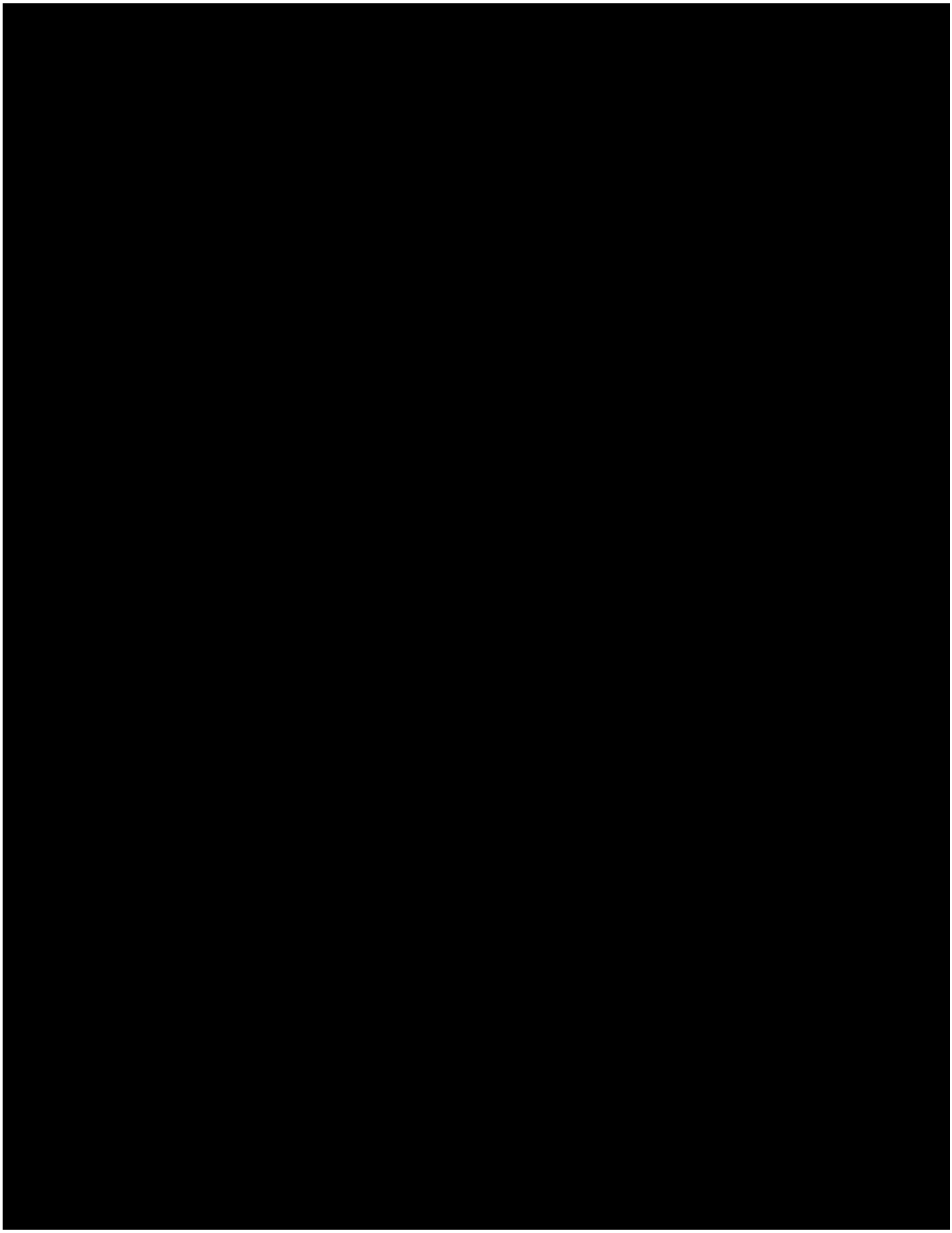

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IMF Working Paper

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After-Effects of the COVID-19 Pandemic: Prospects for Medium-Term Economic Damage[1]

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Abstract

The COVID-19 pandemic has led to a severe global recession with differential impacts within and across countries. This paper examines the possible persistent effects (scarring) of the pandemic on the economy and the channels through which they may occur. History suggests that deep recessions often leave long-lived scars, particularly to productivity. Importantly, financial instabilities—typically associated with worse scarring—have been largely avoided in the current crisis so far. While medium-term output losses are anticipated to be lower than after the global financial crisis, they are still expected to be substantial. The degree of expected scarring varies across countries, depending on the structure of economies and the size of the policy response. Emerging market and developing economies are expected to suffer more scarring than advanced economies.

JEL Classification Numbers: E32, N10, O47

Keywords: COVID-19, scarring, medium-term output

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I. Introduction

The COVID-19 pandemic has led to a severe global recession that is unique in many ways. The contraction in 2020 was very sudden and deep compared to previous global crises, even as the policy response in many countries was swift and sizable. The pandemic crisis also stands out for its differential impacts across sectors and countries, complex channels of transmission, and high uncertainty about the recovery path, given that it depends on the fate of the virus itself. The extent of scarring (persistent damage to supply potential)[3] following the recession will differ across countries, as the health crisis interacts with countries' economic structures (such as the importance of "high-contact" sectors, where people are in close proximity) and varying policy responses.

The atypical features of the crisis—its severity, differential impacts, complex transmission, and high uncertainty—make assessment of the economic effects of COVID-19 challenging. This paper aims to shed light on the potential main channels of scarring post-COVID-19 and implications for the medium-term outlook. We first ask what can we learn about prospects for scarring from historical experience with recessions? What are the most relevant channels in the current setting (productivity, labor, capital)? We draw lessons from previous recessions including those associated with past pandemics and epidemics, financial crises, natural disasters, and violent conflict outbreaks. Second, we investigate expectations of scarring, by comparing current forecasts for medium-term output with those from immediately before the onset of the pandemic. We further explore what factors—such as the income level, the sectoral structure of the economy (its precrisis dependence on tourism and its precrisis services share), and the size of the fiscal policy response in 2020—help explain the variation in expected medium-term outcomes (using a five-year horizon, i.e. by 2024) across economies.

Our findings from historical episodes suggest that severe recessions in the past have been associated with persistent output losses. The greatest scarring in the past has occurred in recessions associated with financial crises. Experience from previous recessions also suggests that the productivity channel could be particularly important, as these recessions have been followed by persistent losses to total factor productivity (TFP).

For the COVID-19 pandemic, expected medium-term output losses are sizable, but they exhibit significant variation across economies and regions. Despite higher-than-usual growth as the global economy recovers from the COVID-19 shock, world output is still anticipated to be about 3 percent lower in 2024 than pre-pandemic projections suggested (see IMF 2021a). This expected scarring is less than what was seen following the global financial crisis, consistent with the assumptions that financial sector disruptions remain contained in the recovery from the current crisis and that the pandemic is brought under control globally by the end of 2022. Unlike during the global financial crisis, when advanced economies were much more affected, emerging market and developing economies are expected to have deeper scars than advanced economies. This reflects in part their more muted policy responses, as countries with larger pandemic-related fiscal responses are projected to experience smaller losses. After accounting for income

[3] Such supply damage could result from the loss of economic ties in production and distribution networks arising from job destruction and firm bankruptcies.

differences, economies that are more reliant on tourism, and those with larger service sectors, are projected to experience more persistent losses.

Our results are in line with previous literature, which suggests that output losses following recessions are persistent, particularly after financial crises, with differential impact across country groups. Cerra and Saxena (2008) find that currency crises lead to permanent output losses ten years after onset, with more adverse impacts for middle- and low-income countries, and that banking crises or concurrent twin crises have even more adverse effects. Moreover, Blanchard, Cerutti, and Summers (2015) find that recessions in general, and also those associated with financial crises and oil price increases, are often followed not only by lower output level, but also lower growth, implying that the scarring effect increases over time. Ball (2014) likewise points to significant scarring following the global financial crisis, with an adverse effect on output growth. Abiad and others (2009) and Chen, Mrkaic, and Nabar (2019) also document larger output losses following banking crises, stemming from lasting declines in capital per worker, TFP, and employment. Adler and others (2017) analyze the widespread decline in TFP growth following the global financial crisis and document that it has been persistent and was the main contributor to output losses relative to the precrisis trend.

There are also several recent studies that focus on the economic impact of past pandemics and epidemics. These include Jordà, Singh, and Taylor (2020), who find that macroeconomic effects of pandemics persist for decades, leading to a decline in real interest rates; Ma, Rogers, and Zhou (2020), who find that following the initial decline the bounce-back in output is rapid, but remains below pre-recession level five years after the shock; and Barro, Ursúa, and Weng (2020), who attempt to disentangle the effects of the Spanish flu and WWI deaths and find that GDP per capita declined by 6 percent as the result of the pandemic, which was on par with the 8.4 percent decline associated with the war.

Our main contributions to the literature on the economics effects of recessions are to conduct a comprehensive analysis of past recessions, using a broader sample of 586 recession episodes from 115 countries over 1957-2019, and to study the channels through which persistent damage occurs, by analyzing the effects of recessions on the supply-side components of GDP. In addition, we differentiate between deep and shallow recessions, as the impact of COVID-19 may be more like that of past recessions that likewise resulted in a large drop in output in the year of the impact, and differentiate between short recessions that last one year and longer recessions in which output declines for longer than a year, as some countries are expected to recover faster from COVID-19 than others. Like previous studies, we differentiate between different types of crises (past pandemics and epidemics, financial crises, natural disasters, and violent conflict outbreaks), but do it in a unified framework in which all types of recessions are analyzed within the same regression via interaction terms, which allows us to account for potential co-occurrence of several types of crisis events. We further contribute to the study of the macroeconomic effects of the COVID-19 pandemic by shedding light on the factors that explain differences in expected medium-term outcomes across countries.

The rest of the paper is organized as follows: Section II describes the data used in the analysis, Section III looks at the impact of past recessions on aggregate output and the channels

of impact, also differentiating recessions by their depth and duration, Section IV presents the expected medium-term output losses following the pandemic and analysis of factors that drive forecast revisions, and Section V concludes.

II. Data

The historical analysis relies on the Penn World Table (PWT) 10.0 database (Feenstra, Inklaar, and Timmer 2015), from which we draw on data for real GDP per capita (at constant prices in 2017 US dollars) that we use to identify recession episodes and to quantify the aggregate impact of those recession episodes on the economy. We also look at the supply-side channels of scarring (capital, labor, and productivity) using PWT data on capital stock (per person engaged), number of persons engaged (as employment-population ratio), and total factor productivity.

Recession episodes and the corresponding peaks and troughs of the cycle are identified using the Harding and Pagan (2002) algorithm on annual real GDP per capita, with a window of 1 year, minimum phase length of 1 year, and minimum cycle length of 2 years. While the standard approach for business cycle dating is typically done using quarterly data, the use of annual data allows for the identification of cycles for a larger sample of countries, in particular including developing economies for which quarterly data is often not available. Recessions identified using this approach for the United States match those reported by the NBER.

Recessions are further classified by co-occurrence of a particular type of a crisis, namely: a financial crisis, an epidemic or pandemic, a disaster, or a violent conflict. Each recession can be associated with several types of crises, or with no crisis, in which case it is referred to as a "typical" recession. The incidence of financial crises follows Laeven and Valencia (2018) for the period going back to 1970 and Reinhart and others (2016) for years prior to 1970. In both cases, financial crises include banking crises, currency crises, and sovereign debt crises. Past modern epidemics and pandemics include the Hong Kong flu, SARS, H1N1, MERS, Ebola and Zika and are identified for countries in which cases have been reported (Furceri and others 2020; Cockburn, Delon, Ferreira 1969). Disasters are identified using the Emergency Events Database (EM-DAT) when a country in a given year has experienced disasters that led to damages exceeding 1% of GDP or affected 5% of population (including deaths). Finally, a country is defined as being in conflict if in a given year there are battle-related deaths that exceed 100 people per one million population (Novta and Pugacheva 2021).

The analysis of expected medium-term output losses following the COVID-19 crisis, rely on the comparison of growth forecasts made by economists at the International Monetary Fund (IMF) presented in the World Economic Outlook (WEO) publication. These forecasts are available up to five years ahead for 194 countries. The forecasts are revised regularly and published twice a year (around April and October), with additional updates made in between the publications (around January and July). Data availability for a large number of countries and a record of forecast revisions at different stages of the pandemic thus make the IMF forecasts a good resource for analyzing the impact of the COVID-19 pandemic. Specifically, we measure medium-term output losses (or gains) as the difference between the level of real GDP forecast

for 2024 immediately prior to the onset of the pandemic (the January 2020 vintage) and the most recent forecast (the April 2021 vintage).

In addition, when looking at the factors that explain differences in forecast revisions, we use the following sources: tourism share of GDP from the World Travel and Tourism Council, service sector share of GDP from the World Bank's World Development Indicators database, and data on fiscal policy responses from the International Monetary Fund's Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic, which includes both additional spending and forgone revenue in response to the COVID-19 pandemic.[4]

Throughout the text, countries are classified into advanced economies (AEs) and emerging market and developing economies (EMDEs), which are further broken down into emerging market economies (EMEs) and low-income countries (LICs). Detailed country list and samples used for each exercise are provided in Appendix Table 1.

III. Analysis of Historical Recessions

Aggregate Impact

This section looks at the aftermath of previous recessions, distinguishing between more typical downturns and those associated with financial crises, epidemics or pandemics, violent conflicts, or natural disasters, to get a sense of how long-lived their effects have been and the supply-side channels (capital, labor, and productivity) through which they occur.

The analysis of the impact of a recession relies on local projections (Jordà 2005) to trace out the impulse response functions based on the following equation:

$$y_{i,t+h} - y_{i,t-1} = \beta_1^h D_{i,t} + \sum_{E \in \{types\}} \left[\beta_2^{E,h} D_{i,t} * E_{i,t-2,t+2} + \beta_3^{E,h} E_{i,t}\right] + \varphi_1^h X_{i,t} + \mu_i^h + \theta_t^h + \varepsilon_{i,t}^h \quad \text{(eq.1)},$$

in which $(y_{i,t+h} - y_{i,t-1})$ represents cumulative growth in log points in real GDP per capita (or another dependent variable) at different horizons (h=0,…7), where h=0 represents the contemporaneous effect; $D_{i,t}$ is a dummy for recession onset (first year after the peak); $E_{i,t}$ is a dummy for occurrence of a crisis event for each of the following types: financial crisis, an epidemic or pandemic, a disaster, or a conflict; the interaction terms $D_{i,t} * E_{i,t-2,t+2}$ capture different types of crisis events that happened within t-2 to t+2 of a given recession; $X_{i,t}$ is a set of controls that includes two lags of the dependent variable's growth rate, one lag of log GDP in constant US dollars, and two lags of credit-to-GDP ratio; μ_i^h and θ_t^h are country and year fixed effects that control for all time-invariant country characteristics and time-specific common global shocks, respectively. The impact of a typical recession is given by β_1^h, and the impact of a recession associated with a crisis event E is given by $\beta_1^h + \beta_2^{E,h} + \beta_3^{E,h}$. Regressions are estimated separately for each horizon on a fixed sample. Thus, the number of observations,

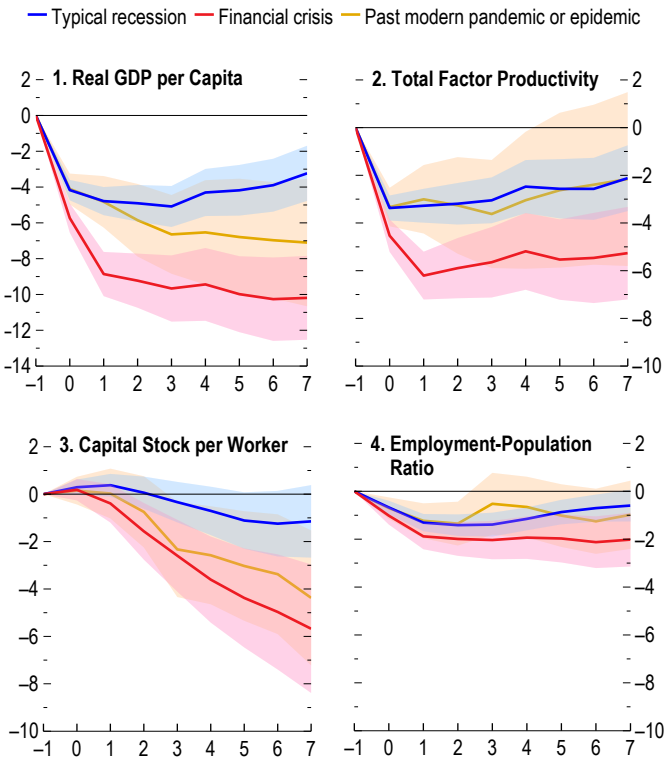
[4] Available at https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19 (accessed March 2021).

countries, and recession episodes is the same at all horizons and across all dependent variables. In all regressions, the left-hand-side variable has been winsorized at 0.5/99.5 percentiles to mitigate the effect of outliers.

The estimation results are presented in Table 1 columns 1-5, and depicted in Figure 1 panel 1. The coefficients show the cumulative impact of a recession relative to the baseline, thus the return of the impulse response to zero signifies that the dependent variable has recovered to its pre-recession level. While the path of output differs by the type of recession, the estimates are negative and mostly statistically significant across all horizons, indicating that recessions are associated with permanent output losses, on average.

Recessions associated with financial crises lead to more negative outcomes (column 3), as has also been shown in the previous literature (Cerra and Saxena 2008). The path of output after past modern epidemic or pandemic recessions (column 2) is in between that of typical recessions and financial crisis recessions. However, the COVID-19 crisis is global and more severe than those previous pandemics. The impact of natural disasters and violent conflict is likewise negative and severe on impact, with effects persisting for several years following the crisis; in later horizons, the effect remains negative but no longer statistically significant, which could be attributed to the positive effects of post-disaster reconstruction efforts and sample limitations as data for fragile states is often not available. In the following analysis, due to space considerations and our focus on the effects of past pandemics or epidemics and associated recessions, we skip the presentation of results on the impact of natural disasters and violent conflict, for which the findings in general are consistent with the literature.

Figure 1. Medium-Term Output Losses and Channels of Impact
(Percentage points)



Sources: Penn World Table 10.0; and authors' calculations.
Note: The solid lines represent the estimated cumulative impulse response functions and shaded areas represent 90 percent confidence intervals. Time since the shock (in years) on the x-axis. Past modern pandemics and epidemics include Hong Kong flu, SARS, H1N1, MERS, Ebola, and Zika.

Table 1. Medium-Term Output Losses and Channels of Impact

	Real GDP per Capita					Total Factor Productivity				
Recession type:	Typical	Past Pandemic/ Epidemic	Financial Crisis	Disaster	Conflict	Typical	Past Pandemic/ Epidemic	Financial Crisis	Disaster	Conflict
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
h = 0	-4.170 ***	-4.107 ***	-5.731 ***	-4.510 ***	-6.810 ***	-3.370 ***	-3.330 ***	-4.532 ***	-3.972 ***	-5.627 ***
	(0.347)	(0.524)	(0.496)	(0.451)	(1.965)	(0.319)	(0.490)	(0.413)	(0.462)	(1.542)
h = 1	-4.785 ***	-4.825 ***	-8.859 ***	-4.486 ***	-10.472 ***	-3.276 ***	-3.006 ***	-6.205 ***	-3.474 ***	-7.624 ***
	(0.478)	(0.875)	(0.750)	(0.636)	(2.712)	(0.431)	(0.873)	(0.609)	(0.600)	(2.224)
h = 2	-4.904 ***	-5.853 ***	-9.230 ***	-3.776 ***	-10.126 ***	-3.193 ***	-3.262 ***	-5.893 ***	-2.585 ***	-7.295 **
	(0.620)	(1.231)	(0.919)	(0.829)	(3.220)	(0.529)	(1.231)	(0.768)	(0.833)	(2.824)
h = 3	-5.084 ***	-6.645 ***	-9.667 ***	-3.656 ***	-9.559 ***	-3.049 ***	-3.623 ***	-5.646 ***	-2.421 **	-5.930 **
	(0.695)	(1.336)	(1.124)	(0.938)	(3.391)	(0.584)	(1.378)	(0.898)	(0.952)	(2.812)
h = 4	-4.305 ***	-6.533 ***	-9.437 ***	-2.556 **	-8.673 **	-2.474 ***	-3.044 *	-5.188 ***	-1.444	-5.632
	(0.799)	(1.773)	(1.236)	(1.070)	(4.131)	(0.678)	(1.745)	(0.979)	(1.101)	(3.423)
h = 5	-4.180 ***	-6.790 ***	-9.983 ***	-2.088	-6.860	-2.568 ***	-2.624	-5.534 ***	-1.186	-3.959
	(0.861)	(1.979)	(1.290)	(1.277)	(5.300)	(0.755)	(1.973)	(1.025)	(1.257)	(4.491)
h = 6	-3.896 ***	-6.970 ***	-10.261 ***	-1.851	-6.216	-2.569 ***	-2.394	-5.466 ***	-1.212	-3.156
	(0.897)	(1.974)	(1.416)	(1.455)	(5.569)	(0.791)	(2.039)	(1.150)	(1.374)	(4.575)
h = 7	-3.231 ***	-7.101 ***	-10.189 ***	-1.264	-4.554	-2.120 **	-2.157	-5.264 ***	-0.749	-1.491
	(0.937)	(2.163)	(1.423)	(1.577)	(5.350)	(0.839)	(2.216)	(1.179)	(1.389)	(4.512)
Number of Observations			4,341					4,341		
Number of Countries			115					115		
Number of Recessions			586					586		
R^2 (for h = 0)			0.38					0.32		
R^2 (for h = 7)			0.59					0.53		

	Capital Stock per Worker					Employment-Population Ratio				
Recession type:	Typical	Past Pandemic/ Epidemic	Financial Crisis	Disaster	Conflict	Typical	Past Pandemic/ Epidemic	Financial Crisis	Disaster	Conflict
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
h = 0	0.293	0.149	0.186	-0.560 **	-0.581	-0.674 ***	-0.705 **	-1.019 ***	-0.046	-0.206
	(0.197)	(0.356)	(0.275)	(0.239)	(0.678)	(0.170)	(0.273)	(0.225)	(0.179)	(0.353)
h = 1	0.377	0.027	-0.390	-1.283 ***	-0.882	-1.309 ***	-1.232 ***	-1.881 ***	-0.102	-0.566
	(0.291)	(0.638)	(0.491)	(0.448)	(1.313)	(0.219)	(0.444)	(0.328)	(0.285)	(0.635)
h = 2	0.062	-0.746	-1.565 **	-2.163 ***	-1.971	-1.414 ***	-1.350 **	-1.991 ***	0.209	-0.432
	(0.412)	(0.914)	(0.727)	(0.704)	(1.732)	(0.273)	(0.556)	(0.429)	(0.439)	(1.129)
h = 3	-0.336	-2.331 *	-2.595 ***	-2.719 ***	-2.577	-1.392 ***	-0.523	-2.037 ***	0.509	-0.431
	(0.519)	(1.221)	(0.922)	(0.937)	(2.171)	(0.303)	(0.786)	(0.488)	(0.566)	(1.313)
h = 4	-0.705	-2.576 **	-3.604 ***	-3.111 ***	-2.974	-1.153 ***	-0.656	-1.935 ***	0.792	-0.320
	(0.620)	(1.257)	(1.104)	(1.172)	(2.761)	(0.290)	(0.769)	(0.539)	(0.678)	(1.512)
h = 5	-1.111	-3.029 **	-4.377 ***	-3.322 **	-3.561	-0.867 ***	-1.017	-1.972 ***	1.027	0.068
	(0.724)	(1.405)	(1.270)	(1.416)	(3.399)	(0.312)	(0.796)	(0.609)	(0.791)	(1.617)
h = 6	-1.245	-3.376 **	-4.969 ***	-3.267 **	-4.336	-0.702 **	-1.253	-2.125 ***	1.110	0.618
	(0.842)	(1.534)	(1.477)	(1.646)	(3.909)	(0.344)	(0.826)	(0.656)	(0.881)	(1.913)
h = 7	-1.146	-4.374 **	-5.676 ***	-3.199 *	-4.271	-0.596	-0.982	-2.019 ***	1.273	0.500
	(0.929)	(1.730)	(1.649)	(1.856)	(4.390)	(0.403)	(0.866)	(0.682)	(0.986)	(2.149)
Number of Observations			4,341					4,341		
Number of Countries			115					115		
Number of Recessions			586					586		
R^2 (for h = 0)			0.57					0.22		
R^2 (for h = 7)			0.65					0.37		

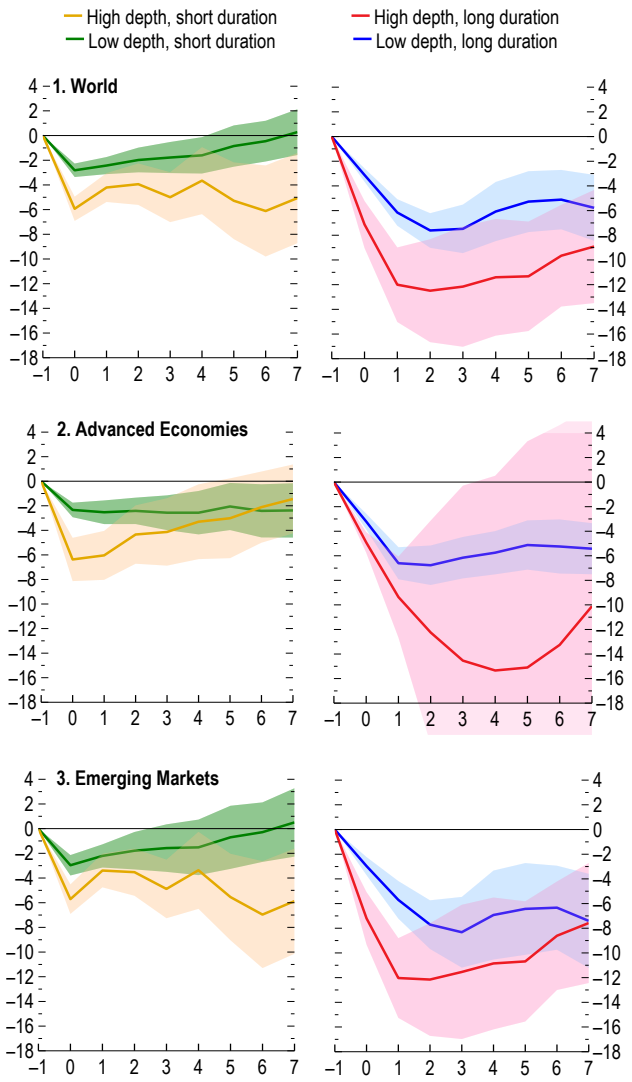
Source: Authors' calculations.

Note: The reported coefficients represent the impact of a recession associated with a particular crisis (β_1 for typical recessions, and $\beta_1+\beta_2+\beta_3$ for other types of recessions, as per equation 1). The dependent variables are cumulative growth of real GDP per capita, total factor productivity, capital per worker, employment-population ration in the horizon year *h* after a recession. Regressions are estimated separately for each horizon. All regressions include interaction terms for recession types (financial crisis, pandemic, disaster, conflict, or regular recession that occurred due to other reasons) and controls for two lags of the dependent variable's growth rate, one lag of log GDP per capita (in constant US dollars), and two lags of credit-to-GDP ratio, country and year fixed effects. Past modern pandemics or epidemics include Hong Kong flu, SARS, H1N1, MERS, Ebola, Zika. Standard errors are clustered at the country level. * p<0.1; ** p<0.05; *** p<0.01.

Depth and Duration

Drawing on the observation that the COVID-19 crisis is characterized by its unprecedented depth, and will differ in how long it lasts across country groups, with faster recovery projected in advanced economies (see IMF 2021a), each recession episode is further characterized by its depth (defined as the loss in real GDP per capita between the peak and the trough in percentage terms) and duration (defined as the number of years between the peak and the trough). In the sample, past recession durations range between one and ten years, with 60 percent of recessions lasting one year and 90 percent of recessions lasting not more than three years for both AEs and EMDEs. We define the depth of a recession as the loss between the peak and the first year of the recession, to ease the comparison across recessions of different duration. Under this definition, the median recession is associated with a 2.2% decline in per capita output in the first year. Recessions are classified as high (low) depth when they fall above (below) the median loss.

Figure 2. Medium-Term Output Losses by Recession Depth and Duration
(Percentage points)



Sources: Penn World Table 10.0; and authors' calculations.
Note: Figure shows the results for "typical" recessions. The solid lines represent the estimated cumulative impulse response functions and shaded areas represent 90 percent confidence intervals. High and low-depth recessions are split based on the median per-capita output loss. Short durations last not more than one year, and long durations last more than one year. Time since the shock (in years) on the x-axis.

Our analysis of the differential effects of recession depth and duration is based on a modified version of regression equation 1 that includes interaction terms for recessions of 1) high depth and one year duration, 2) low depth and one year duration, 3) high depth and more than a year duration, 4) low depth and more than a year duration. The interaction terms are included for all recession types. Table 2 shows the estimated coefficients for different depth and duration for typical recessions. Deep recessions lead to different recoveries across country groups. In advanced economies, deep but short-lived recessions are associated with 'V-shaped' recoveries and no permanent output loss after several years (column 5 and yellow line in Figure 2, panel 2). Emerging market and developing economies, however, experience

protracted downturns and permanent losses, on average (column 9 and yellow line in Figure 2, panel 3).[5]

In general, recessions of high depth and long duration tend to lead to the most adverse effect seven years after recession onset (columns 3, 7, 11). The impact of low depth and long duration recessions is likewise negative up to seven years following the shock (columns 4, 8, 12). On the other hand, recessions of low depth and short duration tend to have statistically significant negative effect in the immediate aftermath of the recession, which starts to lose significance and moves closer to zero after five years, with faster recovery in emerging market and developing economies (columns 2, 6, 10). Not shown, but when looking across recession types, the outcomes tend to be worse for recessions associated with financial crises, for any given depth and duration.

[5]IMF (2012) shows that economic performance in many emerging market and developing economies improved substantially over the preceding two decades, after relatively deep and protracted downturns in the 1970s and 1980s. The chapter finds that the improvement is due largely to greater policy space and improved policy frameworks, with inflation targeting and a countercyclical fiscal policy significantly increasing both the length of expansions and speed of recoveries after recessions.

Table 2. Medium-Term Output Losses by Recession Depth and Duration

	World				Advanced Economies				Emerging Market and Developing Economies			
Recession type:	High Depth Short Duration	Low Depth Short Duration	High Depth Long Duration	Low Depth Long Duration	High Depth Short Duration	Low Depth Short Duration	High Depth Long Duration	Low Depth Long Duration	High Depth Short Duration	Low Depth Short Duration	High Depth Long Duration	Low Depth Long Duration
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
h = 0	-5.933 ***	-2.813 ***	-7.122 ***	-3.118 ***	-6.372 ***	-2.337 ***	-4.909 ***	-3.207 ***	-5.711 ***	-2.967 ***	-7.201 ***	-2.967 ***
	(0.597)	(0.331)	(1.159)	(0.328)	(1.071)	(0.361)	(0.508)	(0.390)	(0.726)	(0.504)	(1.293)	(0.446)
h = 1	-4.212 ***	-2.431 ***	-12.006 ***	-6.153 ***	-6.039 ***	-2.527 ***	-9.362 ***	-6.605 ***	-3.394 ***	-2.209 ***	-12.030 ***	-5.698 ***
	(0.710)	(0.422)	(1.837)	(0.653)	(1.211)	(0.586)	(2.004)	(0.792)	(0.829)	(0.572)	(1.963)	(0.925)
h = 2	-3.941 ***	-1.978 ***	-12.492 ***	-7.610 ***	-4.343 ***	-2.413 ***	-12.244 **	-6.769 ***	-3.526 ***	-1.786 *	-12.156 ***	-7.704 ***
	(1.020)	(0.607)	(2.534)	(0.852)	(1.444)	(0.654)	(5.536)	(0.975)	(1.163)	(0.923)	(2.774)	(1.198)
h = 3	-4.994 ***	-1.778 **	-12.159 ***	-7.477 ***	-4.129 **	-2.563 ***	-14.537	-6.156 ***	-4.886 ***	-1.575	-11.538 ***	-8.323 ***
	(1.229)	(0.766)	(2.963)	(1.194)	(1.668)	(0.862)	(8.662)	(1.024)	(1.443)	(1.171)	(3.307)	(1.740)
h = 4	-3.655 **	-1.602 *	-11.403 ***	-6.074 ***	-3.298 *	-2.564 **	-15.342	-5.751 ***	-3.372 *	-1.514	-10.850 ***	-6.928 ***
	(1.649)	(0.897)	(2.874)	(1.456)	(1.852)	(1.075)	(9.642)	(1.070)	(1.896)	(1.368)	(3.248)	(2.191)
h = 5	-5.282 ***	-0.852	-11.323 ***	-5.271 ***	-3.017	-2.058 *	-15.097	-5.123 ***	-5.542 **	-0.704	-10.687 ***	-6.433 ***
	(1.887)	(1.018)	(2.695)	(1.497)	(1.973)	(1.165)	(11.199)	(1.217)	(2.131)	(1.555)	(2.961)	(2.260)
h = 6	-6.111 ***	-0.451	-9.653 ***	-5.111 ***	-2.110	-2.413 *	-13.254	-5.243 ***	-6.964 ***	-0.284	-8.608 ***	-6.333 ***
	(2.243)	(1.004)	(2.504)	(1.463)	(1.761)	(1.317)	(10.884)	(1.338)	(2.635)	(1.466)	(2.673)	(2.068)
h = 7	-5.064 **	0.280	-8.910 ***	-5.776 ***	-1.445	-2.377 *	-10.108	-5.424 ***	-5.873 **	0.503	-7.574 **	-7.400 ***
	(2.221)	(1.129)	(2.785)	(1.622)	(1.708)	(1.345)	(9.916)	(1.264)	(2.591)	(1.685)	(2.957)	(2.318)
Number of Observations	4,341				1,337				2,999			
Number of Countries	115				34				81			
Number of Recessions	586				146				439			
R^2 (for h = 0)	0.40				0.62				0.38			
R^2 (for h = 7)	0.59				0.71				0.61			

Source: Authors' calculations.

Note: The dependent variable is cumulative growth of real GDP per capita in the horizon year *h* after a recession. Regressions are estimated separately for each horizon. All regressions include interaction terms for recession types (financial crisis, pandemic, disaster, conflict) and recession depth (high and low depth recessions are split based on the median loss, with separate interaction terms for recessions that last only one year and those that last longer than one year), as well as controls for two lags of the dependent variable's growth rate, one lag of log GDP per capita (in constant US dollars), and two lags of credit-to-GDP ratio, country and year fixed effects. * p<0.1; ** p<0.05; *** p<0.01.

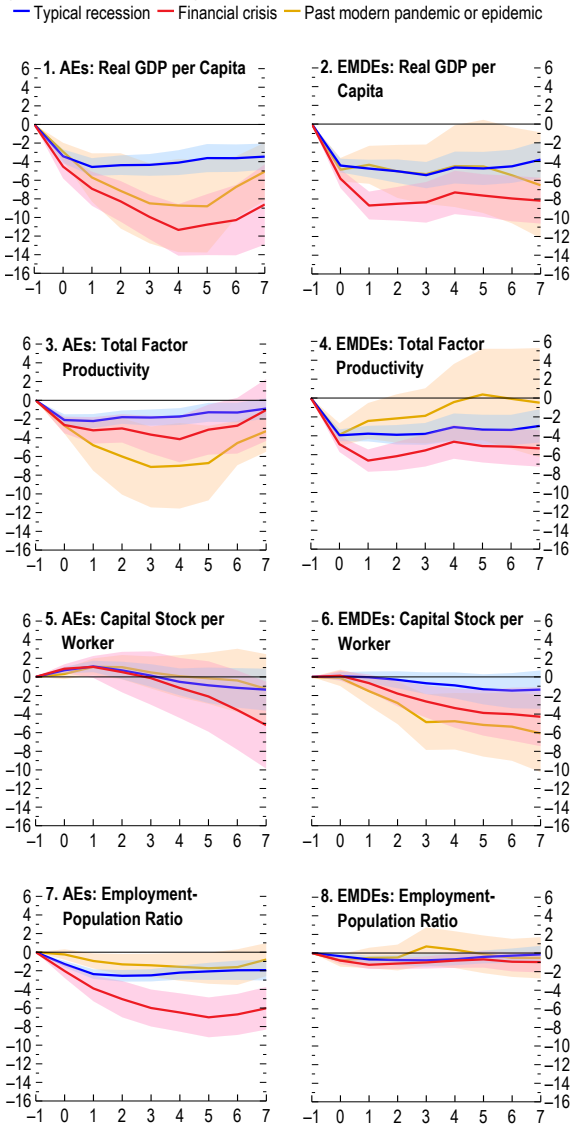
Channels of Impact

Previous literature suggests that permanent damage to an economy's supply potential following a recession can occur through a number of channels.[1] First through the labor channel, as unemployment may remain higher even after the recession (Blanchard and Summers 1986) and could result in a smaller labor force as discouraged workers exit. Human capital accumulation and future earnings can be affected by skill deterioration during extended periods of unemployment, delayed labor market entry for young workers, and negative effects on educational achievement in the longer term.[2] Second through the capital channel, as weak investment could result in both slower physical capital accumulation and slower technology adoption that hampers productivity growth. Greater scarring through the physical capital channel could also materialize as the result of capital being stranded and corporate debt buildup constraining future investment (IMF 2021b). Lastly, productivity could also be permanently affected by the loss of firm-specific know-how as a result of bankruptcies and their spillovers (Bernstein and others 2019), the effects of a decline in research and development and innovation during the recession, and an increase in resource misallocation (Adler and others 2017; Furceri and others 2021).

Focusing on the supply-side channels, we look at the components of the Cobb-Douglas production function. We run stand-alone regressions for total factor productivity, capital per worker, and the employment-population ratio, to show the impact of recessions on each

Figure 3. Medium-Term Output Losses and Channels of Impact: Across Advanced Economies and Emerging Market and Developing Economies

(Percentage points)



Sources: Penn World Table 10.0; and authors' calculations.
Note: The solid lines represent the estimated cumulative impulse response functions and shaded areas represent 90 percent confidence intervals. Time since the shock (in years) on the x-axis. Past modern pandemics and epidemics include Hong Kong flu, SARS, H1N1, MERS, Ebola, and Zika. AEs = advanced economies; EMDEs = emerging market and developing economies.

[1]See Cerra, Fatás, and Saxena (2020) for a review of the related literature.

[2]Parental job losses can adversely affect children's schooling and future labor market outcomes (Oreopoulos, Page, and Stevens 2008; Stuart, forthcoming). In the short-term, however, reduced labor market opportunities during recessions can lead to higher educational attainment for high school and college-aged students.

of these three components. The results for the World are presented in Table 1. The analysis shows that medium-term losses in GDP per capita for typical recessions can be primarily attributed to losses in TFP (column 6). Employment per capita also declines before recovering somewhat in the medium-term (column 16). For financial crisis recessions, there is significant, persistent damage to all factors: TFP (column 8), capital-to-worker ratio (column 13), and employment per capita (column 18).

Table 3 and Figure 3 report impulse response functions for advanced economies and emerging market and developing economies separately. For typical recessions and financial crises, the channels of impact are broadly the same across country groups, except that employment per capita losses play a role in AEs, on average, and not EMDEs. In modern era epidemics and pandemics, productivity losses were the main contributor to output losses in AEs, while capital stock losses played the largest role in EMDEs.

Building further on the previous section on recession depth and duration, Table 4 presents the breakdown by supply-side channels for short duration recessions of high and low depth. The table shows that the impact is primarily driven by reduction in total factor productivity and capital per worker ratio.

The impact of the COVID-19 pandemic could be even larger than suggested by the analysis of past recessions. From the labor side, some high-contact sectors may shrink permanently. Moreover, widespread school closures have occurred across countries, with disproportionately adverse impacts on schooling in low-income countries and those less prepared to switch to virtual learning. Productivity-decreasing resource mismatches from the COVID-19 crisis, across sectors and occupations, may likewise be larger than in previous crises, depending on how permanent the asymmetric losses are.[3] Productivity could also be negatively affected by a decline in competition, if the market power of large companies increases due to small business closures in high-contact sectors and even more broadly.[4] At the same time, the pandemic has spurred increased digitalization and innovation in production and delivery processes, likely helping to offset the adverse productivity shock in some countries, as others lack the prerequisite widespread and reliable connectivity (Njoroge and Pazarbasioglu 2020).

[3]Productivity could improve, however, if reallocation forces shift resources from unviable businesses in lower-productivity, high-contact sectors toward higher-productivity service sectors and industry. Bloom and others (2020) finds that, in the United Kingdom, this positive between-firm reallocation effect is likely to only partially offset the negative within-firm effects. The study estimates private sector TFP to be 5 percent lower at the end of 2020 than it would have been, and likely to remain 1 percent lower in the medium term.

[4]See Bernstein, Townsend, and Xu (2020), for example, which documents this "flight to safety" of consumers and job-seekers toward known brands and large companies in the US labor market. At the same time, new business formation in the United States reached a record high in the third quarter of 2020 (Brown 2020).

Table 3. Medium-Term Output Losses and Channels of Impact: By Country Group

Advanced Economies	Real GDP per Capita			Total Factor Productivity			Capital Stock per Worker			Employment-Population Ratio		
Recession type:	Typical	Past Pandemic/ Epidemic	Financial Crisis	Typical	Past Pandemic/ Epidemic	Financial Crisis	Typical	Past Pandemic/ Epidemic	Financial Crisis	Typical	Past Pandemic/ Epidemic	Financial Crisis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
h = 0	-3.421 ***	-2.933 ***	-4.533 ***	-2.108 ***	-2.710 ***	-2.642 ***	0.712 ***	0.314	0.875 ***	-1.281 ***	-0.248	-2.031 ***
	(0.444)	(0.586)	(0.772)	(0.369)	(0.514)	(0.541)	(0.219)	(0.335)	(0.290)	(0.204)	(0.340)	(0.449)
h = 1	-4.572 ***	-5.696 ***	-6.911 ***	-2.220 ***	-4.804 ***	-3.215 ***	1.121 ***	1.081 *	1.073	-2.359 ***	-0.947 *	-3.903 ***
	(0.574)	(1.575)	(1.113)	(0.456)	(1.650)	(0.859)	(0.368)	(0.550)	(0.714)	(0.316)	(0.491)	(0.837)
h = 2	-4.378 ***	-7.146 ***	-8.274 ***	-1.806 ***	-6.006 **	-3.007 ***	0.698	1.043	0.516	-2.542 ***	-1.310 *	-5.053 ***
	(0.641)	(2.459)	(1.329)	(0.434)	(2.474)	(0.919)	(0.567)	(0.791)	(1.321)	(0.380)	(0.676)	(1.188)
h = 3	-4.350 ***	-8.483 ***	-9.945 ***	-1.848 ***	-7.124 **	-3.674 ***	0.139	0.479	-0.129	-2.485 ***	-1.406 *	-6.003 ***
	(0.710)	(2.611)	(1.455)	(0.523)	(2.624)	(1.222)	(0.741)	(1.044)	(1.742)	(0.401)	(0.754)	(1.209)
h = 4	-4.106 ***	-8.718 ***	-11.342 ***	-1.740 ***	-6.997 **	-4.157 ***	-0.534	0.068	-1.186	-2.196 ***	-1.582 *	-6.484 ***
	(0.811)	(3.043)	(1.681)	(0.546)	(2.775)	(1.505)	(0.880)	(1.375)	(1.960)	(0.457)	(0.907)	(1.254)
h = 5	-3.617 ***	-8.799 ***	-10.768 ***	-1.285 **	-6.711 ***	-3.138 *	-0.908	-0.148	-2.107	-2.065 ***	-1.733 *	-7.010 ***
	(0.919)	(3.017)	(1.992)	(0.615)	(2.421)	(1.623)	(1.158)	(1.676)	(2.303)	(0.561)	(1.014)	(1.303)
h = 6	-3.627 ***	-6.721 ***	-10.282 ***	-1.306 **	-4.568 ***	-2.717	-1.179	-0.390	-3.564	-1.943 ***	-1.605	-6.690 ***
	(0.898)	(2.006)	(2.301)	(0.634)	(1.440)	(1.808)	(1.290)	(2.072)	(2.589)	(0.634)	(1.165)	(1.341)
h = 7	-3.459 ***	-5.062 **	-8.599 ***	-0.889	-3.304 **	-1.043	-1.376	-1.283	-5.185 *	-1.933 ***	-0.794	-6.030 ***
	(0.854)	(1.891)	(2.626)	(0.660)	(1.339)	(2.010)	(1.368)	(2.265)	(2.841)	(0.675)	(1.078)	(1.390)
Number of Observations		1,337			1,337			1,337			1,337	
Number of Countries		34			34			34			34	
Number of Recessions		146			146			146			146	
R^2 (for h = 0)		0.60			0.38			0.68			0.48	
R^2 (for h = 7)		0.70			0.47			0.72			0.41	
Emerging Market and Developing Economies	Real GDP per Capita			Total Factor Productivity			Capital Stock per Worker			Employment-Population Ratio		
Recession type:	Typical	Past Pandemic/ Epidemic	Financial Crisis	Typical	Past Pandemic/ Epidemic	Financial Crisis	Typical	Past Pandemic/ Epidemic	Financial Crisis	Typical	Past Pandemic/ Epidemic	Financial Crisis
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
h = 0	-4.429 ***	-4.868 ***	-5.820 ***	-3.945 ***	-3.881 ***	-4.890 ***	0.084	-0.108	0.128	-0.344	-0.794 *	-0.810 ***
	(0.445)	(0.762)	(0.610)	(0.379)	(0.733)	(0.500)	(0.263)	(0.535)	(0.324)	(0.215)	(0.407)	(0.230)
h = 1	-4.749 ***	-4.346 ***	-8.693 ***	-3.771 ***	-2.426 **	-6.625 ***	-0.036	-1.525	-0.667	-0.689 ***	-0.524	-1.263 ***
	(0.573)	(1.229)	(0.904)	(0.500)	(1.154)	(0.719)	(0.375)	(0.955)	(0.563)	(0.247)	(0.665)	(0.275)
h = 2	-5.033 ***	-5.057 ***	-8.505 ***	-3.889 ***	-2.159	-6.158 ***	-0.315	-2.806 **	-1.792 **	-0.755 **	-0.484	-1.131 ***
	(0.764)	(1.724)	(1.093)	(0.626)	(1.554)	(0.919)	(0.554)	(1.379)	(0.831)	(0.345)	(0.848)	(0.347)
h = 3	-5.447 ***	-5.349 ***	-8.347 ***	-3.797 ***	-1.884	-5.549 ***	-0.681	-4.859 ***	-2.647 **	-0.778 *	0.709	-1.015 **
	(0.851)	(1.928)	(1.318)	(0.704)	(1.768)	(1.037)	(0.711)	(1.818)	(1.054)	(0.415)	(1.243)	(0.397)
h = 4	-4.640 ***	-4.487 *	-7.293 ***	-3.078 ***	-0.433	-4.632 ***	-0.912	-4.766 **	-3.346 **	-0.668 *	0.360	-0.812 *
	(1.036)	(2.655)	(1.408)	(0.877)	(2.456)	(1.095)	(0.851)	(1.846)	(1.286)	(0.395)	(1.202)	(0.475)
h = 5	-4.735 ***	-4.521	-7.638 ***	-3.347 ***	0.373	-5.089 ***	-1.335	-5.162 **	-3.875 **	-0.421	-0.137	-0.682
	(1.074)	(3.025)	(1.383)	(0.957)	(2.943)	(1.054)	(0.984)	(2.069)	(1.483)	(0.419)	(1.231)	(0.540)
h = 6	-4.510 ***	-5.467 *	-7.946 ***	-3.382 ***	-0.081	-5.154 ***	-1.473	-5.354 **	-4.009 **	-0.281	-0.519	-0.940
	(1.074)	(3.114)	(1.479)	(0.976)	(3.217)	(1.168)	(1.145)	(2.228)	(1.732)	(0.473)	(1.243)	(0.627)
h = 7	-3.792 ***	-6.532 *	-8.175 ***	-2.954 ***	-0.495	-5.338 ***	-1.369	-6.071 **	-4.286 **	-0.149	-0.518	-0.971
	(1.185)	(3.435)	(1.484)	(1.073)	(3.517)	(1.172)	(1.255)	(2.531)	(1.924)	(0.560)	(1.347)	(0.681)
Number of Observations		2,999			2,999			2,999			2,999	
Number of Countries		81			81			81			81	
Number of Recessions		439			439			439			439	
R^2 (for h = 0)		0.36			0.34			0.55			0.18	
R^2 (for h = 7)		0.60			0.56			0.66			0.39	

Source: Authors' calculations.

Note: The dependent variables are cumulative growth of real GDP per capita, total factor productivity, capital per worker, employment-population ration in the horizon year *h* after a recession. Regressions are estimated separately for each horizon. All regressions include interaction terms for recession types (financial crisis, pandemic, disaster, conflict, or regular recession that occurred due to other reasons) and controls for two lags of the dependent variable's growth rate, one lag of log GDP per capita (in constant US dollars), and two lags of credit-to-GDP ratio, country and year fixed effects. Past modern pandemics or epidemics include Hong Kong flu, SARS, H1N1, MERS, Ebola, Zika. Standard errors are clustered at the country level. * p<0.1; ** p<0.05; *** p<0.01.

Table 4. Medium-Term Output Losses and Channels of Impact by Recession Depth (Short Duration)

	Real GDP per Capita		Total Factor Productivity		Capital Stock per Worker		Employment-Population Ratio	
Recession type:	High Depth	Low Depth	High Depth	Low Depth	High Depth	Low Depth	High Depth	Low Depth
	(1)	(2)	(4)	(5)	(7)	(8)	(10)	(11)
h = 0	-5.933 ***	-2.813 ***	-4.683 ***	-2.170 ***	0.754 *	0.474 **	-1.175 ***	-0.666 ***
	(0.597)	(0.331)	(0.522)	(0.350)	(0.416)	(0.191)	(0.377)	(0.175)
h = 1	-4.212 ***	-2.431 ***	-2.253 ***	-1.306 ***	1.057 *	1.056 ***	-1.835 ***	-1.483 ***
	(0.710)	(0.422)	(0.770)	(0.424)	(0.601)	(0.324)	(0.417)	(0.300)
h = 2	-3.941 ***	-1.978 ***	-1.909 *	-0.931	0.668	1.099 **	-1.694 ***	-1.571 ***
	(1.020)	(0.607)	(1.074)	(0.597)	(0.810)	(0.476)	(0.477)	(0.416)
h = 3	-4.994 ***	-1.778 **	-2.705 **	-0.993	0.185	0.993 *	-1.627 ***	-1.452 ***
	(1.229)	(0.766)	(1.263)	(0.687)	(0.995)	(0.596)	(0.478)	(0.461)
h = 4	-3.655 **	-1.602 *	-1.338	-1.227	-0.463	1.019	-1.418 **	-1.259 **
	(1.649)	(0.897)	(1.684)	(0.753)	(1.269)	(0.802)	(0.541)	(0.490)
h = 5	-5.282 ***	-0.852	-3.065	-0.773	-1.295	0.818	-0.934	-1.027 *
	(1.887)	(1.018)	(1.933)	(0.818)	(1.573)	(0.903)	(0.610)	(0.542)
h = 6	-6.111 ***	-0.451	-4.161 *	-0.574	-1.773	0.772	-0.574	-0.847
	(2.243)	(1.004)	(2.220)	(0.860)	(1.825)	(0.944)	(0.633)	(0.574)
h = 7	-5.064 **	0.280	-3.253	0.020	-2.254	1.003	-0.117	-0.744
	(2.221)	(1.129)	(2.272)	(0.933)	(2.043)	(1.048)	(0.751)	(0.679)
Number of Observations	4,341		4,341		4,341		4,341	
Number of Countries	115		115		115		115	
Number of Recessions	586		586		586		586	
R^2 (for h = 0)	0.40		0.34		0.57		0.22	
R^2 (for h = 7)	0.59		0.53		0.65		0.37	

Source: Authors' calculations.

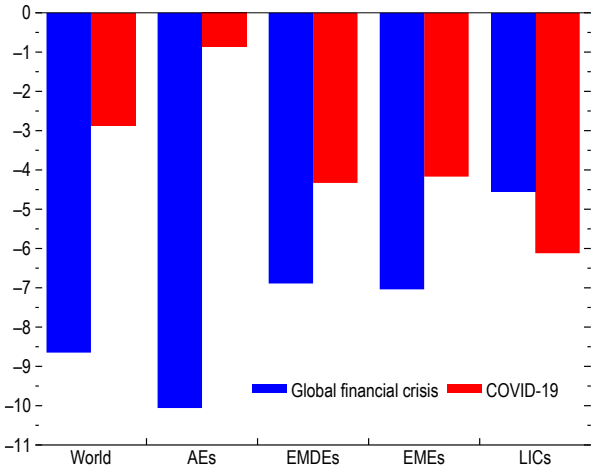
Note: The dependent variable is cumulative growth of real GDP per capita, total factor productivity, capital per worker, employment-population ratio in the horizon year h after a recession. Regressions are estimated separately for each horizon. All regressions include interaction terms for recession types (financial crisis, pandemic, disaster, conflict) and recession depth (high and low depth recessions are split based on the median loss, with separate interaction terms for recessions that last only one year and those that last longer than one year), as well as controls for two lags of the dependent variable's growth rate, one lag of log GDP per capita (in constant US dollars), and two lags of credit-to-GDP ratio, country and year fixed effects. For conciseness, the table only shows the impact of a typical recession of short duration. * p<0.1; ** p<0.05; *** p<0.01.

V. Forecast Revisions and Factors Affecting Medium-Term Output Paths Following the COVID-19 Pandemic

As discussed in the previous section, the historical record suggests that most recessions leave persistent scars—largely through lower productivity growth and (in the case of pandemic recessions and financial crises) slower capital accumulation. There is high uncertainty around the current outlook, over both the short and medium term. The extent of scarring following COVID-19 also depends on factors unique to a pandemic-driven downturn and inherently hard to predict: the path of the pandemic (whether transmission of new variants outpaces vaccinations and makes COVID-19 an endemic disease of as yet-unknown severity) and the scale of activity disruptions from restrictions needed to lower transmission before vaccinations start to deliver society-wide protection. Other factors also remain uncertain, including the effectiveness of the evolving policy response; possible amplification through the financial system; and global spillover channels, such as portfolio flows and remittances.

The extent of scarring is likely to vary across countries, given differences in the level of exposure of sectors of the economy to disruptions caused by the pandemic due to lockdowns and other pandemic containment measures—as contact-intensive sectors such as hotels, restaurants, and air transportation have been particularly hard hit—variation in sectoral composition across countries could bring about differences in the magnitude of medium-term output losses (Das and others 2021). In addition, the size of the policy response, which helped preserve economic relationships, cushioned household income and firms' cash flow, and prevented amplification of the shock through the financial sector, has varied across countries. Growth forecasts published by the International Monetary Fund in the April 2021 World Economic Outlook envisions output losses, relative to pre-pandemic projections, of about 3 percent for the world economy by 2024. By comparison, the lasting damages over a comparable period from the global financial crisis (GFC) were larger, at almost 8.7 percent for the world as a whole (Figure 4).[5] These patterns are consistent with the baseline assumption of a sustained recovery from the current crisis in which financial stability risks remain contained, unlike what happened with the global financial crisis.[6] Although the aggregate losses at the global level appear smaller than in the global financial crisis, we find evidence of substantial divergence in the recovery paths across countries. In particular, losses are expected to be much lower in advanced economies than in emerging market and developing economies, owing to the difference in the scale of policy support and the access to vaccines and therapies.

Figure 4. Medium-Term Output Losses
(Percent difference from precrisis forecast)



Source: International Monetary Fund, World Economic Outlook; and authors' calculations.
Note: Bars show the percent difference in real GDP four years after the crisis and anticipated GDP for the same period prior to the crisis for the indicated group. For the COVID-19 crisis, it compares the current WEO vintage forecast for 2024 versus that from the January 2020 vintage (prior to the pandemic). For the global financial crisis, it compares the April 2013 vintage for 2012 versus the October 2007 vintage (prior to the start of the US recession at end-2007). Economy weights are fixed using April 2013 vintage year 2007 for the global financial crisis, and the current vintage year 2019 for the COVID-19 crisis. Sample consists of 178 economies. AEs = advanced economies; EMDEs = emerging market and developing economies; EMEs = emerging market economies; LICs = low-income countries.

To explore differences in the extent of scarring expected across countries, we conduct a simple regression analysis of the correlates of news about expected medium-term output losses. In particular, we explore whether the average income level, the sectoral structure of the economy (its precrisis dependence on tourism and its precrisis services share), and the size of the fiscal

[5] Figure 4 shows the expected medium-term output losses from COVID-19 and realized medium-term output losses following the global financial crisis. Forecasts for medium-term output losses one year into the global financial crisis show the same pattern. That is, expected medium-term output losses following the global financial crisis were considerably larger than is now expected for COVID-19, with larger losses expected in advanced and emerging market economies than in low-income countries.

[6] The protracted period of financial stress in the global economy started with the subprime mortgage crisis in the United States in 2007 and continued through the euro area sovereign debt crisis, which peaked in 2012.

policy response in 2020 help explain the variation in outcomes across economies. See Section II for additional details about the data used in the analysis.

The exercise examines revisions to output forecasts across economies, focusing on the outer years of the forecast horizon (2022–24). The main comparison is between forecasts reported in the April 2021 *World Economic Outlook* (WEO) and forecasts reported in the January 2020 *WEO Update*, thus spanning the full duration of the crisis up to the time of writing. For some specifications, the comparison between forecasts in the October 2020 *WEO* and forecasts in the January 2020 *WEO Update* is also considered, which captures the first phases of the crisis—notably before news on vaccines and the stronger-than-expected economic performance in many countries in the second half of 2020.

The analysis is conducted relying on regressions of the following type:

$$\Delta \hat{Y}_i^t = \alpha + \beta X_i + \gamma \Gamma_i + \varepsilon_i \,,$$

where $\Delta \hat{Y}_i^t$ is the percentage change in forecasts for output in year t in country i between two forecast vintages; X_i is a country-specific regressor of interest; Γ_i is a country-specific vector of control variables; and ε_i is an error term. The years t for which output forecast revisions are considered are 2022–2024. The main effect of interest, β, corresponds to the percentage change in output forecast revisions associated with a (unit) change in X_i. The evolution of β in the regressions at different forecast horizons t provides evidence on the expected effects of the COVID-19 crisis on future economic activity and their heterogeneity according to X_i. In particular, the effects for the outer years can be interpreted as estimates of the degree of expected medium-term scarring.

Several regressors of interest X_i are considered: (*i*) indicators for income group based on the WEO country classification into advanced, emerging, or low-income economies; (*ii*) share of GDP coming from tourism and transportation in 2019; (*iii*) share of GDP coming from services in 2019; (*iv*) fiscal support during COVID-19 crisis up to December 2020. Regressions that look at the difference across income groups do not include any additional controls. Regressions that consider independent variables as in *ii-iv* include income-group and region fixed effects. Regressors described in *ii-iv* are standardized to have zero mean and unitary standard deviation. As a result, the estimates for the effects of interest, β, are given in terms of percent change in output per standard deviation of the regressor. In all regressions, standard errors are clustered at the region level.[7]

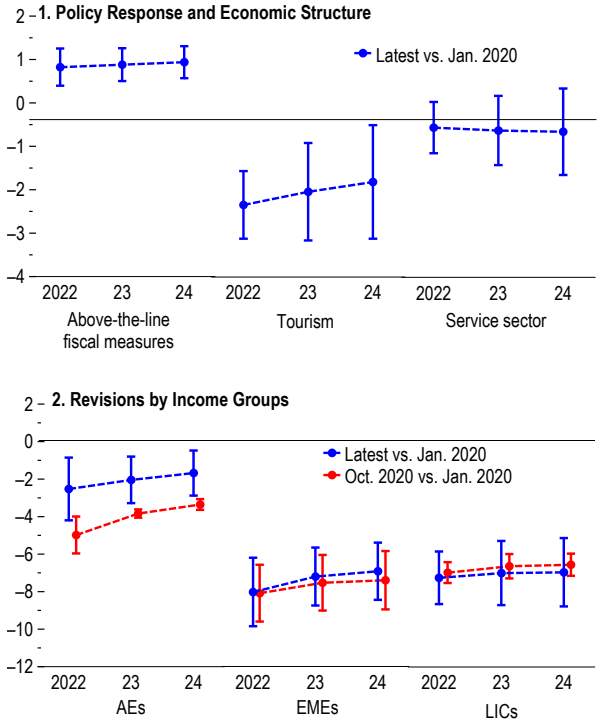
The analysis shows that the largest impacts of the crisis are on the most tourism-dependent economies, with a one-standard deviation increase in tourism and travel share of GDP associated with a 2.5 percent reduction in expected output in 2022 (Figure 5, panel 1). The exposure through tourism is expected to fade somewhat over time but remains close to 2 percent in 2024. Economies with larger service sectors are also likely to experience larger output

[7] These results are robust to including additional variables that capture the severity of the pandemic, health care capacity, and the level of government debt. Importantly, the current severity of the pandemic affects the forecast revision in the near term but is not a significant explanatory factor further out in the forecast horizon once other variables (most notably, income classification) are considered.

losses, with a ½ percent reduction in expected output in 2022.[8] Policy support also plays an important role. Countries with larger pandemic-related above-the-line fiscal measures are projected to experience smaller losses, all else equal.

The uncertainty surrounding these projections (and the extent to which incoming news affects views on the outlook) can be seen by examining changes in expectations of medium-term losses between the October 2020 WEO and the April 2021 WEO forecast (Figure 5, panel 2). Recent favorable news with regard to vaccines and a stronger-than-expected second half of 2020 had a larger impact on advanced economy projections. The losses currently projected (blue line) are notably smaller than those foreseen in the October 2020 WEO (red line) for the advanced economy group, but broadly similar for the other income groups. The assessment described here is based on the current understanding of the path of the pandemic. As the changes from the October 2020 WEO demonstrate, the prospects for medium-term scarring and the associated medium-term forecast will evolve, based on incoming news about vaccines, new virus mutations, disruptions to activity, and the policy response.

Figure 5. Expected Medium-Term Output Losses: Explanatory Factors and Revisions
(Percentage points)



Sources: International Monetary Fund, World Economic Outlook; World Bank, World Development Indicators; World Travel and Tourism Council; and authors' calculations.
Notes: X-axis units are different forecast horizons. Above-the-line fiscal measures refer to additional spending and forgone revenue in response to COVID-19. Both the tourism and service sector are in share of GDP. Chart shows point estimate and two standard error ranges for coefficients of a cross-sectional, cross-country regression (unweighted) of forecast revisions on explanatory variables. Panel 2 shows the estimated coefficient on the economy group indicator. Explanatory variables are standardized to have zero mean and unit standard deviation. Units of the y-axis are therefore percent change in output per one-standard-deviation increase across countries. Regression specification also includes dummies for region and income group (not shown). Standard errors are clustered by region. AEs = advanced economies; EMEs = emerging market economies; LICs = low-income countries.

VI. Conclusions

The prospects for scarring from COVID-19 are substantial, even if lower than after the global financial crisis. Severe recessions in the past, particularly deep ones, have been associated with persistent output losses. The relative financial stability following the COVID-19 shock so far is encouraging, however, as the greatest scarring in the past has occurred in recessions associated with financial crises. Experience from previous recessions also suggests that the productivity channel could be

[8]The relationship between services share and output losses will depend on the composition of services, as low-contact services, such as information and communication, financial, and professional and business services, have been less affected (Das and others 2021) by the pandemic. The results are robust to using a measure of the precrisis high-contact services share of the economy rather than the services share.

particularly important, as recessions have typically been followed by persistent losses to total factor productivity. Nonetheless, this crisis is different from past recessions in many ways, and high uncertainty surrounds the outlook.

Medium-term output losses following the pandemic are currently expected to be large but exhibit significant variation across economies and regions. Despite higher-than-usual growth as the global economy recovers from the COVID-19 shock, world output is still anticipated to be about 3 percent lower in 2024 than pre-pandemic projections suggested. These expected losses are lower than what was seen during the global financial crisis, consistent with the swift policy response that supported incomes and helped contain financial sector disruptions. However, emerging market and developing economies, in particular, are expected to have deeper scars than advanced economies, partly reflecting their greater sectoral exposure to the pandemic shock and more muted policy response.

The picture of divergent recoveries that is emerging, with a larger likelihood and extent of scarring in many of the same countries that have limited fiscal space, suggests a challenging path ahead. Experience from past recessions underscores the importance of avoiding financial distress as the COVID-19 policy response evolves. To prevent scarring that could result from future financial instability, measures that support credit provision should be maintained while ensuring balance sheet resilience and adequate buffers. To maximize the use of limited fiscal space, policymakers should tailor their responses, targeting support to the most-affected sectors and firms. Policies that reverse the setback to human capital accumulation, boost job creation, and facilitate worker reallocation will be key to addressing long-term output losses and the rise in inequality. Policies to promote competition, innovation, and technology adoption would also lift productivity growth and boost investment. Finally, multilateral cooperation on vaccines to ensure adequate production and timely universal distribution will be crucial to prevent even worse scarring in developing economies.

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Appendix Table 1. Economies Included in the Analysis

Afghanistan*; Albania*; Algeria*; Angola; Antigua and Barbuda*; Argentina; Armenia; Aruba*; Australia; Austria; Azerbaijan*; Bahamas, The*; Bahrain; Bangladesh*; Barbados; Belarus*; Belgium; Belize*; Benin; Bhutan*; Bolivia; Bosnia and Herzegovina*; Botswana; Brazil; Brunei Darussalam*; Bulgaria; Burkina Faso; Burundi; Cabo Verde*; Cambodia*; Cameroon; Canada; Central African Republic; Chad*; Chile; China; Colombia; Comoros*; Congo, Democratic Republic of the*; Congo, Republic of*; Costa Rica; Croatia; Cyprus; Czech Republic; Côte d'Ivoire; Denmark; Djibouti*; Dominica*; Dominican Republic; Ecuador; Egypt; El Salvador*; Equatorial Guinea*; Eritrea*; Estonia; Eswatini; Ethiopia*; Fiji; Finland; France; Gabon; Gambia, The*; Georgia*; Germany; Ghana*; Greece; Grenada*; Guatemala; Guinea*; Guinea-Bissau*; Guyana*; Haiti*; Honduras; Hong Kong SAR; Hungary; Iceland; India; Indonesia; Iran; Iraq; Ireland; Israel; Italy; Jamaica; Japan; Jordan; Kazakhstan; Kenya; Kiribati*; Korea; Kosovo*; Kuwait; Kyrgyz Republic; Lao P.D.R.; Latvia*; Lesotho; Liberia*; Libya*; Lithuania*; Luxembourg; Macao SAR; Madagascar*; Malawi*; Malaysia; Maldives*; Mali*; Malta; Marshall Islands*; Mauritania; Mauritius; Mexico; Micronesia*; Moldova; Mongolia; Montenegro, Rep. of*; Morocco; Mozambique; Myanmar*; Namibia; Nauru*; Nepal*; Netherlands; New Zealand; Nicaragua; Niger; Nigeria; North Macedonia*; Norway; Oman*; Pakistan*; Palau*; Panama; Papua New Guinea*; Paraguay; Peru; Philippines; Poland; Portugal; Puerto Rico*; Qatar; Romania; Russia; Rwanda; Samoa*; San Marino*; Saudi Arabia; Senegal; Serbia; Seychelles*; Sierra Leone; Singapore; Slovak Republic; Slovenia; Solomon Islands*; Somalia*; South Africa; South Sudan*; Spain; Sri Lanka; St. Kitts and Nevis*; St. Lucia*; St. Vincent and the Grenadines*; Sudan; Suriname*; Sweden; Switzerland; São Tomé and Príncipe*; Taiwan Province of China*; Tajikistan; Tanzania; Thailand; Timor-Leste*; Togo; Tonga*; Trinidad and Tobago; Tunisia; Turkey; Turkmenistan*; Tuvalu*; Uganda*; Ukraine; United Arab Emirates*; United Kingdom; United States; Uruguay; Uzbekistan*; Vanuatu*; Venezuela; Vietnam*; Yemen*; Zambia; Zimbabwe

Source: Authors' compilation.

Note: The list of economies corresponds to the sample used in the historical country-level analysis. The sample used for the medium-term losses exercise is marked with an asterisk (*).