.000]	[0.000]
Life expectancy, destination	0.097	0.039	0.214	0.209
	[0.070]	[0.078]	[0.081]	[0.068]
Ebola				
Origin	−0.065***			
	[0.005]			
Destination	−0.089***			
	[0.008]			
Malaria				
Origin		−0.001		
		[0.001]		
Destination		−0.007		
		[0.001]		
SARS				
Origin			−0.387***	
			[0.092]	
Destination			−0.078***	
			[0.104]	
Yellow fever				
Origin				0.004
				[0.012]
Destination				−0.017
				[0.104]
Number of observations	210,221	210,221	210,221	213,645
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R^2	0.83	0.83	0.83	0.84

Note: The dependent variable is bilateral tourism flows (in log form). Robust standard errors, clustered at the country level, are reported in brackets. A constant is included in each regression, but not shown in the table. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Annex Table 2.3. Infectious Diseases and Tourism—Robustness Checks (2SLS-IV)

	(Dependent variable: Bilateral tourism flows)		
	Truncated sample	**Sub-sample (1995–2007)**	**Additional controls**
Real GDP, origin	0.961***	1.259***	1.023***
	[0.013]	[0.028]	[0.018]
Real GDP, destination	0.808***	0.751***	0.967***
	[0.015]	[0.028]	[0.019]
Distance	−1.632***	−1.688***	−1.704**
	[0.015]	[0.021]	[0.018]
Common language	1.202***	1.170***	1.233***
	[0.033]	[0.046]	[0.039]
Colonial history	0.755***	0.919***	0.864***
	[0.089]	[0.106]	[0.093]
Geographical contiguity	1.116***	1.232***	1.261**
	[0.072]	[0.084]	[0.074]
Population, origin	0.478***	1.224***	0.554***
	[0.022]	[0.057]	[0.033]
Population, destination	0.478**	0.305***	0.625***
	[0.023]	[0.057]	[0.032]
REER, destination	0.001**	0.001**	0.001**
	[0.000]	[0.000]	[0.000]
Life expectancy, destination	0.151	0.060	0.711***
	[0.078]	[0.136]	[0.194]
Hospital beds, destination			0.027***
			[0.010]
SARS			
Origin	−0.224***	−0.281***	−0.224***
	[0.085]	[0.041]	[0.095]
Destination	−0.028***	−0.016***	−0.011***
	[0.091]	[0.050]	[0.103]
Number of observations	176,489	96,416	111,591
Origin FE	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R^2	0.79	0.83	0.83

Note: The dependent variable is bilateral tourism flows (in log form). Robust standard errors, clustered at the country level, are reported in brackets. A constant is included in each regression, but not shown in the table. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Annex Table 2.4. Infectious Diseases and Tourism—Estimations by Income Group and Region (2SLS-IV)

(Dependent variable: Bilateral tourism flows)

	Advanced	Developing	Africa	Asia	Europe	Latin America	Middle East
Real GDP, origin	1.008***	0.935***	0.860***	1.044***	0.754***	0.889***	1.169***
	[0.017]	[0.020]	[0.044]	[0.054]	[0.044]	[0.035]	[0.052]
Real GDP, destination	1.083***	0.744***	0.304***	1.201***	0.575***	0.744***	0.371***
	[0.044]	[0.024]	[0.040]	[0.077]	[0.045]	[0.047]	[0.060]
Distance	−1.351***	−1.821***	−1.512**	−1.932***	−1.518***	−1.737***	−1.482***
	[0.026]	[0.019]	[0.053]	[0.077]	[0.085]	[0.051]	[0.072]
Common language	0.584***	1.404***	1.170***	0.697***	0.863	1.451***	0.781***
	[0.054]	[0.040]	[0.058]	[0.112]	[0.406]	[0.064]	[0.126]
Colonial history	1.164***	0.848***	0.231	1.116**	0.109	0.541	0.526
	[0.082]	[0.146]	[0.499]	[0.409]	[0.208]	[0.529]	[0.388]
Geographical contiguity	0.480***	1.307***	1.126**	0.936***	1.525***	0.970***	1.662***
	[0.106]	[0.079]	[0.148]	[0.185]	[0.167]	[0.150]	[0.198]
Population, origin	0.219***	0.660***	1.010***	0.824***	0.860***	0.797***	0.156
	[0.030]	[0.031]	[0.065]	[0.084]	[0.068]	[0.060]	[0.084]
Population, destination	0.231***	0.433***	0.398***	0.393	0.316	0.729***	0.885***
	[0.063]	[0.031]	[0.133]	[0.179]	[0.148]	[0.114]	[0.065]
REER, destination	0.006***	−0.000***	0.000	−0.002***	0.000	0.000***	0.000
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]
Life expectancy, destination	5.847***	0.585***	0.366*	1.668**	3.911***	0.745	0.887
	[0.528]	[0.087]	[0.146]	[0.554]	[1.264]	[0.420]	[0.659]
SARS							
Origin	−0.472	−0.556***	−0.362	−0.993***	−0.144	−0.455**	−0.850*
	[0.136]	[0.120]	[0.221]	[0.315]	[0.322]	[0.219]	[0.331]
Destination	−0.246	−0.243***	−0.207	−0.311***	−0.761	−0.204	−0.229
	[0.110]	[0.091]	[0.544]	[0.191]	[1.505]	[0.630]	[0.371]
Number of observations	70,721	139,500	36,232	23,922	23,794	33,750	21,802
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.88	0.85	0.81	0.86	0.85	0.85	0.81

Note: The dependent variable is bilateral tourism flows (in log form). Robust standard errors, clustered at the country level, are reported in brackets. A constant is included in each regression, but not shown in the table. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Annex Table 2.5. Out-of-Sample Forecast Performance

(Dependent variable: Bilateral tourism flows)

	Standard	Ebola	SARS
PPML models			
MAE	5.103	5.086	**4.954**
RMSE	5.806	5.791	**5.675**
U-Theil	0.625	0.624	**0.613**
2SLS-IV models			
MAE	1.168	1.165	**1.096**
RMSE	1.675	1.652	**1.561**
U-Theil	0.118	0.116	**0.111**

Note: Each model is trained with the data covering the period 1995–2014, then tested in forecasting on the period 2015–2017. The model with the lowest MAE, RMSE, and U-Theil values is considered to better forecast accuracy, which is shown in bold.

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Annex 3. Analyzing Macroeconomic Scenarios Using GIMF

Summary of New Features in the Theoretical Model

The IMF's Global Integrated Monetary and Fiscal model (GIMF) is an annual, multi-region, micro-founded general equilibrium model of the global economy. Readers are pointed to the documentation for the core model in Kumhof and others (2010) and Anderson and others (2013).

The tourism sector is a special feature of this application of GIMF. It is not documented in the two aforementioned papers. While tourism is a service, a tourism bundle is produced in the same manner as consumption and investment goods from a combination of tradable and nontradable goods, with one added feature—there is also a term for productivity, which is used in this paper to capture the costs incurred from the pandemic, including health costs, social distancing requirements, new technologies, and the like. The bundle of tourism services can be consumed by domestic households or by foreigner visitors, in which case it registers as tourism exports for the region and as imported tourism for the visitor's region. Consequently, households have a two-item consumption bundle made up of tourism services and other goods and services. The tourism portion consists of domestic tourist services produced (visiting within the region), and imports from foreign markets (visiting a foreign region). As with consumption goods, based on its production and consumption structure, tourism has a price, and forms part of the consumption basket, thereby having a role in determining consumer price index (CPI) inflation. Trade in tourism services is tracked bilaterally between all regions, just like consumption, investment, and intermediate goods.

Because of the tourism sector, this version of the model has more detail in trade overall. Unlike in the standard GIMF, consumption and investment goods are always treated separately, and not just as a single imported final good. Non-tariff barriers (NTBs) are also present, where country A

imposes the NTB, but country B will bear the cost in its production processes, and then have to pass it back to the importing consumers through higher prices. This is unlike tariffs, which would be imposed by country A on country B, and country A's government then collects the tariff revenues which it can then redistribute. Country B facing the tariff only experiences shifts in demand from the importing consumers in country A who bear the cost of the tariff.

Summary of the Calibration of the Asia-Pacific and Western Hemisphere Versions of GIMF

Two structurally identical eight-regions versions of GIMF are used, with some overlap in the regions used. One is focused on Asia-Pacific regions (ASEAN-5, Pacific Island 5, Australia and New Zealand, China and the other Asia-Pacific block), along with Europe, the United States, and the remaining countries. The other is focused on the Western Hemisphere (Caribbean, Central America, Latin America, and the other western hemisphere block) along with Canada, Europe, the United States, and the remaining countries to round out the model.[1]

Structurally, each country/regional block is close to identical, but with different key steady-state ratios and behavioral parameters (Annex Table 3.1). These are drawn from stylized data set consistent with 2018, and assumptions on long-term values for certain stocks, such as the capital-to-output and government debt-to-GDP ratios. There are data also for tourism services, for exports, imports and consumption, from which its production data are derived. The tourism economies vary markedly in their share of global GDP, as does the size of tourism exports and the balance between consumption and production of tourism services. As a share of their own GDP, tourism exports

[1]The more precise definitions of the regions are as follows: ASEAN-5 (ASE) comprises Indonesia, Malaysia, Philippines, Thailand, and Vietnam; Australia and New Zealand (ANZ) comprises Australia and New Zealand; the Pacific Islands (PIC) comprises Fiji, Palau, Samoa, Tonga, and Vanuatu; the Caribbean (CRB) comprises the Eastern Caribbean Currency Union (ECCU—Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines), Bahamas, Barbados, Belize, Dominican Republic, and Jamaica; Central America (CAM) comprise Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama; Latin America (LAM) comprises Argentina, Brazil, Chile, Colombia, Mexico and Peru; Other Asia-Pacific (OAP) comprises India, Japan, Korea, the rest of South and Southeast Asia and the other Pacific island states; Other Western Hemisphere (OWH) comprises Bolivia, Ecuador, Guyana, Paraguay, Surinam, Trinidad and Tobago, Uruguay, Venezuela, and the remaining Caribbean islands; Europe (EUR) comprises the European Union, Albania, Iceland, Montenegro, North Macedonia, Norway, Serbia, Switzerland, and the United Kingdom; the Remaining Countries for the Asia-Pacific model (RC1) comprises any countries not in ASE, ANZ, China (CHN), PIC, OAP, EUR, and the United States (USA); and the Remaining Countries for the Western Hemisphere model (RC2) comprises any countries not in CRB, CAM, LAM, OWH, Canada (CAN), EUR, and USA.

Annex Table 3.1. Key National Accounts Ratios in GIMF

(Percent of a region's GDP, unless otherwise stated)

	Caribbean	Pacific Islands	ASEAN-5	Central America	Australia/ New Zealand	Canada	China	Europe	Latin America	United States
Share of Global GDP (%, US$)	0.15	0.01	3.04	0.31	1.91	2.01	15.74	21.79	5.26	24.23
Domestic Demand										
Household Consumption	63.9	51.1	61.0	65.3	57.4	56.8	47.5	57.0	65.6	65.2
Private Investment	21.0	24.8	22.6	18.5	18.9	18.6	27.5	20.7	16.0	17.4
Government Absorption	15.1	24.1	16.4	16.2	23.7	24.6	25.0	22.3	18.4	17.4
Tourism										
Consumed	5.0	8.0	6.0	4.0	5.0	5.0	3.6	5.5	2.6	2.0
Produced	18.3	28.9	7.8	9.6	5.3	3.9	2.0	7.3	1.9	2.8
Trade										
Goods Exports	12.6	20.7	171.2	17.9	18.8	30.5	18.7	18.5	22.8	12.1
Consumption	*7.9*	*16.2*	*143.8*	*13.8*	*7.4*	*11.6*	*8.7*	*8.6*	*7.5*	*5.4*
Investment	*0.7*	*3.0*	*6.8*	*0.6*	*0.6*	*4.2*	*4.9*	*4.2*	*1.5*	*2.0*
Intermediate	*4.0*	*1.5*	*20.6*	*3.5*	*10.8*	*14.7*	*5.1*	*5.7*	*13.8*	*4.7*
Tourism Service Exports	18.7	28.4	6.1	8.8	3.6	2.4	0.7	3.2	2.3	1.7
Goods Imports	26.9	43.1	44.4	23.8	19.2	29.6	17.1	20.4	19.5	12.9
Consumption	*12.9*	*25.0*	*11.1*	*10.0*	*9.5*	*12.9*	*3.5*	*8.6*	*6.7*	*6.5*
Investment	*3.9*	*9.6*	*10.2*	*3.9*	*4.3*	*7.4*	*2.5*	*3.7*	*4.5*	*2.6*
Intermediate	*10.1*	*8.5*	*23.1*	*9.9*	*5.4*	*9.3*	*11.1*	*8.1*	*8.3*	*3.8*
Tourism Service Imports	4.5	6.4	4.0	2.8	3.1	3.3	2.4	1.3	1.7	0.9

Sources: National statistical agencies; UN Comtrade database; and IMF staff calculations.

AQ1 Note: GIMF = ; ASEAN = Association of Southeast Asian Nations.

Annex Table 3.2. Calibration of Goods Trade and Tourism Elasticities

Elasticity between =>	Consumption and Tourism	Domestic/ Foreign Tourism	Foreign Tourist Destinations
Tourism	0.9	0.9	1.5
Elasticity between =>		Domestic/ Imported Goods	Different Regions' Goods
Consumption	–	1.5	1.5
Investment	–	1.5	1.5
Intermediates	–	1.5	1.5

Sources: IMF staff calculations.

and production are largest in the Pacific Islands and the Caribbean. All of this data allow for the calibration of the model parameters.

Many of the elasticities in GIMF are calibrated the same across regions, but each region has a unique set of related bias parameters. The bias parameters, given the elasticities, are computed based on the calibration of key steady-state ratios. This is also true of the bias parameters for trade. Those for goods trade rely on the UN Comtrade database and the IMF Direction of Trade Statistics. Those for tourism rely on the UN and OECD EBOPS databases for services, augmented by national authorities' data on visitor arrivals from different countries and regions.

Behavior is governed by elasticities calibrated with some differences from the goods sectors (Annex Table 3.2). The demand between tourism services and other consumption is relatively inelastic; the demand between tourism in the region or abroad is also relatively inelastic, but between different foreign markets, it is more elastic. This is in contrast to the trade in consumption, investment, and intermediate goods, which is relatively elastic between domestic and foreign goods, with the same higher elasticity among foreign markets.

In the short term, the degree and rapidity with which various sectors of the economy adjust are governed by real rigidities and nominal adjustment costs. Real rigidities play a small role in GIMF's annual dynamics and are set to 1 across all regions for all variables (labor demand, liquidity-constrained households, investment, and imports of consumption, investment and intermediate goods, and tourism) except consumption by saving households which is set to 2. For the COVID-19 pandemic shocks, real rigidities in the tourism sector are set to zero to account for the unusually rapid adjustment. Nominal adjustment costs are set the same across domestic (tradable intermediates, nontradable intermediates, final consumption goods, final investment goods, tourism), although they are higher in Europe to reflect greater structural rigidities. However, they vary widely across regions for imports (Annex Table 3.3). Countries which are large import markets (like the United States) have high adjustment costs, meaning exporters can only adjust their prices slowly in those markets. Smaller markets (such as the Caribbean

Annex Table 3.3. Calibration of Nominal Adjustment Costs

	United States		Europe		China		Canada, Other Asia-Pacific, Latin America	
	Baseline	COVID-19 Shock	Baseline	COVID-19 Shock	Baseline	COVID-19 Shock	Baseline	COVID-19 Shock
Real wage	100	100	150	150	100	100	100	100
Consumption price	100	100	150	150	100	100	100	100
Tourism price	100	50	150	50	100	50	100	50
Investment price	100	100	150	150	100	100	100	100
Intermediate prices	100	100	150	150	100	100	100	100
Price of imports of								
Goods	100	100	50	50	25	25	10	10
Tourism	100	8	50	8	25	8	10	4

Sources: IMF staff calculations.

and Pacific Islands, along with other emerging markets) are essentially price takers—exporters can shift their prices quickly in these smaller markets. For the COVID-19 pandemic shocks, the nominal adjustment costs for both domestic and imported tourism prices are greatly reduced in all regions, reflecting the involuntary and highly unusual adjustment of prices that have occurred, largely driven by exogenous factors (such as the sudden shutting of international borders).

Summary of Assumptions Underpinning the Use of GIMF

Readers should keep in mind that the results from the scenarios simulated with GIMF are underpinned by the following assumptions:

1. All agents in the model (including households, firms, and the fiscal and monetary authorities) have perfect foresight.
2. All regions in GIMF have the same economic structures, differing only through their parameterization and calibration.
3. The model is at an annual frequency, so degree of detail for some of the economy's dynamics are lost, particularly in the first year for investment.
4. The baseline calibration of GIMF is based on parameter values consistent with 2018 for the great ratios to GDP such the capital stock, government debt and deficit, net foreign assets, and current account balance, and national accounts aggregates as well as trade flows and services data.
5. The model has non-linearities in the financial accelerator, and potential for non-linearities in the conduct of monetary policy by either encountering the zero-interest-rate floor or using monetary accommodation (features not used here). Otherwise, the model is approximately linear for small enough shocks.

6. The real exchange rate is a "jumper," adjusting immediately in the first year to shocks, since it follows the standard forward-looking, risk-adjusted uncovered interest rate parity condition that equates the forward sum of national-US interest rate differentials with the one-year-forward difference in the nominal exchange rate. However, there is no financial friction in the equation required to bring the net foreign asset position to its steady state, as the net foreign asset position and its dynamics solve endogenously as part of the OLG framework.
7. There are no substantial financial market channels. GIMF only has a financial accelerator (albeit using the full general equilibrium form with non-linearities) and assumes complete domestic ownership of firms. All net foreign asset positions are denominated in US dollars, in all countries.

Then there are the assumptions underlying the behavior of monetary and fiscal policy in this paper's scenarios:

1. Monetary Policy: Monetary policy is passive, relying only on its inflation targeting rules (interest rate reaction functions). There is no additional monetary policy stimulus to offset the impact of the shocks to tourism, to allow for a full illustration of the potential impact of the tourism sector on the economy.

2. Fiscal Policy:

   a. Fiscal policy is configured so that the government follows through on its pre-COVID-19 spending plans for government consumption, infrastructure investment and household transfers, although automatic stabilizers are also active (and react to the large tourism-driven recession). Revenues will move with the state of the economy as well.

   b. Some of these features are changed when modelling the fiscal stimulus shocks in Box 1.

   c. The deficit will vary over time, growing during the recessionary phases, and shrinking during economic expansions from automatic stabilizers, variability in revenues, and unchanged spending plans.

   d. For model stability, after 20 years, the government pursues its pre-COVID-19 debt-and deficit-to-GDP targets. It achieves the deficit-to-GDP target in the short term by cutting transfers to households. Combined with ongoing economic growth, the debt-to-GDP ratio will then return to its target level in the longer term.

Technical Summary of the Scenarios Presented

This section explains the benchmark and alternative scenarios, along with the scenarios built for the boxes. The benchmark scenario and the box scenarios are comprehensively presented in the body of the paper, so their presentation here is limited to their technical implementation in GIMF. The presentation of alternative downside and upside scenarios starts with their technical specifications and a further decomposition into their constituent layers. There is additional analysis for the layers, focusing on different variations which comprise the benchmark and alternative scenarios.

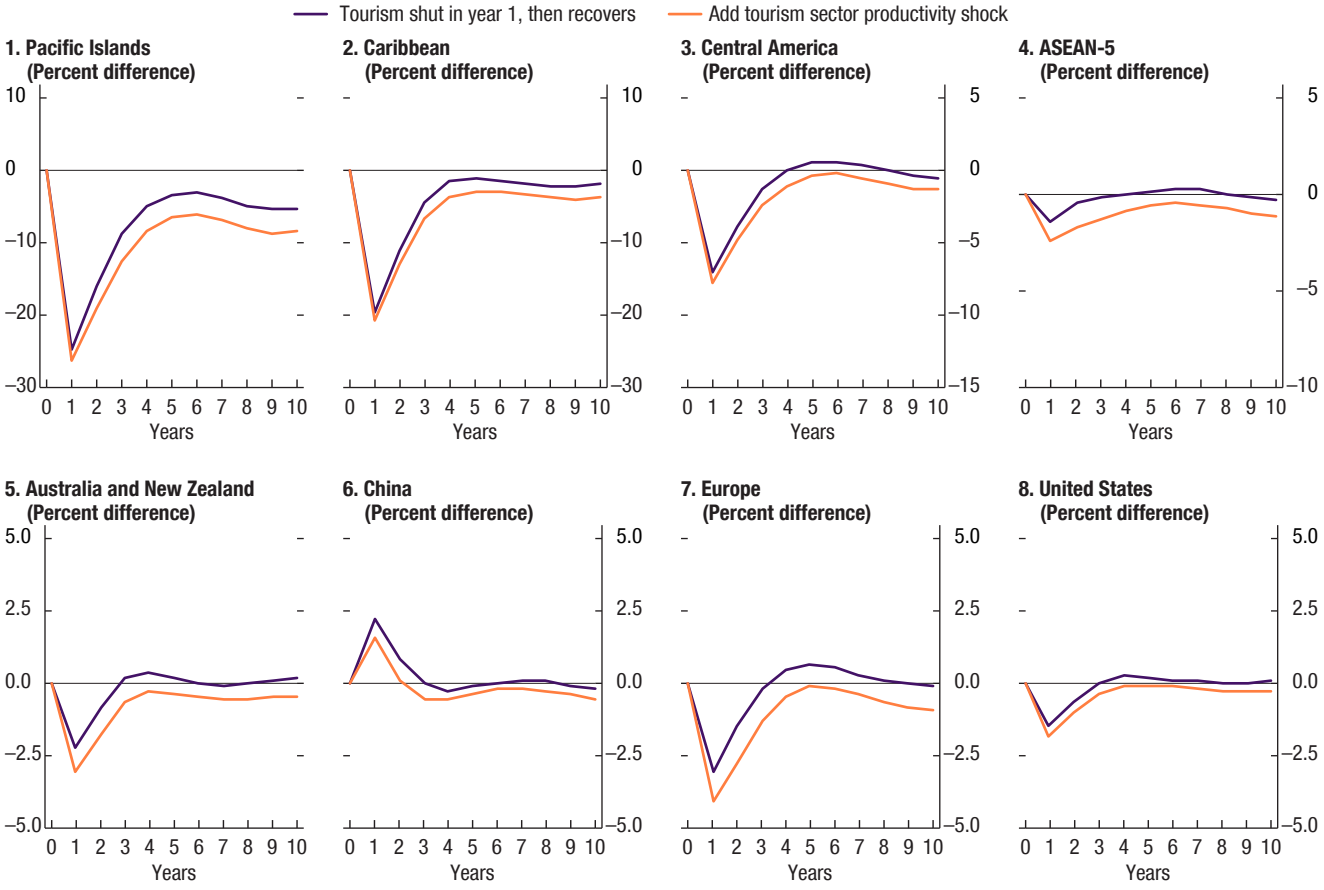
Benchmark Scenario

The benchmark scenario combines shocks to consumer preferences for all tourism and domestic versus foreign tourism and a permanent negative productivity shock in all regions' tourism sectors. The simulation starts in Year 1, using the existing steady state (representative of the pre-COVID-19 global economy) as its control case for both the Asia-Pacific and Western Hemisphere versions of GIMF. Tourism collapses and then recovers, subject to permanent economic scarring.

Annex Figure 3.1 illustrates the contribution of the productivity layer. Generally, for the tourism-dependent economies, it merely worsens the results. However, the presence of a negative productivity shock confined to the tourism sector in the more diversified economies, such as Canada and, not only worsen the outcomes, they lead to negative outcomes in the short term, offsetting the impacts from diverting consumer spending on tourism abroad to purchasing domestic goods and services instead.

Even in the case without the productivity shock, real GDP does not return to its original level, which reflects changes in measurement of real GDP, not actual permanent losses in income. Measuring real variables that are aggregates of real components rely on weighting those real components by their relative prices. Those relative prices shift over time when compared to the originally forecasted path (as component inflation rates are different than expected from the pre-COVID-19 forecasts). So even though all the real components for GDP (domestic and imported consumption, investment and government absorption, as well as exports) return to their original levels in the long term, their relative prices paths will be different (and are not bound to return to their previously forecasted values), so in the long term, real GDP's level will be different under the new forecasts presented in this paper relative to the pre-COVID-19 forecast of real GDP. The visible impact on the deviations of real GDP from the pre-COVID-19 forecast is greater

Annex Figure 3.1. Decomposition of the Benchmark Scenario
(Percent deviation from the pre-COVID-19 forecast)



Source: IMF staff calculations.
Note: ASEAN = Association of Southeast Asian Nations.

in those countries with larger tourism sectors, such as the Pacific Islands and Caribbean, as more of their economies would have been subjected to relative price shifts during the pandemic shock. The relevant model-based measure is real income, and it does return to its pre-COVID-19 forecasted level in the long term. This phenomenon does occur in all regions, but to a much lesser extent.

Because the large shift in relative prices in 2020 is present in both the upside and downside scenarios, the same phenomenon is present. It is most visible in the upside scenario, given that all the components of real GDP return to their pre-COVID-19 forecast values in the long term, even as real GDP itself does not. Compare Figures 16 and 17 in the body of the paper and see Annex Figures 3.2 and 3.3.

Technical Description

1. Tourism is reduced to close to zero in Year 1. This is achieved by:
   a. Reducing the bias toward other consumption over tourism (ALPHA_C) to almost zero within each region.
   b. Reducing the bias toward domestic tourism over foreign tourism (ALPHA_SH) to almost zero within each region.
2. Tourism reopens from Year 2 to Year 14, with a greater emphasis on domestic tourism. This is achieved by:
   a. Returning the bias toward other consumption over tourism (ALPHA_C) to its original values with a decay rate of 0.65.
   b. Returning the bias toward domestic tourism over foreign tourism (ALPHA_SH) to its original values with a decay rate of 0.65.
3. To represent the economic scarring, a permanent –10 percent shock is added starting in Year 1 to the level of sectoral productivity in the production function for tourism (AA_S) in each region.

Alternative Scenarios

This section presents the details for the alternative scenarios. The aggregated downside and upside scenarios are discussed first, followed by further exploration of the scenarios' component layers, highlighting the uncertainty inherent in all scenarios.

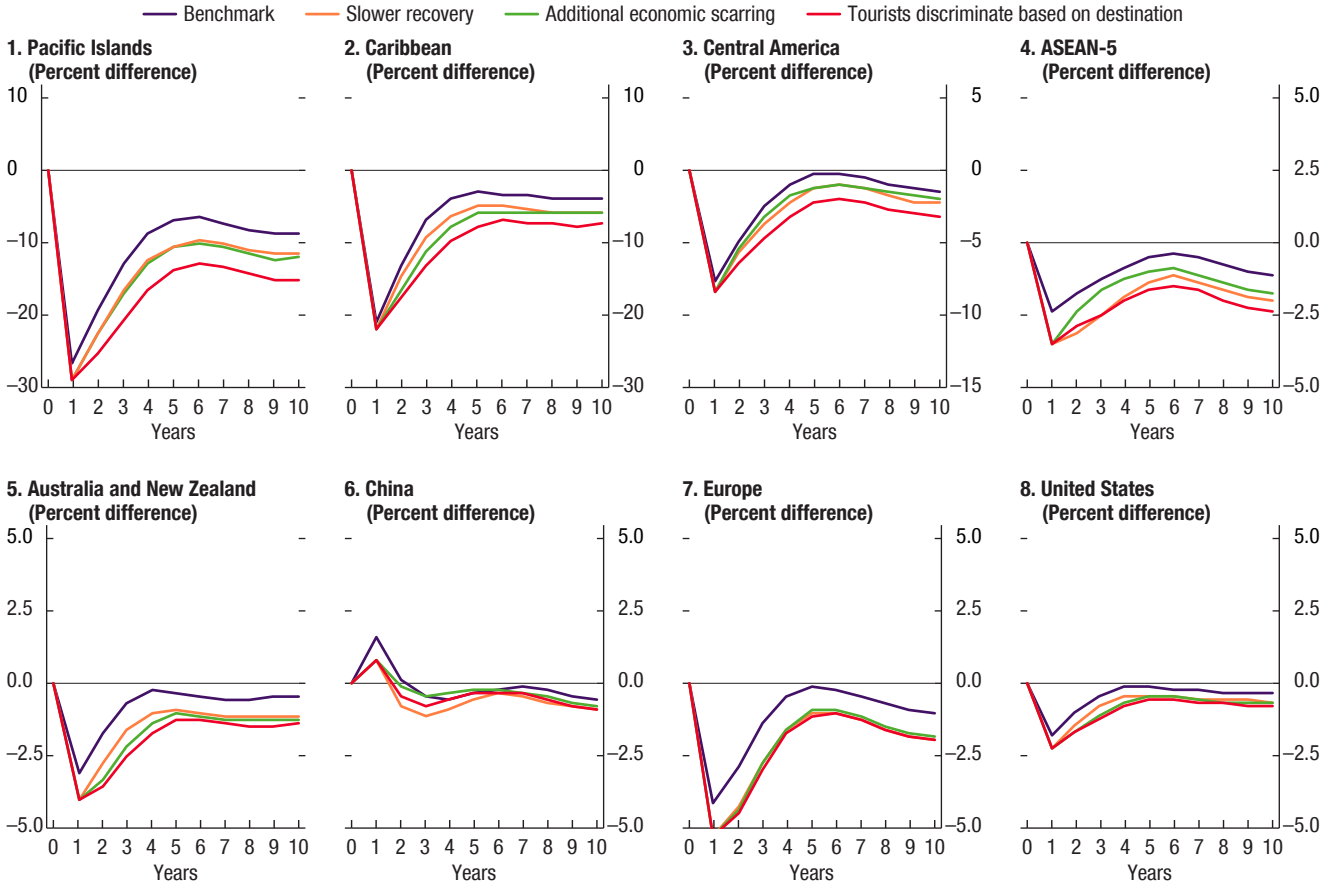
Downside Scenario

The downside scenario is built on top of the benchmark scenario. It assumes a more severe set of outcomes from the pandemic. The differing outcomes begin in Year 2 and are unanticipated as the shock hits in Year 1, when the benchmark scenario is the expected outcome. The downside scenario can be decomposed into its three constituent layers (Annex Figure 3.2).

Technical Description

1. More economic scarring in the tourism sector: As of the Year 2, the level of sectoral productivity in the production function for tourism (AA_S) in each region is at –20 percent (–10 percent in the benchmark scenario).
2. Slower recovery of tourist preferences for tourism, both domestic and foreign:
   a. Starting in Year 2, reduce the speed of recovery for the bias toward other consumption over tourism (ALPHA_C), using a decay rate of 0.80 instead of 0.65.

Annex Figure 3.2. Decomposition of the Downside Scenario
(Percent deviation from the pre-COVID-19 forecast)



Source: IMF staff calculations.
Note: ASEAN = Association of Southeast Asian Nations.

b. Starting in Year 2, reduce the speed of recovery for the bias toward domestic over foreign tourism (ALPHA_SH), using a decay rate of 0.80 instead of 0.65.

3. *Tourists differentiate among destinations based on quality of healthcare:* Starting in Year 2, NTBs are added to the tourism sector (NTB_S_[visiting region]_[visited region]). The shocks placed against the visiting regions as follows:

a. 5 percent for ANZ, CAN, EUR, USA

b. 7.5 percent for OAP

c. 10 percent for ASE, CHN, CRB, LAM, RC1, RC2

d. 15 percent for CAM, OWH, PIC

Upside Scenario

The upside scenario is also built on top of the benchmark scenario. The upside assumes a more favorable set of outcomes from the pandemic, even from Year 1. In Year 1, there is no assumption of a productivity shock in the tourism sector. Then from Year 2, the recovery is faster, both with the release of pent-up demand in Year 2, and then a faster speed of recovery overall. The differing outcomes begin in Year 2 and are unanticipated as the shock hits in Year 1, when the benchmark scenario is the expected outcome. The upside scenario can be decomposed into two constituent layers (Annex Figure 3.3).

Technical Description

1. No economic scarring in the tourism sector: There is no longer any change in level of sectoral productivity in the production function for tourism (–10 percent in the benchmark scenario). Real income will return to its original value, while real GDP will still deviate in some regions in the long term because of relative prices shifts.[2]

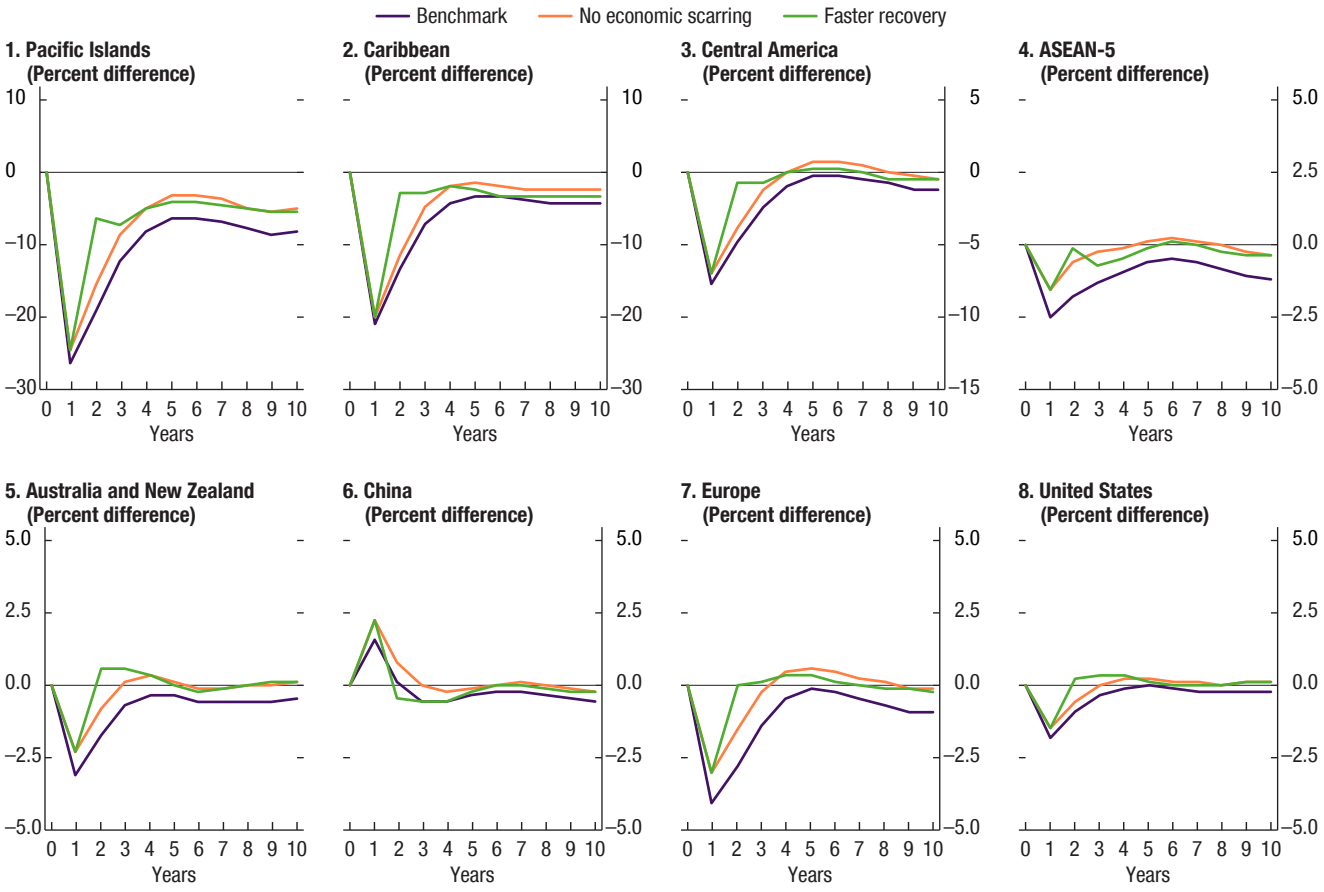
2. Faster recovery of tourist preferences for tourism, both domestic and foreign:
   a. Starting in Year 2, have a higher speed of recovery for the bias toward other consumption over tourism (ALPHA_C), using a decay rate of 0.20 instead of 0.65, and then let the recovery pause in Year 3 by using a decay rate of 1.00.
   b. Starting in Year 2, have a higher speed of recovery for the bias toward domestic over foreign tourism (ALPHA_SH), using a decay rate of 0.20 instead of 0.65, and then let the recovery pause in Year 3 by using a decay rate of 1.00.
   c. Starting in Year 4, have a higher speed of recovery for the bias toward other consumption over tourism (ALPHA_C), using a decay rate of 0.40 instead of 0.65.
   d. Starting in Year 4, have a higher speed of recovery for the bias toward domestic over foreign tourism (ALPHA_SH), using a decay rate of 0.40 instead of 0.65.

Differing Extents of Economic Scarring

Here four options for economic scarring are presented. Two options for scarring have been discussed for the benchmark (–10 percent) and alternative (–20 percent) scenarios. However, given that part the developments

[2]This technical phenomenon is explained in the preceding subsection on the benchmark scenario.

Annex Figure 3.3. Decomposition of the Upside Scenario
(Percent deviation from the pre-COVID-19 forecast)



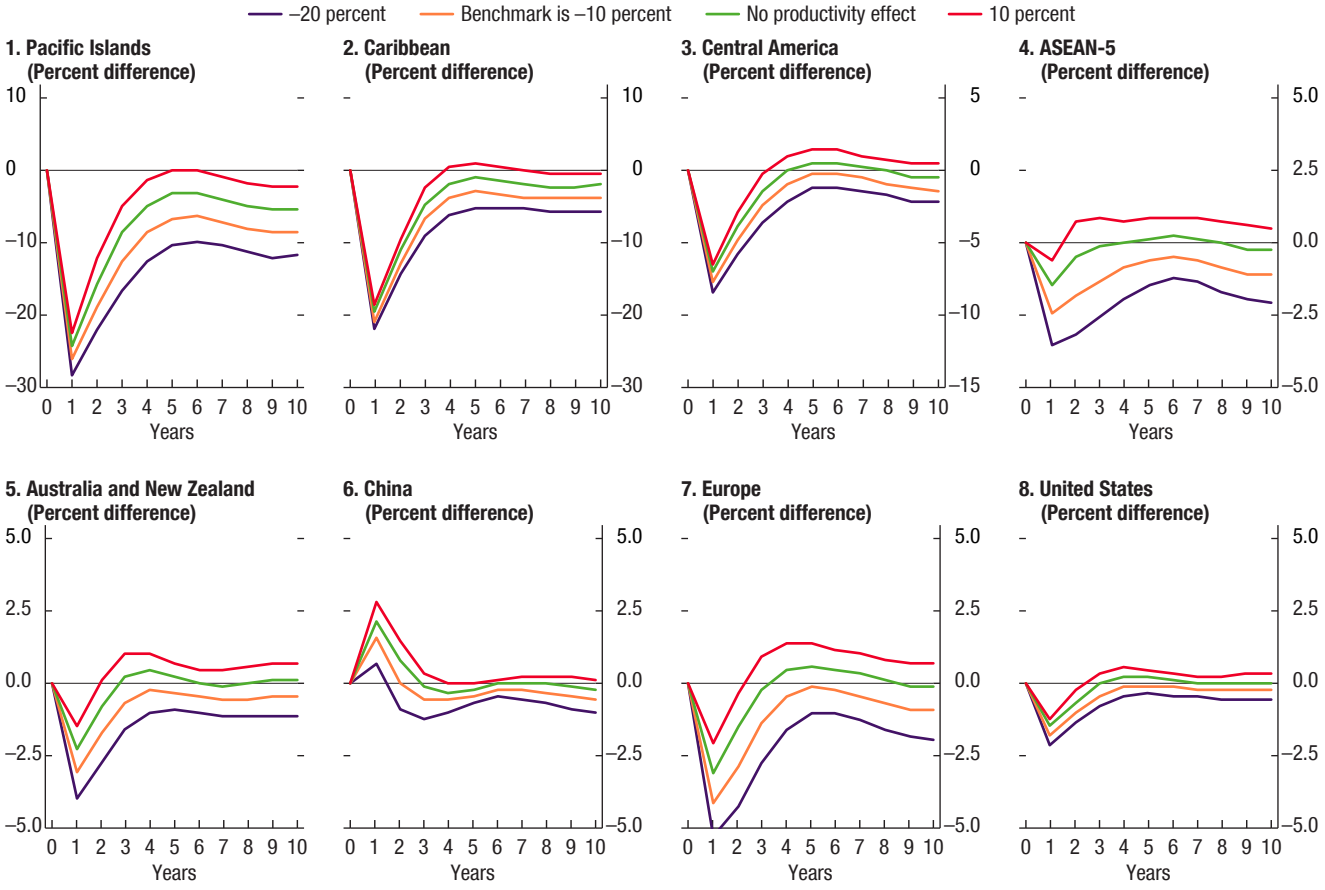
Source: IMF staff calculations.
Note: ASEAN = Association of Southeast Asian Nations.

in response to the pandemic will involve new technologies and potentially greater safety for healthcare, productivity could have a net zero effect, or even be positive (for example, +10 percent in the tourism sector). Therefore, a range of real GDP outcomes is possible (Annex Figure 3.4). The range of outcomes is the most widely dispersed for heavily tourism-dependent regions, such as the Pacific Islands and the Caribbean (up to more than 13 percentage points after 10 years), but much less for others (for example, only about 1 percentage point for China).

Technical Description

Economic scarring is represented by shocks to productivity in the tourism sector, which is the third component of the benchmark scenario. Four sim-

Annex Figure 3.4. Impact of Differing Degrees of Scarring in the Tourism Sector on Real GDP
(Percent deviation from the pre-COVID-19 forecast)



Source: IMF staff calculations.
Note: ASEAN = Association of Southeast Asian Nations.

ulations that begin in Year 1, using the steady state as their control cases for both the Asia-Pacific and Western Hemisphere versions of GIMF.

1. Use shocks 1) and 2) of the benchmark scenario for each region.

2. Add a permanent +10/0/–10 (benchmark scenario)/–20 (alternative scenario) percent shock starting in Year 1 to the level of sectoral productivity in the production function for tourism (AA_S) in each region.

Differing Speeds of Recovery

The recovery of the economy from the pandemic could be drawn out or compressed depending on tourist preferences. This outcome can depend

on the availability of a reliable vaccine. Here, two simulations starting in Year 2 are considered, using the existing benchmark scenario as their control cases for both the Asia-Pacific and Western Hemisphere versions of GIMF (Annex Figure 3.5). Assume the rebound is such that after five years, preferences for tourism are back at either 67 percent or 99 percent of their pre-COVID-19 levels, as opposed to the benchmark scenario level of 88 percent.

The recovery could be staggered among economies. Vaccinating the entire world will take time. Therefore, it could lead to staggered recoveries between regions—dependent on whether people are still afraid to travel to particular regions, or particular regions are reluctant to reopen their borders if incoming tourists are not vaccinated or the virus is still rampant.

Technical Description

The rate of recovery is governed by the speed of decay for the shock to tourist preferences. There are two simulations that begin in Year 1, using the benchmark scenario as their control cases for both the Asia-Pacific and Western Hemisphere versions of GIMF.

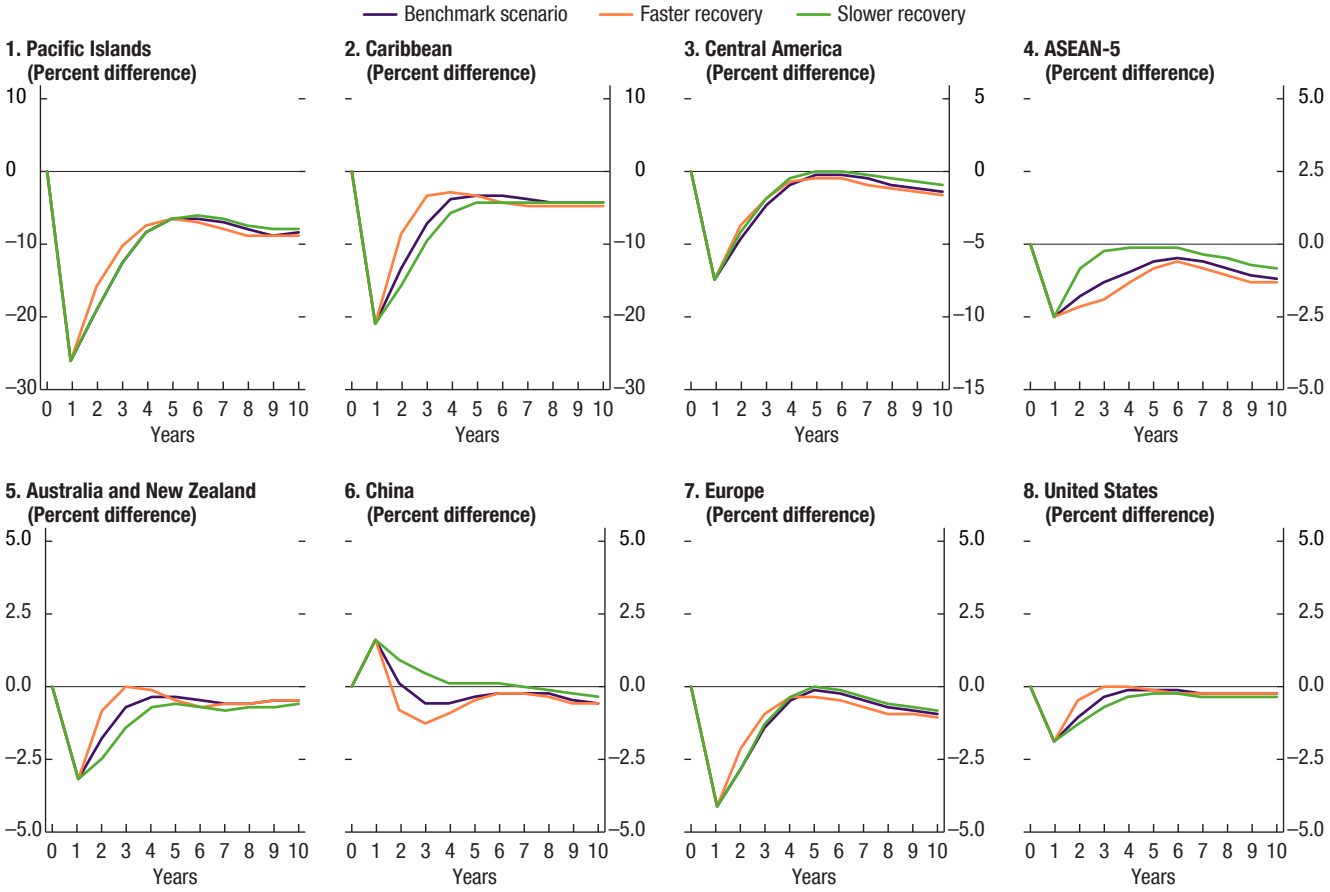
1. Starting in the Year 2, reduce (increase) the speed of recovery for the bias toward other consumption over tourism (ALPHA_C), using a decay rate of 0.80 (0.40) instead of 0.65.

2. Starting in the Year 2, reduce (increase) the speed of recovery for the bias toward domestic over foreign tourism (ALPHA_SH), using a decay rate of 0.80 (0.40) instead of 0.65.

Tourists Differentiating by Destination

Tourists preferences could permanently change because of lingering concerns related to COVID-19 or future pandemics. Under this scenario, tourists are assumed to differentiate among destinations based on the quality of healthcare available, specifically whether this is of higher, medium, or lower quality (Annex Figure 3.6, orange lines). Since many Pacific Island states tend to also have lower-quality healthcare, they are found to be most severely impacted, with negligible implications for advanced economies. Differentiating by region could potentially be further linked to the availability of a reliable vaccine. In that case, many regions with weaker healthcare system may see not only reduced levels of tourism, but slower recoveries in the return of tourists, with more delays the worse the state of a region's healthcare system (Annex Figure 3.6, green lines).

Annex Figure 3.5. Impact of Differing Speed of Recovery in the Tourism Sector on Real GDP
(Percent deviation from the pre-COVID-19 forecast)



Source: IMF staff calculations.
Note: ASEAN = Association of Southeast Asian Nations.

Technical Description

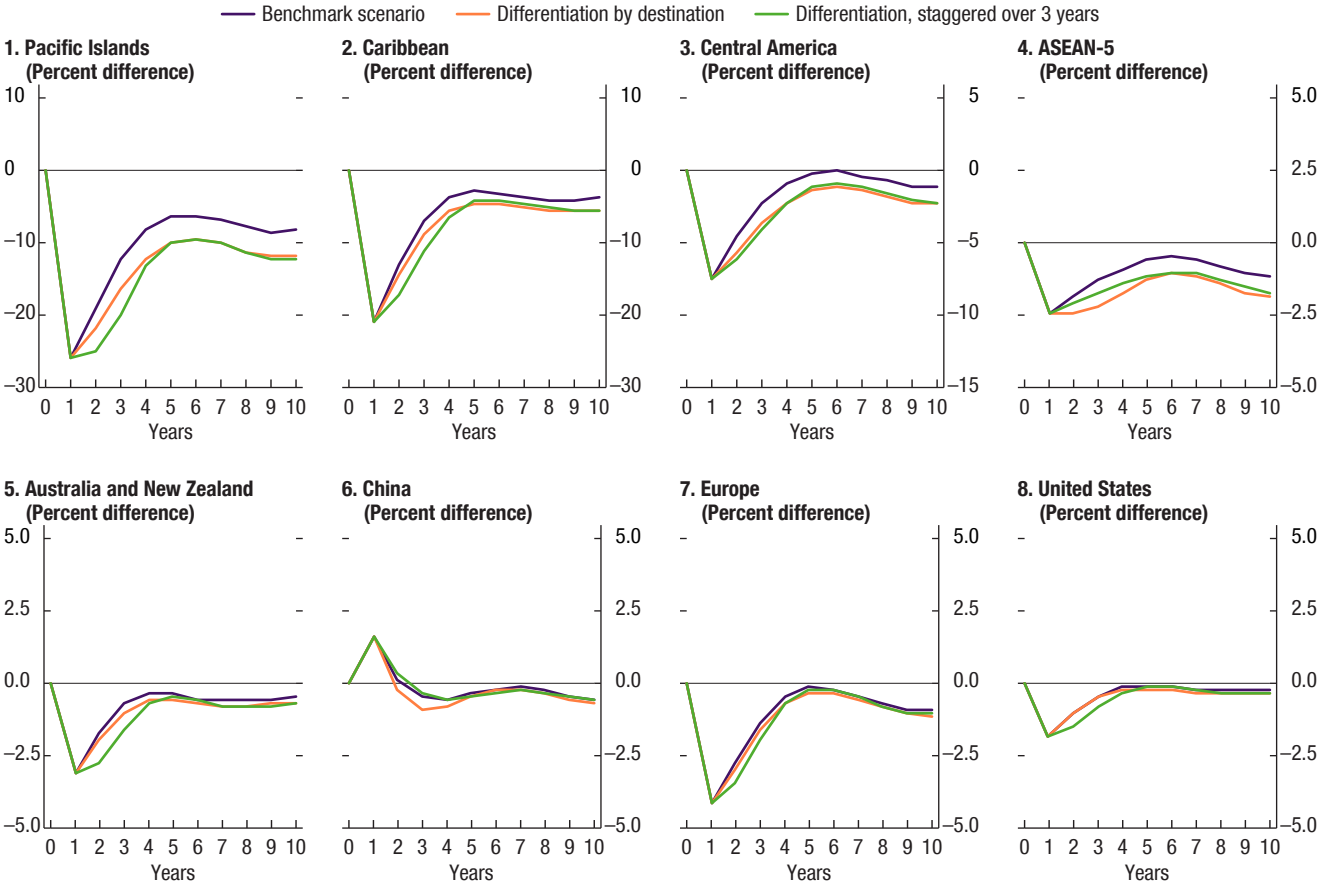
How tourists behave differently toward different regions is represented by different levels of NTBs on tourism. The simulations begin in Year 2, using the existing benchmark scenario as their control cases for both the Asia-Pacific and Western Hemisphere versions of GIMF.

1. Starting in Year 2, NTBs are added to the tourism sector (NTB_S_[visiting region]_[visited region]). The shocks placed against the visiting regions as follows:

   a. 5 percent for ANZ, CAN, EUR, USA

   b. 7.5 percent for OAP

Annex Figure 3.6. Tourists Differentiate by Destination—Impact on Real GDP, Globally
(Percent deviation from the pre-COVID-19 forecast)



Source: IMF staff calculations.
Note: ASEAN = Association of Southeast Asian Nations.

c. 10 percent for ASE, CHN, CRB, LAM, RC1, RC2

d. 15 percent for CAM, OWH, PIC

2. Same as the first scenario, but those regions facing 10 percent NTBs have a slower rate of return for tourists in Year2 (a root of 0.8 instead of 0.65), while those facing 15 percent NTBs have slower rates of return in Year 2 (a root of 0.9 instead of 0.65) and Year 3 (a root of 0.80 instead of 0.65).

Policy Scenario 1 (Box 1): Short-Term Fiscal Stimulus

Fiscal stimulus is formulated to have either a lower or a high multiplier in aggregate for the ASEAN-5. Each stimulus package is for three years,

at 3 percent of GDP for the first two years, and then halved in the third year. Afterward, fiscal instruments return to their former settings, with the exception of government investment, which may be needed to sustain a new higher infrastructure capital stock.

Technical Description

Two simulations begin in Year 1, using the benchmark scenario as its control case, with shocks in the ASEAN-5 (ASE) region for only the Asia-Pacific version of GIMF.

1. Shocks for the lower multiplier fiscal package:

   a. In Years 1 and 2, introduce a +1.0 percent of GDP shock on government consumption (GOVCONS) through E_GOVCONS (scaled by GDP and GOVCONS from the benchmark scenario). Cut the shock in half to +0.5 percent of GDP for Year 3.

   b. In Years 1 and 2, introduce a +1.5 percent of GDP shock general lumpsum transfers (TRANSFERS). Cut the shock in half to +0.75 percent of GDP for Year 3. Since transfers are endogenous in the fiscal identity, transfers will move by the shock to the government surplus (see below) less the shocks to government consumption (see above) and the labor income tax for saving households (see below).

   c. In Years 1 and 2, introduce a –0.5 percent of GDP shock on labor income taxes for saving households (TAU_L_OLG) through TAU-LOLGBAR (scaled by GDP and the labor income tax base for savings households, TAXBASE_L_OLG, from the benchmark scenario). Cut the shock in half to –0.25 percent of GDP for Year 3.

   d. As a result of all three shocks above, in Year 1 and Year 2 increase the deficit target to GDP ratio (GOVSURSTAR) through E_GOVSURSTAR by 3 (which is 3 percent of GDP). Cut the shock in half to 1.5 percent of GDP in Year 3.

2. Shocks for the higher multiplier fiscal package:

   a. In Years 1 and 2, introduce a +1.5 percent of GDP shock on government infrastructure investment (GOVINV) through E_GOVINV (scaled by GDP and GOVINV from the benchmark scenario). Cut the shock in half to +0.75 percent of GDP for Year 3.

   b. In Years 1 and 2, introduce a +1.0 percent of GDP shock targeted lumpsum transfers (TRANSFERS_TARG_RAT) and set TRANSFERSHARE=1 so that the transfers are directed only to liquidity-constrained households. Cut the shock in half to +0.5 percent of GDP for Year 3.

c. In Years 1 and 2, introduce a –0.5 percent of GDP shock on consumption value-added tax (TAU_C) through TAUCOLGBAR (scaled by GDP and the consumption tax base for all households, TAXBASE_C, from the benchmark scenario), which will automatically flow through to TAUCLIQSTAR. Cut the shock in half to –0.25 percent of GDP for Year 3.

d. As a result of all three shocks above, in Year 1 and Year 2 increase the deficit target to GDP ratio (GOVSURSTAR) through E_GOVSURSTAR by 3 (which is 3 percent of GDP). Cut the shock in half to 1.5 percent of GDP in Year 3.

Policy Scenario 2 (Box 2): Tourism Bubble

To consider a tourism bubble, a two-year variant of the benchmark scenario is first constructed. The example of the Pacific Islands and Australia and New Zealand are considered in this case, although there are other candidates that would yield similar results.

Technical Description

There are two simulations. The first simulation creates a variant of the benchmark scenario, where the Year 1 shocks to tourism extend into Year 2, before they begin to run off using the decay roots found in the benchmark scenario. The second simulation creates a travel bubble between the Australia and New Zealand (ANZ) and Pacific Islands (PIC) regions.

The first simulation begins in Year 2 to create a more severe scenario than the benchmark scenario, by using the benchmark scenario as its control case.

1. Tourism is kept at close to zero in Year 2 in all regions. This is achieved by:

   a. Keeping the bias toward other consumption over tourism (ALPHA_C) is maintained at the same value as in Year 1.

   b. Keeping the bias toward domestic tourism over foreign tourism (ALPHA_SH) is maintained at the same value as in Year 1.

2. Tourism reopens from Year 3 to Year 14 in all regions, with a greater emphasis on domestic tourism. This is achieved by:

   a. Returning the bias toward other consumption over tourism (ALPHA_C) to its original values with a decay rate of 0.65.

   b. Returning the bias toward domestic tourism over foreign tourism (ALPHA_SH) to its original values with a decay rate of 0.65.

The second simulation begins in Year 2, using the first scenario as its control case, but with shocks in ANZ and PIC to create a tourism bubble for only those two regions.

1. In Year 2, remove the shock from ALPHA_C in ANZ and PIC to allow for full resumption of tourism as a share of consumption.

2. In Year 2, returning the bias toward domestic tourism over foreign tourism (ALPHA_SH) to its original values with a decay rate of 0.80 in ANZ and 0.65 in PIC.

3. For Year 2 only, add a shock to non-tariff barriers (NTBs) on imports of tourism services by ANZ from other regions (NTB_S_ANZ_[visited region]) of 200 percent.

4. For Year 2 only, add a shock to NTBs on imports of tourism services by PIC from other regions (NTB_S_PIC_[visited region]) of 200 percent.

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Annex 4. Assessing Export Development Potential in Tourism-Dependent Economies

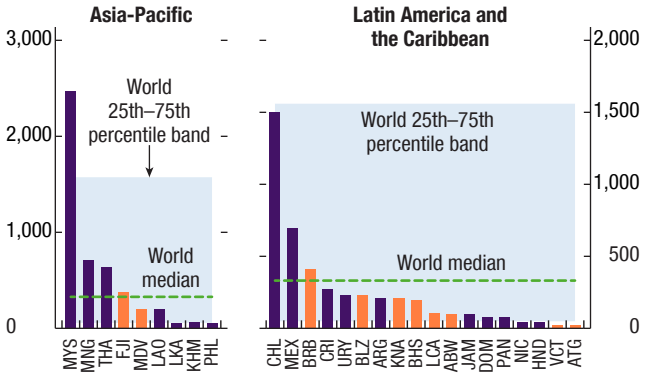
Non-Tourism Exports in Tourism-Dependent Economies

Several tourism-dependent countries have substantially developed other export sectors. This approach has in turn helped them mitigate the current shock to tourism.

- A few countries in this group can rely on an abundance of natural resources, with the resulting foreign exchange and revenue flows. Chile and Mexico, for example, with their fuel/mineral commodity exports per capita rank among the world's top quartile (Annex Figure 4.1, panel 1). Some commodity exporters may also have room to further develop natural resource exploitation to reduce the impact of a potential long-term tourism decline, subject to country-specific circumstances.
- Some countries have also an important level of development of non-commodity goods exports per capita. For example, Thailand, Panama, Chile, and Mexico rank among the world's upper quartile on this indicator (Annex Figure 4.1, panel 2). This is also the case in a number of small states (below 1 million population, highlighted in red), which have significant levels of manufacturing exports. For example, Bahamas, Barbados, Saint Kitts and Nevis, and Saint Lucia have export medicaments, medical goods and equipment, ships and vessels, and electronics. Natural resource-based exports (for example, in fisheries and agriculture) are also a significant export diversification option, including for small states.
- Several countries have developed other service exports, although they often do not represent a reliable source of receipts. Many countries with population below 1 million are in the world's upper half in terms of non-tourism services per capita and many of them, especially in the Central America and the Caribbean, are in the top quartile (Annex Figure 4.1, panel 3).

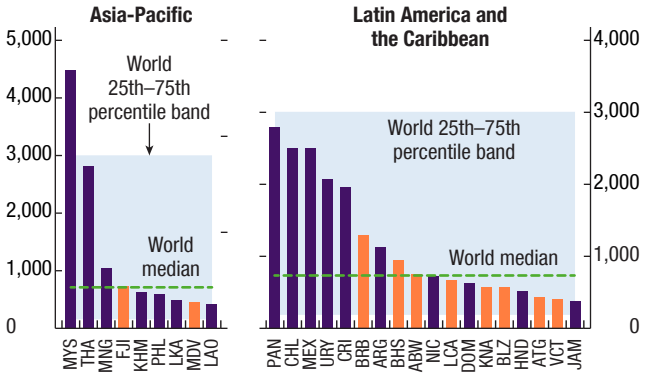
Annex Figure 4.1. Non-Tourism Exports in Tourism-Dependent Economies
(US dollars per capita, average over 2015–17)

1. Fuel and Mineral Exports per Capita (US dollars)



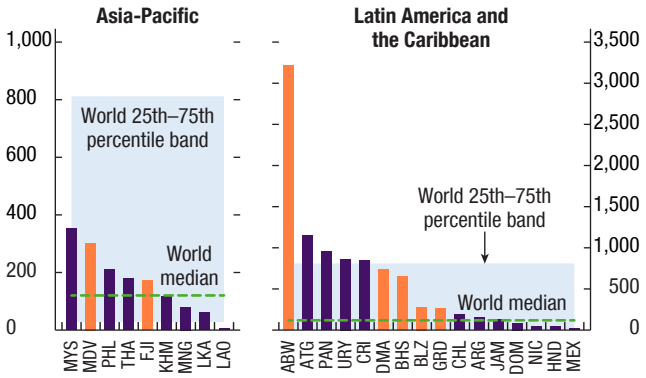
Sources: UN Comtrade database; and IMF staff calculations.
Note: Includes only raw hydrocarbon and mineral exports. Orange bars denote countries with population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

2. Non-Commodity Goods Exports per Capita (US dollars)



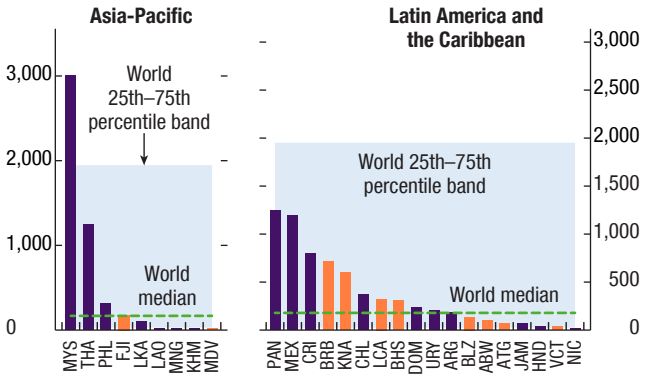
Sources: UN Comtrade database; and IMF staff calculations.
Note: Excluding raw hydrocarbon/mineral exports. Orange bars denote countries with a tourism population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

3. Non-Tourism Service Exports per Capita (US dollars)



Sources: UN EBOPS database; and IMF staff calculations.
Note: Orange bars denote countries with population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

4. Complex Exports per Capita (US dollars)



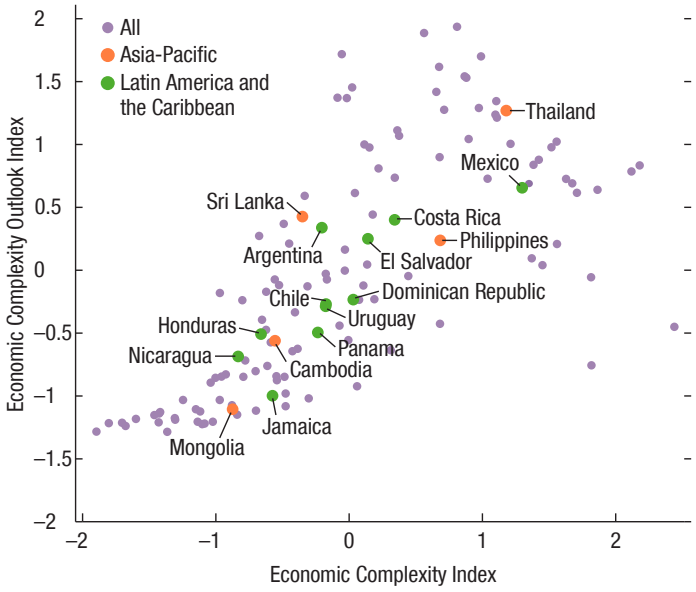
Sources: UN Comtrade database; Hausmann and others (2014); and IMF staff estimates and calculations.
Note: Orange bars denote countries with population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

However, these exports tend to be concentrated on financial services that benefit from very low taxation and/or passport sales. Both sectors are subject to an uncertain outlook in light of ongoing changes in international regulations to avoid tax evasion and of the highly volatile demand for second citizenship programs. Medical and education tourism services provide a likely more stable diversification option.

Export Development Potential

The levels of export diversification and complexity are positively associated with the level of income per capita. This is the case at least until countries reach the level of income that exists in advance economies (Hausmann and others 2014, IMF 2014). IMF (2014) notes that the higher level of diversification can be achieved through developing new products or trade linkages with new trading partners as well as through quality upgrade of existing products.

Annex Figure 4.2. Economic Complexity Outlook Index, 2018



Sources: Harvard Kennedy School of Government, *The Atlas of Economic Complexity*; and World Travel and Tourism Council.
Note: The Economic Complexity Index (ECI) is a measure of the diversity and complexity of a country's export basket. The Economic Complexity Outlook Index is a measure of how many complex products are near a country's current set of productive capabilities. Chile's low ECI is due to exogenous high natural resource abundance; however, it has a high level of complex exports per capita.

Several tourism-dependent countries have relatively low level of export complexity that affects their options for new products development (Annex Figure 4.2). Development of new products requires the expansion of the productive knowledge and capacities. Hausmann and others (2014) argue that countries move from products that they already made to new products that require similar know-how, as this demands a smaller amount of additional production knowledge. Therefore, existing production capabilities determine the ease of developing new products for the country. Hausmann and others (2014) approximate the variety of capabilities available for the country by the diversity of its export basket. In particular, the Economic Complexity Index (ECI) measures how diversified and complex country's export basket is. ECI combines diversity, that measures how many different types of products a country is able to make, and ubiquity, that measures the number of countries that are able to make a product. Hausmann and others (2014) show that there exists the positive association between economic complexity and income per capita. Annex Figure 4.2 shows that several tourism-dependent countries do not have very complex export baskets.

Given existing capabilities, some countries have limited options to move to more complex products.

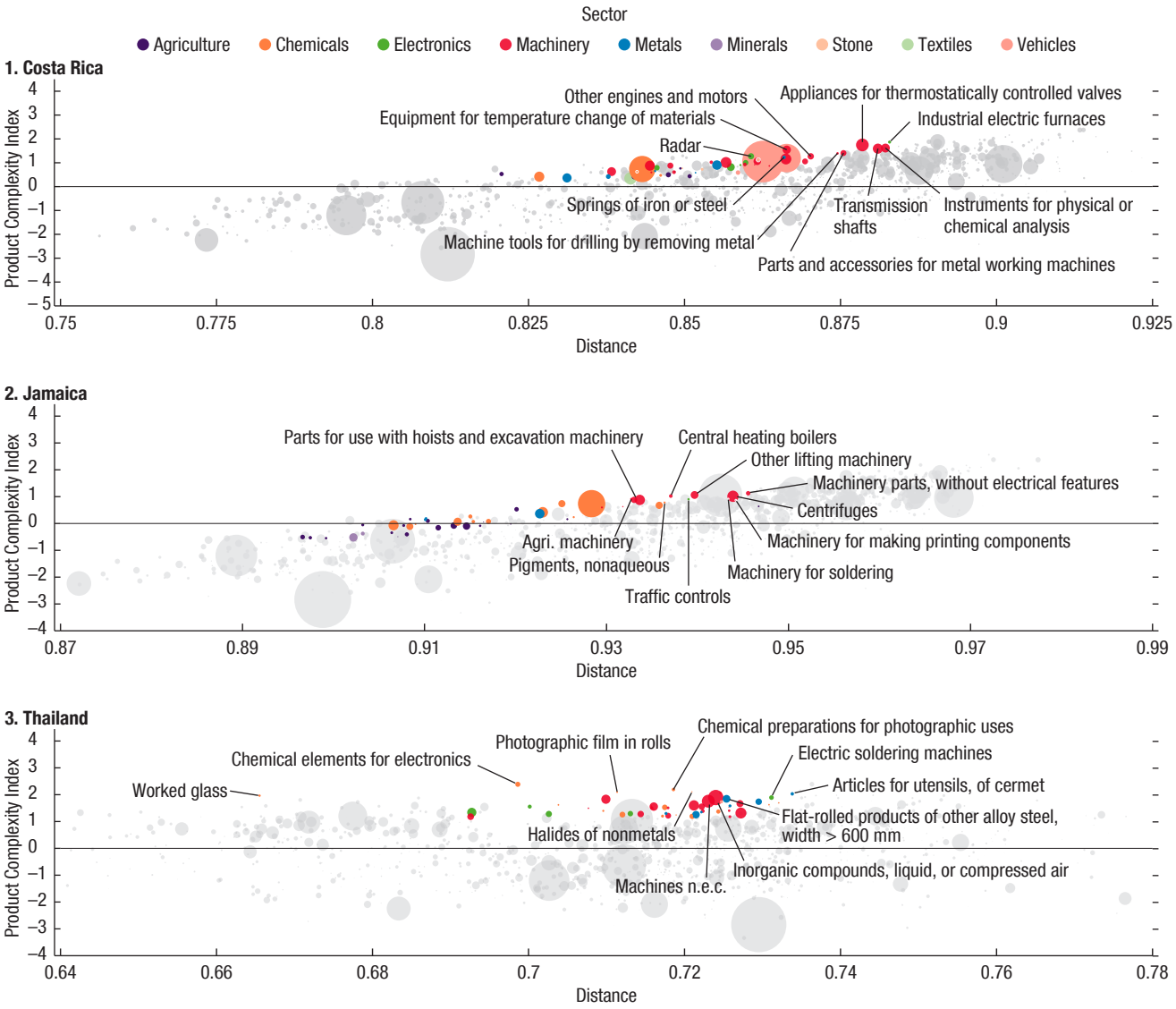
- The economic complexity outlook (COI) measures how many complex products are near a country's current production capabilities based on its existing export basket and the complexity of the underlying products. COI helps identify a country's potential for diversification. Cambodia, Dominican Republic, Honduras, Jamaica, Mongolia, Nicaragua, Panama, and have few nearby opportunities, so they would need stronger policies to move to strategical areas with future diversification potential (Annex Figure 4.2). In contrast, Thailand is an example of a country where existing production capacity and knowhow provide many options to diversify into related products.
- COI reflects a country's position in the product space, which provides a more granular view on diversification options for a country. The product space represents relatedness, or *distance*, between different goods, based on the similarities of know-how required for their production. The country's position in the product space reflects availability of more complex products with the smallest distance to existing know-how.[1] For example, as illustrated in Annex Figure 4.3, for both Costa Rica and Thailand, their position in the product space suggests significant opportunities to diversify into related products, notably industrial machinery, and electrical machinery and equipment, given their existing production of complex products. Jamaica is also connected to a few production opportunities, with industrial machinery products and plastics having the highest potential. Agricultural products have smaller product complexity and opportunity gains for Jamaica, but smaller distance to existing know-how.

Another diversification option for the countries is quality upgrade of the existing products. The quality of the goods produced by a country is also linked to its level of economic development (IMF 2014, Henn and others 2020). As the cost of moving to new sectors could be high, production of higher quality varieties of existing products might be a more feasible option for the diversification. At the same time, countries that have capacity to produce goods which are already close to the world quality frontier might have scope to further expand production and market shares in these sectors.

Many tourism-dependent economies have significant scope for the quality upgrade (Annex Figure 4.4). The quality index as developed in Henn, Papageorgiou, and Spatafora (2013) is calculated as the unit value of exported

[1]Complexity Outlook Index (COI) is based on the distance between the products that a country is currently making and those that it is not, weighted by the complexity of the products it is not making.

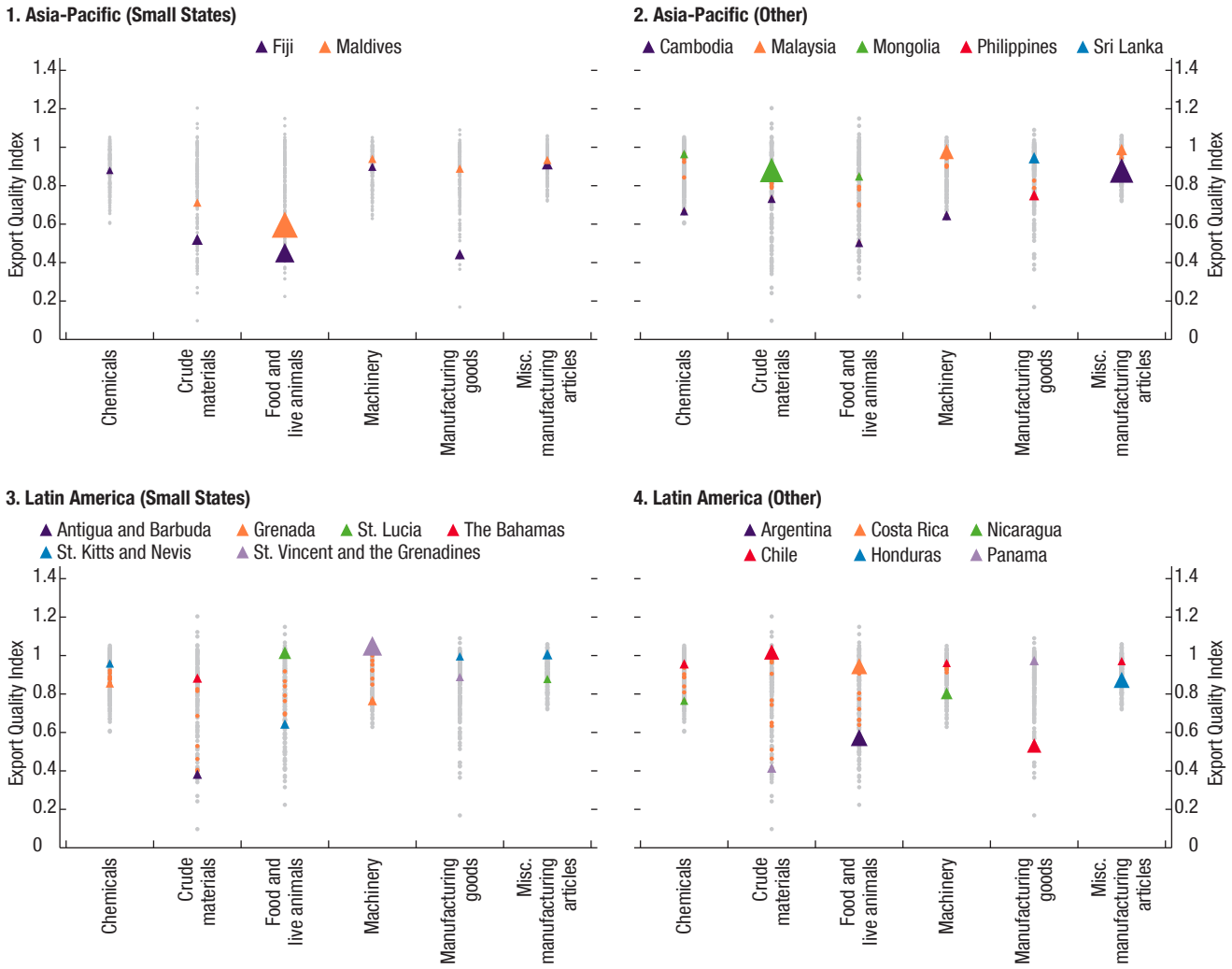
Annex Figure 4.3. Product Space Analysis



Source: Harvard Kennedy School of Government, *The Atlas of Economic Complexity*.
Note: The figure depicts the top 50 products with high potential for new diversification. Product complexity index ranks the diversity and sophistication of the productive know-how required to produce a product. Distance captures the extent of a location's existing capabilities to make the product as measured by how closely related a product is to its current exports. The size of the bubbles reflects the size of the global market for each good.

goods adjusted for differences in production costs and for the selection bias stemming from relative distance. The quality ladders represent the extent of existing heterogeneity in quality across different varieties of a product, that can be aggregated on the sectoral level. The country's position on the sectoral quality ladders reflects its potential for quality upgrading within the existing production basket.

Annex Figure 4.4. Quality Ladders



Sources: Henn, Papageorgiou, and Spatafora (2013); and the IMF staff calculations.
Note: Orange dots show tourism-dependent countries; triangles indicate countries with the lowest and highest positions on the quality ladders for each sector. The size of the squares and triangles reflects the share of each sector in total export of goods. Export quality index is calculated as the unit value of exported goods adjusted for differences in production costs and for the selection bias stemming from relative distance. Small states covered by the data set in the Asia-Pacific region include only Fiji and Maldives.

- Among Asia and Pacific countries, Cambodia is an example of country with the biggest potential for quality upgrade. The quality of clothing and footwear, a subcategory of miscellaneous manufactured articles which contributes about 80 percent of Cambodia's exports of goods, is slightly below the middle of the quality ladder, while the quality of machinery products, the second biggest export in Cambodia, is very low.

- Among Latin American and Caribbean countries, Argentina, Chile, and Honduras also show potential to upgrade quality across important export sectors, such as clothing, food, and manufacturing goods. Micro-states, such as St. Vincent and the Grenadines, and Saint Kitts and Nevis, produce machinery and manufactured goods that are at the world frontier of quality, including ships and boats and measuring instruments.

Policy and Institutional Choices

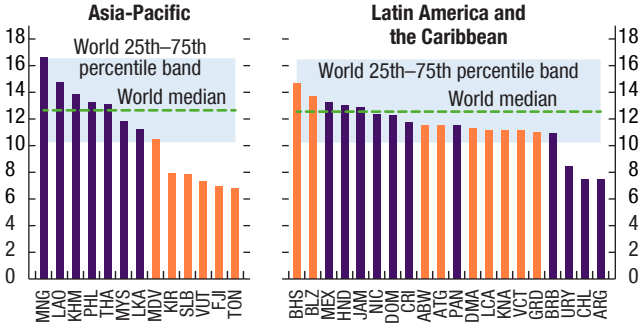
Countries' ability to further diversify their export baskets, aside from their starting position, tends to be determined by several geographical, economic, and institutional factors. Specifically, the economic literature tends to identify three main groups of determinants of a country's ability to diversify and develop complex exports: (1) distance/proximity to other economies (Cadestin, Gourdon, and Kowalski 2016; Weldemicael 2012; Raei, Ignatenko, and Mircheva 2019; and Salinas forthcoming-a); (2) productivity-related variables (Hausmann and others 2007; Weldemicael 2012; Ding and Hadzi-Vakov 2017; Giri, Quayyum, and Yin 2019; Salinas, forthcoming-b); and (3) unit labor costs (Salinas forthcoming-a).

Many tourism-dependent countries can leverage their *proximity to other markets*, such as China or the United States, to integrate into global value chains (Annex Figure 4.5, panel 1). Specifically, a country's proximity can be gauged by an index, based on a sum of the size of partner economies weighted by the inverse of their distance.

- For Latin America and the Caribbean, the index suggests that only Argentina, Chile, and Uruguay are relatively remote, but these countries are also less dependent on tourism. Caribbean countries, as well as Mexico, which are the most tourism-dependent countries in the region, have an index above the world's median, given their close distance to the United States and hence have greater scope to integrate into value chains.
- In Asia and the Pacific, countries have an index of proximity to markets below the world's median. These results are mainly driven by the highly tourism-dependent, small, and remote Pacific islands. This group of countries, therefore, would need stronger productivity-related policies to offset their distance disadvantage, possibly with a focus on services sectors, which are less dependent on distance to other markets. They could also effectively shorten distance to other economies by enhancing connectedness at all levels, reducing trade policy barriers, enhancing trade facilitation, strengthening transport infrastructure, investing in top-notch communication technology (particularly on internet connectivity), and fostering technological diffusion.

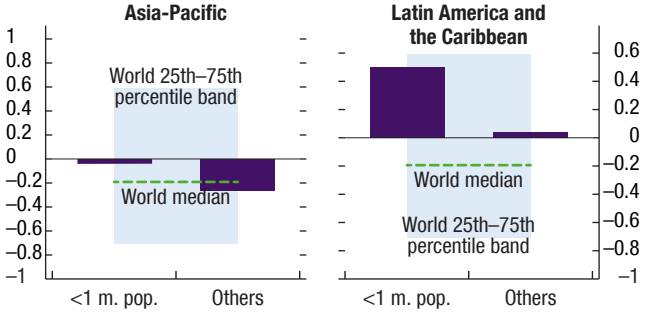
Annex Figure 4.5. Export Diversification Policies for Selected Regions (Average 2015–17)

1. Proximity to Markets (Index; millions)



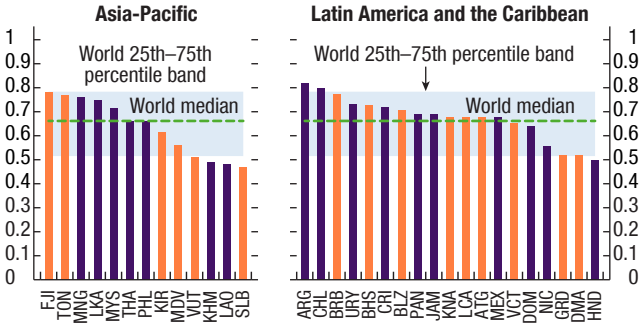
Sources: UN Comtrade; and IMF staff calculations.
Note: Index for each country is the sum of GDP of other countries weighted by distance to the country. Orange bars denote countries with a population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

2. Governance (Index –2 to 2, highest)



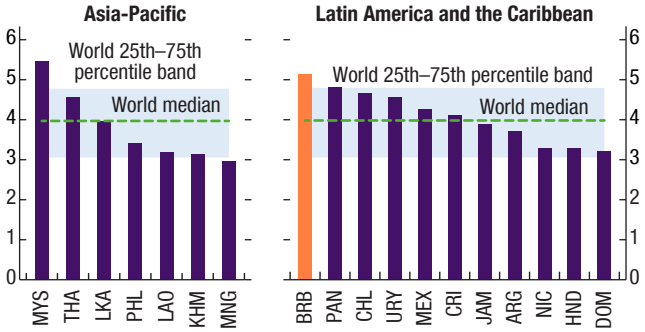
Source: World Bank, Worldwide Governance Indicators.

3. Educational Attainment (Index 0 to 1, highest)



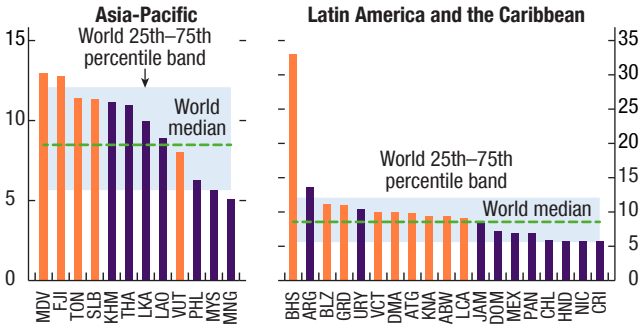
Sources: *UN Human Development Report*, various editions.
Note: Orange bars denote countries with a population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

4. Infrastructure (Index 0 to 7, highest)



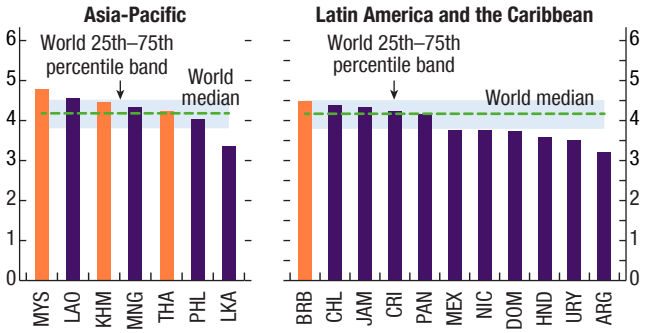
Sources: World Economic Forum, *Global Competitiveness Report*, various editions.
Note: Orange bar denote countries with a population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

5. Average Import Tariffs (Percent)



Source: World Bank, World Integrated Trade Solution database.
Note: Orange bars denote countries with a population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

6. Labor Market Efficiency (Index) (Index 0 to 7, highest)



Sources: World Economic Forum, *Global Competitiveness Report*, various editions.
Note: Index calculation factors in labor market rigidities and labor productivity promotion. Orange bars denote countries with a population below 1 million. Country list uses International Organization for Standardization (ISO) country codes.

Several *productivity-related variables* also appear to be robustly associated with exports diversification and complexity in empirical studies.[2,3]

- *Governance* is relatively sound among most tourism-dependent countries, although their position just above the global median, based on the World Bank Worldwide Governance Indicator, suggests scope for further enhancements (Annex Figure 4.5, panel 2). Also, many Caribbean and Central American countries have high crime indicators, which would limit export development including of tourism itself. Government effectiveness and combat of corruption are key aspects of governance that are significantly associated with export diversification (Salinas forthcoming-a).
- *Educational quality* is one of the most significant and robust determinants of export diversification and complexity according to the empirical literature. Most tourism-dependent countries in both regions have significant scope to improve educational quality. Based on the United Nations Human Development Index of education, many countries, especially in Asia-Pacific, have educational attainment below the world median (Annex Figure 4.5, panel 3). And in a scenario of declining tourism, governments may need to support labor reallocation to new export sectors through retraining.
- Availability of data on *infrastructure* is limited for several tourism-dependent countries, especially small states. However, for the countries covered by the Global Competitiveness Index of the World Economic Forum, the infrastructure performance pillar indicates relatively weak infrastructure quality (in the world's lowest quartile) in some tourism-dependent countries (Annex Figure 4.5, panel 4). Besides strengthening general infrastructure, countries may need to support any promising exports by developing sector specific infrastructure. Developing natural disaster resilient infrastructure protects both tourism and non-tourism activities and is of outmost importance to several TDCs that are frequently devastated by these events. Since many tourism-dependent countries are facing substantial fiscal constraints private sector participation for infrastructure development could be important.
- Many tourism-dependent countries have also relatively *high imports tariffs*, averaging about and above 10 percent. Only Central American

[2]This assessment is partly based on several third-party indicators. The analysis of governance is based on the Worldwide Governance Indicators, which is a perceptions-based measure constructed by researchers affiliated with the Brookings Institution and the World Bank. The education sub-index of the Human Development Index is based on estimates of expected years of schooling and mean years of schooling. Cross-country comparisons based on the Global Competitiveness Report should acknowledge some degree of uncertainty around point estimates.

[3]Export marketing and additional policies associated with the overall investment climate are also expected to strengthen exports.

countries as well as Chile have average tariffs among the world's lowest quartile (Annex Figure 4.5, panel 5). Due to the importance of imports access for competitiveness many TDCs provide tax exemptions to imports for the tourism sector. Export diversification thus requires reducing this bias against non-tourism sectors and lowering trade barriers across the board. Taxation in general should avoid penalizing non-tourism sectors. Trade openness, including of intraregional trade, is especially critical for small and microstates as access to imports could help offset their lack of economies of scale.

A cross-country comparison of labor market efficiency indicators suggests room for improvements in labor market frameworks to enhance export competitiveness (Annex Figure 4.5, panel 6). This is particularly the case of several Latin American countries that rank well below the world's median of the Global Competitiveness Report labor market efficiency index, in large part due to significant labor market rigidities This indicator is not available for small Caribbean countries, but it is worth noting that many of them have strong unionization and high collective bargaining coverage. Labor market rigidities can increase effective unit labor costs as well as limit the sector reallocation needed for export diversification. Without their flexibilization, policies to enhance human capital can result in outward migration as the better trained workers do not find adequate productive/competitive occupations in the labor market. Furthermore, public sector labor policies should target efficiency, linking wages and employment to productivity.

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