The COVID-19 crisis: what explains cross-country differences in the pandemic's short-term economic impact?

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ABSTRACT

The COVID-19 pandemic has caused the most universal health and socio-economic crisis in recent history. However, the magnitude of the economic damage has differed widely; some countries were hit particularly hard, while others have managed to weather the storm much better. In this paper, we employ a cross-country analysis to identify factors that help explain the differences in the growth impact of the COVID-19 shock. Our findings underscore the critical role of balancing health and economic concerns in managing the pandemic as both a country's exposure to the coronavirus and the stringency of containment measures are strongly correlated with its growth performance. In addition, our results shed light on several aspects of economic resilience. Good governance, provision of fiscal support and strong macroeconomic fundamentals all helped cushion the economic impact. By contrast, a lack of economic diversification – reflected in overreliance on the tourism sector or oil production – has significantly amplified the shock.

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I Introduction

The COVID-19 pandemic has caused the most universal health and socio-economic crisis in recent history. According to data from Johns Hopkins University, 176 out of the 179 countries covered in the *World Economic Situation and Prospects (WESP) 2021* registered coronavirus cases in 2020 (United Nations, 2021). At the same time, almost all of the world's Governments implemented far-reaching containment measures to slow the spread of the virus, causing massive disruptions to economic activity. No country has been left unscathed by the economic fallout from the pandemic. In each of the 179 countries, GDP growth in 2020 is estimated to have been slower than expected prior to the outbreak of COVID-19.

While the crisis has affected every single country in the world, the magnitude of the economic damage has differed widely. Many countries, especially in Africa and East Asia, have been able to limit the impact of the pandemic, resulting in only mild downward revisions in economic growth. By contrast, a large number of countries in Europe, Latin America and the Caribbean and South Asia, have experienced GDP contractions of historic proportions. The growth performances of China and India are a striking example of the uneven economic impact of the crisis. Prior to the pandemic, both countries were expected to see annual GDP growth of 6 to 7 per cent in 2020.[2] In the updated projections of the *WESP 2021*, China's GDP growth was revised downward by about 3.5 percentage points, whereas India's growth was revised downward by almost 15 percentage points.

This raises the question why the crisis has hit some countries particularly hard, while others have managed to weather the storm much better. Given the complex dynamics of the pandemic, many factors are potentially linked to countries' economic performance. For example, one may ask how strongly the health and economic shocks have been correlated; how much the duration and severity of containment measures have impacted economic growth; to what extent monetary and fiscal support measures have helped mitigate the economic downturn; and what role country characteristics, such as dependence on tourism or oil, and macroeconomic fundamentals have played.

[2] See United Nations (2020). All annual figures refer to the calendar year.

In this study, we empirically examine a broad range of potential explanatory factors, assessing their relevance for the observed cross-country differences in the pandemic's impact on economic growth in 2020. We focus on revisions in GDP growth forecasts, based on projections by the United Nations' Department of Economic and Social Affairs (UN DESA) and the International Monetary Fund (IMF). Following the analysis by Berkmen, Gelos, Rennhack & Walsh (2009) for the case of the global financial crisis, we employ cross-country OLS regressions for a global sample of developed, developing and transition economies.

Our findings underscore two key areas for government action, which could help dampen the impact of future pandemics or similar crises. First, countries' exposure to the pandemic and the stringency of containment measures are among the most important determinants of downward GDP adjustments. Hence, balancing health and economic concerns in countries' closure and containment policy is critical. Further public health and epidemiological research on the effectiveness of different policy responses is needed to guide political decisions and strike an optimal balance between protecting public health and avoiding unnecessary disruptions to the economy. Second, we find evidence that strong structural and macroeconomic fundamentals and effective economic management provided some degree of insulation against the economic downturn. Countries with good governance, more diversified production structures, better pre-pandemic economic performance and lower debt-servicing burdens generally experienced smaller downturns in 2020.

The remainder of the paper is structured as follows. Section II describes the data used in the empirical analysis, with the explanatory variables capturing different aspects of the economic shock. Section III briefly discusses regional trends in some key variables that are directly related to COVID-19, such as a country's exposure to the pandemic, the stringency of containment measures and the fiscal response. Section IV presents the empirical methodology and the main results of our regression analysis; and section V concludes.

II COVID-19: determinants of economic performance

The COVID-19 pandemic has played out differently across the world, with large disparities in economic outcomes. Our objective is to determine which factors help explain the observed

cross-country differences in the pandemic's impact on GDP growth. We focus our analysis on a set of key explanatory variables with global coverage.

Growth revisions

In examining the pandemic's adverse impact on economic output, we focus on revisions to GDP growth for 2020, comparing the latest available estimates with the respective forecasts that had been made prior to the outbreak of the pandemic.[3] We use two alternative sources for the growth data: projections made in the United Nations' *World Economic Situation and Prospects 2020* and *2021* (released in January of each year); and projections made in the International Monetary Fund's (IMF's) World Economic Outlook in October 2019 and October 2020.[4] Relying on annual rather than quarterly data allows us to abstract from potential differences in the cyclical positions of countries and to include a large number of countries in our sample.[5]

Explanatory Variables

Our explanatory variables can be divided into five broad groups that capture different aspects of the economic shock faced by countries: (i) exposure to the pandemic; (ii) stringency of containment measures; (iii) fiscal response; (iv) governance; and (v) structural and macroeconomic vulnerabilities.[6]

Exposure to the pandemic

We use the number of confirmed COVID-19 cases and deaths as reported by Johns Hopkins University to account for countries' exposure to the pandemic. The two indicators help assess

[3] Our approach implicitly assumes that the revisions to GDP growth in 2020 are exclusively attributable to factors related to COVID-19. While this assumption is not valid in a strict sense, the unprecedented magnitude of the crisis justifies this simplification.

[4] The 2020 projections by the United Nations and the IMF include data up to the third quarter of the year. For a subset of countries preliminary full-year estimates have become available. However, most national statistical offices will only release official 2020 GDP figures by the third quarter of 2021.

[5] A quarterly breakdown of growth trajectories in 2020 would severely restrict our sample and create a bias towards developed countries.

[6] We proxy the health dimension of the shock by incorporating countries' exposure to the pandemic into our model. Many indicators related to health or social development conditions are highly correlated and are thereby largely captured by our exposure metric or GDP per capita level which we control for. The correlation coefficient between GDP per capita and the Human Development Index (HDI), for example, was 0.94 in 2019.

the global transmission of the virus, but do not provide a complete picture of the health impact of the pandemic. In fact, the true level of virus transmission is often significantly underestimated as many infected people are asymptomatic and testing capacities are limited. The number of undetected cases and deaths is particularly high in countries with weak healthcare systems and limited medical supplies. While both indicators are fraught with measurement problems, underreporting and underestimation are significantly less pronounced for deaths than cases. This is due to the fact that deaths are concentrated among severe cases who are more likely to have been tested; further, post-mortem testing corrects some of the undercount. Rahmandad, Lim, and Sterman (2020) estimate that throughout the summer of 2020, cumulative cases were 10.5 times higher than the official count; their estimated fatalities, on the other hand, exceeded the official count only by a factor of 1.5.

Stringency of containment measures

In response to the spread of the virus, governments worldwide have been implementing a broad range of containment measures. To account for the stringency of these measures, we use the Oxford COVID-19 Government Response Tracker (Hale, et al., 2020), which aggregates high frequency data on five government response indicators: (i) school or workplace closings; (ii) cancellations or restrictions of public events and social gatherings; (iii) closures of public transport; (iv) stay-at-home orders; and (v) restrictions on national and international movement. The index is scaled to a value between 0 (least stringent) and 100 (most stringent).[7]

Fiscal response

The pandemic has prompted the largest global fiscal expansion since World War II as governments aimed to cushion the health and economic damage. The most comprehensive source for fiscal stimulus data is the IMF's 'Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic' (International Monetary Fund, 2021). This database summarizes key fiscal measures globally, distinguishing between different types of fiscal responses and quantifying their size. Fiscal stimulus is grouped into three categories, which have different budgetary implications in the short and long term (International

[7] Notably, the indicator does not capture how well policies are enforced, nor does it capture demographic or cultural characteristics and leniencies with regards to private restraint and compliance with public policy.

Monetary Fund, 2020): (i) additional spending or one-off tax cuts result in immediately higher budget deficits today, but only indirectly affect countries' future balances through multiplier effects, or higher interest payments on rising debt levels; (ii) tax deferrals have a temporary effect – they increase debt levels and deficits today in order to provide liquidity to the taxpayers, but need to be eventually repaid in the future to settle the score; (iii) guarantees or liquidity support to companies in financial trouble can similarly raise debt levels in the short run, but only affect future deficits, if the guarantees are called, or firms fail and default on their loans.[8]

Governance

In times of crisis, good governance matters more than ever. The quality of governance played a critical role in countries' immediate response to the pandemic and in the effective utilization of stimulus funds. The Worldwide Governance Indicators (WGI) project (Kaufmann, Kraay, & Mastruzzi, 2010) reports on six dimensions of governance: (i) voice and accountability; (ii) regulatory quality; (iii) political stability and absence of violence; (iv) rule of law; (v) government effectiveness; and (vi) control of corruption. These indicators combine the views of a large number of enterprises, citizens, and expert survey respondents from over 30 data sources. In order to avoid overfitting of our model, we include one indicator at a time.

Structural and macroeconomic vulnerabilities

The crisis has hit different sectors of the economy in very different ways. In doing so, it has exposed the vulnerabilities associated with a lack of diversification in a country's productive structure. The most severely affected sector has been tourism, with international arrivals declining by an estimated 74 per cent in 2020 (UNWTO, 2021). We capture a country's dependency on the tourism sector by including tourism receipts as a share of GDP in our estimations. Oil prices and oil demand also collapsed in 2020. We therefore include countries' oil rents – the difference between the value and the cost of total oil production – as a share

[8] As an alternative indicator we use the Economic Support index from the Oxford COVID-19 Government Tracker, which comprises of measures on (i) income support; (ii) debt/contract relief for households; (iii) fiscal measures; and (iv) provision of international support (Hale, et al., 2020). However, the indicator does not include support to firms or businesses and does not take into account the total fiscal value of economic support.

of GDP in our regressions. Both indicators are taken from the World Bank's World Development Indicators (WDI) database.[9]

Given the unique nature of COVID-19, another important question is whether, and to what extent, strong macroeconomic fundamentals have provided some kind of protection against the shock. Have countries that entered the pandemic with stronger economic positions experienced smaller contractions in 2020, all else equal? We focus on two aspects of macroeconomic fundamentals: First, we capture the overall public debt situation prior to the crisis, proxied by the total public debt service paid as a share of total government revenues or, alternatively, the government debt-to-GDP ratio.[10] Second, we incorporate the strength of economic growth, measured by average GDP per capita growth in the three years prior to the crisis.

Lastly, we are interested in potential effects from trade openness, measured as total merchandise exports as a share of GDP. Global trade in goods collapsed in the early stages of the pandemic, but has recovered significantly faster than after the global financial crisis in 2008–09. For all structural and macroeconomic vulnerability variables, we use 2017–19 averages to avert endogeneity problems and reduce the effect of outliers.

III Descriptive evidence: regional trends

To better understand the varying impact of the COVID-19 pandemic, this section reviews regional trends in countries' epidemic trajectories, the policy responses, and the economic outcomes. This allows us to identify which regions and countries were hit particularly hard, which weathered the storm better, and which factors might have played a role. The review builds an important foundation for our regression analysis in the following section.

Key takeaways are that the short-term economic fallout from the pandemic has differed widely. Namely, the economic shock in 2020 has been most severe in South Asia, Europe and

[9] As an alternative measure, we include the share of oil in total exports.
[10] As a robustness check, we include the total public debt service paid as a share of total government expenditures.

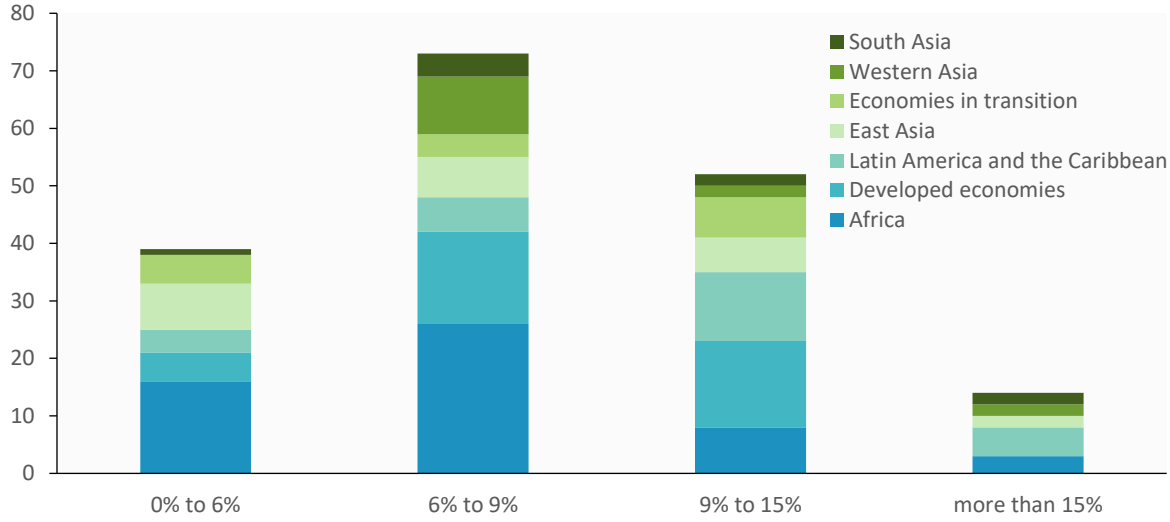
Latin America, while East Asia and the United States have experienced significantly smaller GDP revisions. In part, this may be explained by the massive fiscal spending in the United States, and strictly enforced early lockdowns in East Asia that curbed the spread of the virus and allowed a loosening of restrictions over the course of 2020.

What further stands out is the challenging situation of many low-income countries, whose minimal fiscal response, coupled with stringent closure and containment policies over the course of 2020, could severely damage human capital and long-term growth prospects.

Growth revisions

On top of the devastating health crisis, COVID-19 has triggered the most severe global economic shock since the Great Depression. World gross product is estimated to have fallen by 4.3 per cent in 2020 (United Nations, 2021) – a downward revision by 6.8 percentage points compared to the pre-pandemic growth forecast of 2.5 per cent.

Figure 1: Number of countries by size of 2020 GDP downward revision

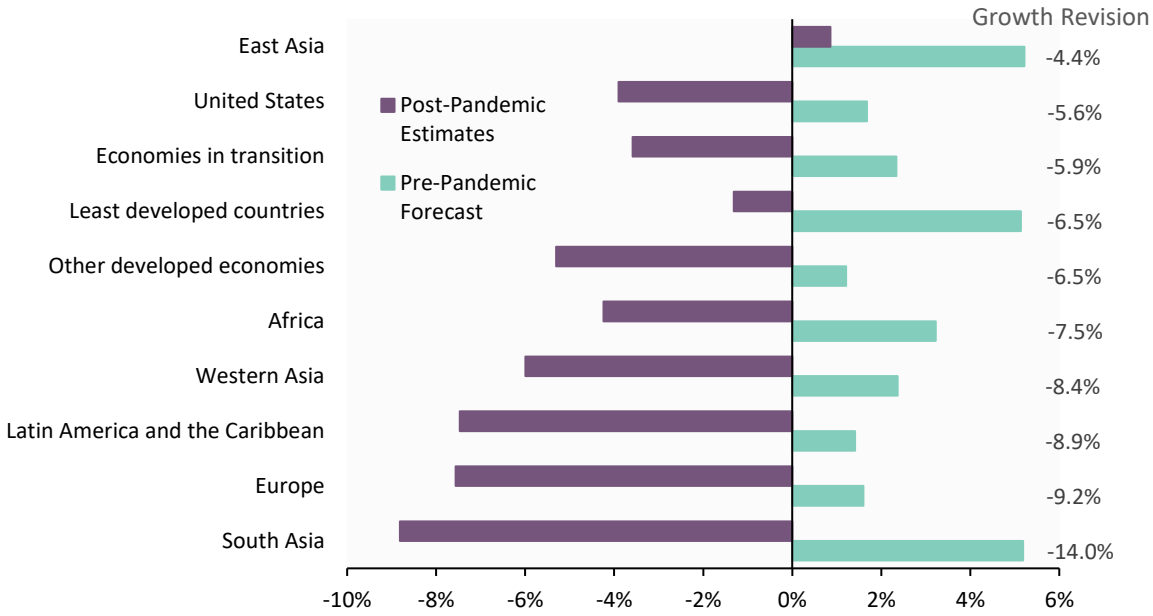


Source: United Nations (2020) and United Nations (2021).
Note: According to UN country classification, developed economies include Australia, Canada, Japan, New Zealand, the United States of America, and the EU-28. Economies in transition consist of countries from South-Eastern Europe and the Commonwealth of Independent States and Georgia.

The impact on economic activity has differed vastly across countries and regions (figure 1). While about a quarter of the 179 countries covered by United Nations (2021) saw relatively mild GDP growth revisions between 0 and 6 percentage points, 14 countries experienced growth revisions of more than 15 percentage points. At the regional level, East Asia and the

United States registered comparatively small downward revisions of 4.4 and 5.6 percentage points, respectively (Figure 2). On the other end of the spectrum, Latin America and the Caribbean (8.9 ppt), Europe (9.2 ppt), and particularly South Asia (14.0 ppt) were hit extremely hard.

Figure 2: Revisions of GDP growth for 2020, by region



Source: United Nations (2020) and United Nations (2021).
Note: Regional averages are calculated as GDP weighted averages of individual country growth rates, using market exchange rates for aggregation.

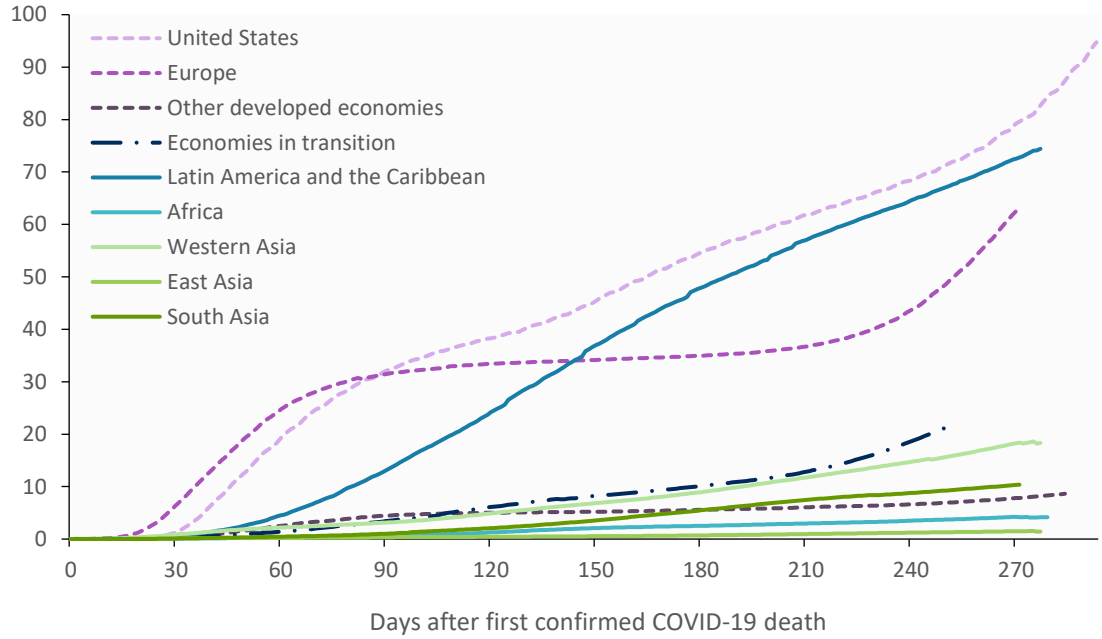
COVID-19 exposure

By the end of 2020, more than 80 million people globally had been diagnosed with COVID-19 and about 1.8 million deaths had been recorded. The cross-country differences in exposure to the virus have been extraordinarily large. The United States of America alone recorded 20 million cases in 2020 – almost a quarter of all cases worldwide. Meanwhile, several other large economies, such as China (about 90,000 cases) or Japan (240,000 cases), were able to limit the spread of the virus.

To make countries' epidemic trajectories comparable, we calculate daily cumulative death numbers from the first confirmed death in each country onwards. Given countries' differing

timelines, countries that were last exposed to the virus have lower coverage for later stages of the pandemic.[11]

Figure 3: COVID-19 deaths per 100,000 people



Source: Authors' calculations based on data from Johns Hopkins University.
Note: Regional averages are weighted by the population size in 2019.

As shown in figure 3, per capita fatalities in the United States, Europe, and Latin America and the Caribbean have been much higher than in other regions. Europe initially saw a very steep increase in the number of deaths but managed to flatten the curve between June and October 2020. However, this positive trend did not last long as the region was hit hard by a second wave in late 2020 and early 2021 that was driven by seasonality and new, more infectious virus mutations. By contrast, per capita fatalities in the United States and Latin America and the Caribbean increased steadily throughout the year.

Among other developed countries, New Zealand (0.5 per 100,000), Japan (2.6), and Australia (3.6) all sustained remarkably low fatalities during 2020.[12] The success can partly be explained by the remote geographic locations of these countries and strict control of in- and outbound travel, which has allowed for efficient and comprehensive contact tracing. New Zealand, for

[11] Regional averages are only computed when at least 75 per cent of the region's countries have data available for the respective epidemic phase.
[12] In many countries, death rates have increased considerably in early 2021. Japan, for example, was significantly exposed to a new wave and the mortality rate rose to about 6 per 100,000 by the end of February 2021.

example, was able to reduce prevalence of COVID-19 to an extent that allowed a fast and almost complete reopening of the economy. Between mid-May and mid-July 2020, no new COVID-19 cases were recorded in the country.

Furthermore, many East Asian countries have so far weathered the pandemic remarkably well despite being hit early with the virus. Fatalities in the region averaged only 1.8 in 100,000 people by the end of 2020. China (0.3), Singapore (0.5), Thailand (0.1) and the Republic of Korea (1.8) managed to keep the death toll from COVID-19 to a minimum. The reasons for this success are manifold and vary from country to country. Overall, the region benefited from strong crisis management systems, drawing on the experiences from previous epidemics, such as the Severe Acute Respiratory Syndrome (SARS) and the Middle East Respiratory Syndrome (MERS). Many of the region's Governments responded swiftly and decisively to tame the spread of the disease, relying on extensive testing and using advanced information and communication technologies for public information sharing and contact tracing.[13]

Africa also recorded remarkably few COVID-19 deaths during 2020 as the continent was largely spared from the catastrophic effects seen elsewhere. The very low reported death rate of 4.9 per 100,000 people partly reflects a significant number of undetected cases, resulting from limited testing capacities, weak institutions, and underfunded health services. However, underestimation likely explains only a fraction of the difference with other developing regions, such as Western Asia and Latin America and the Caribbean that have much higher incidence. Regional characteristics and measures taken by local governments have played an important role in keeping the prevalence rates low in Africa (Chitungo, Dzobo, Hlongwa, & Dzinamarira, 2020). First, resources for widespread HIV and tuberculosis testing were leveraged in the fight against COVID-19, and strict lockdowns were imposed early on. Secondly, African countries were experiencing significantly lower air travel from Asia at the onset of the pandemic compared to other regions (especially Europe and North America) and are generally less integrated into the global economy. Lastly, Africa's younger population has made countries more resilient to the pandemic, given that older people are much more likely to suffer severe illness from COVID-19. Yet, there remains epidemiological uncertainty as to

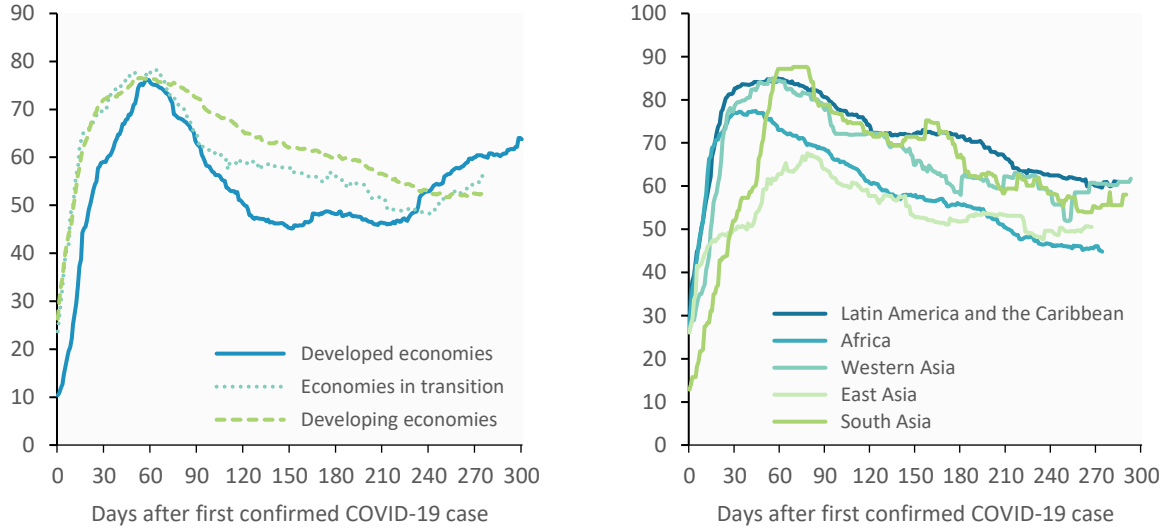
[13] See for example Han et al. (2020) and Yang (2021).

why some regions were much more strongly affected by COVID-19 than others and how social, economic, and political factors have affected transmission dynamics.

Containment measures

Figure 4 shows how containment measures have evolved in different groups of countries in the course of 2020.[14] What stands out is that developing countries were, on average, considerably more cautious in easing restrictions than developed economies. Lockdowns and other movement restrictions were particularly severe in Latin America and the Caribbean, South Asia and Western Asia. East Asia, by contrast, was able to avert strict nationwide lockdowns, but maintained some restrictions throughout the year.

Figure 4: Oxford stringency index (0 – 100) by country groups and developing regions



Source: Authors' calculations based on data from the Oxford COVID-19 Government Response Tracker.
Note: The figure shows the unweighted regional averages for countries' stringency trajectories after country's respective first COVID-19 casualty.

Thus, over the course of 2020, many developing countries have been facing even harsher lockdowns than developed countries. Moreover, movement restrictions tend to have a more severe impact on developing countries, which rely more heavily on in-person production and distribution of goods and services amid weaker digital infrastructure. In addition to the

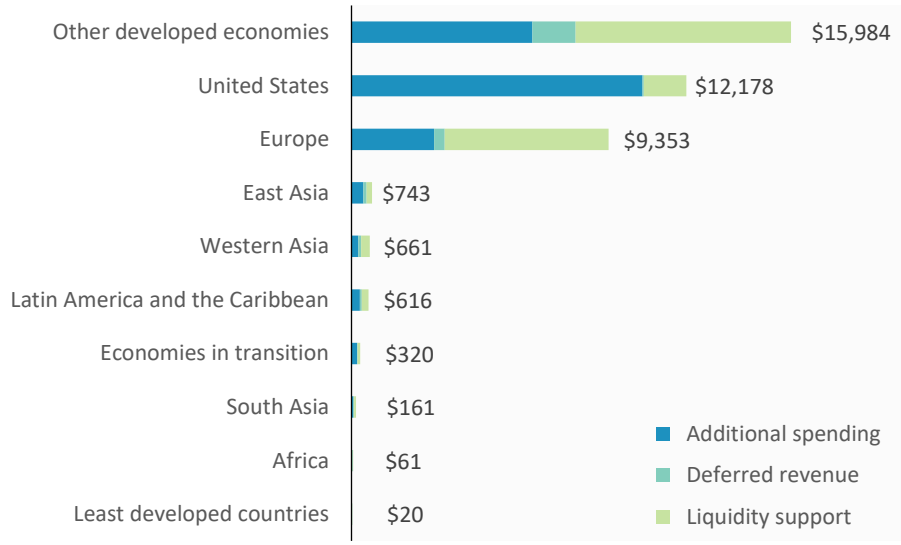
[14] Regional figures are unweighted averages of country-level data. Due to the large number of countries, Europe dominates the category 'developed economies'. Using population- or GDP-weighted averages would bias the results strongly towards a region's largest economies (such as China for East Asia and India for South Asia) and not provide a comprehensive picture of regional developments.

negative short- and medium-term effects on economic activity, the lockdowns threaten to damage human capital in the long run. In many developing countries, school closures and lack of access to distance learning options have severely disrupted education, potentially leading to a 'lost generation' (UNICEF, 2020). In sub-Saharan Africa, for example, it is estimated that four out of five learners do not have access to the internet.

Fiscal responses

The worldwide fiscal response in 2020 has been estimated at a staggering $14.8 trillion, accounting for over 17 per cent of the 2019 world gross product (International Monetary Fund, 2021). This makes it the largest global fiscal response since World War II.[15]

Figure 5: Fiscal stimulus per capita by region, 2020 (current US$)



Source: Authors' calculations based on data from the IMF database of fiscal policy responses to COVID-19.
Note: Regional per capita averages are weighted according to population size as of 2019.

The fiscal response is heavily skewed towards developed economies (Figure 5). The combined stimulus in developed countries makes up more than 80 per cent of the worldwide fiscal response (United Nations, 2021). In stark contrast, all African countries together account for less than 0.6 per cent of the total stimulus. This trend is even more striking in per capita terms: while developed countries' fiscal support has amounted to $11,466 per capita, least developed countries (LDCs) averaged as little as $20. Thus, for every dollar of per capita relief

[15] Several countries, most importantly the United States, announced additional fiscal stimulus in early 2021. By March, the total global fiscal support was estimated at more than $16 trillion.

provided in the LDCs, over $580 were spent in developed ones. This gap dwarfs the disparity in income levels between the two groups. While many LDCs with minimal fiscal responses officially recorded relatively low rates of infections and fatalities, the number of undetected cases is probably significant. At the same time, many LDCs face challenges from the crisis similar to those in countries with higher per capita incomes: weaker global trade activity, reduced demand for goods and services; negative labour markets effects due to mobility restrictions and slower economic activity; and rising demands for the healthcare system. In contrast to developed countries, however, most developing countries lack fiscal space to mount a response, due in large part to their more limited borrowing capacity. This discrepancy will likely exacerbate cross-country inequalities going forward.

Lastly, not only the size, but also the type of fiscal stimulus differs strongly across regions (Figure 5). While direct spending – in the form of fiscal stimulus or one-off tax cuts – makes up over 85 per cent of the United States' total fiscal response, other developed economies such as European countries and Japan have relied more heavily on the provision of liquidity support.

IV Methodology and regression results

In this section, we assess the relevance of the various explanatory factors for the downward revisions in countries' 2020 GDP growth. Following the analysis by Berkmen, Gelos, Rennhack & Walsh (2009) on the global financial crisis, we employ cross-country OLS regressions for a sample of 156 developed, developing and transition economies. Summary statistics are reported in the appendix table 2.

Standardizing the explanatory variables helps simplify the interpretation of our results and allows us to directly compare the relative magnitude of the different explanatory variables. Our estimated coefficients indicate the amount of GDP growth revisions associated with a one standard deviation increase in our dependent variable, all else equal. Hence, the larger the coefficient, the larger its impact on economic growth.

The main findings of our empirical analysis are summarized in Table 1. The estimated equations explain between 46 and 59 per cent of the observed cross-country variation (R^2) in the revisions to economic growth. The findings are robust to the different model specifications and choice of indicators (see appendix 3). The White robust standard errors account for the possibility of heteroskedasticity in our data.

Table 1: Cross-country regressions: drivers of GDP growth revisions

Dependent variable:	WEFM revision of 2020 GDP forecast		WEO revision of 2020 GDP forecast	
	(1)	(2)	(3)	(4)
COVID deaths per 100,000	-0.788***	-0.637*	-0.949***	-0.945***
	(0.231)	(0.370)	(0.253)	(0.360)
Stringency of containment	-0.865***	-0.691**	-1.035***	-0.957***
measures	(0.228)	(0.247)	(0.239)	(0.279)
Fiscal support	0.280	0.053	0.841*	0.963**
	(0.458)	(0.402)	(0.508)	(0.455)
Governance: voice and	0.895**	0.954**	0.997***	1.319***
accountability	(0.322)	(0.342)	(0.317)	(0.341)
Tourism share of GDP	-2.087***	-1.657***	-2.218***	-1.486***
	(0.359)	(0.352)	(0.480)	(0.381)
Oil rents share of GDP	-0.653**	-0.971***	-0.749***	-0.955***
	(0.364)	(0.312)	(0.285)	(0.248)
Past GDP per capita growth	1.141***	0.647**	0.772***	0.447
	(0.711)	(0.266)	(0.473)	(0.243)
Merchandise exports share	-0.073	0.169	-0.195	-0.371
of GDP	(0.203)	(0.356)	(0.180)	(0.336)
Debt servicing share of		-1.460***		-1.044***
government revenue		(0.343)		(0.235)
Observations	156	114	155	114
R^2	0.457	0.587	0.460	0.575
Adjusted R^2	0.423	0.547	0.426	0.534

Sources: Data from United Nations (2020), United Nations (2021), International Monetary Fund (2019), International Monetary Fund (2020), Oxford's Coronavirus Government Response Tracker, World Development Indicator database, the IMF fiscal support database, the world governance indicators project, and UN DESA staff calculations.
Note: Robust White standard errors are shown in parenthesis. The regression further controls for logged GDP per capita levels. Fiscal support is included in logged form. For tourism share of GDP, oil rents share of GDP, past GDP per capita growth, merchandise exports share of GDP, and debt servicing share of government revenue, 2017–2019 averages are used.
Significance levels: *p < 0.1; ** p < 0.05; *** p < 0.01.

Our empirical results confirm the complexity and multifaceted nature of the economic shock caused by the COVID-19 pandemic. Many of the factors identified earlier appear to have played a role in countries' economic performance in 2020. The size of the estimated coefficients varies considerably, indicating substantial differences in the relative importance of the various channels.[16]

[16] When indicating the size of the respective coefficient, we focus on equation (4) of table 1, unless noted otherwise.

Exposure to the pandemic

The magnitude of the health shock has strongly affected growth performance. Countries with a higher number of COVID-19 deaths per capita have seen larger downward revisions in GDP growth, when controlling for other factors. One standard deviation (37.0) in COVID-19 deaths per 100,000 people is associated with a significant growth reduction of about one percentage point.

Stringency of containment measures

Stringent containment measures – while slowing the spread of the disease – have also been associated with larger downward revisions in GDP growth. According to our estimates, one standard deviation in countries' 2020 average stringency (12.8) corresponds to a 0.96 percentage point reduction in 2020 growth estimates all else equal. For Latin America and the Caribbean, which had the strictest closure and containment policy among all regions globally (59 or 4.6 SDs), this factor alone is associated with a growth revision of up to 4.4 percentage points. Countries with the most stringent and prolonged lockdowns, such as Argentina (71), the Plurinational State of Bolivia (77) and Honduras (73), were hit particularly hard. On the other hand, some countries managed to record sustained economic growth despite stringent closure and containment policies. Notably, China reported a high average stringency index of 68 in 2020 but also registered an extremely low prevalence of COVID-related deaths at only 0.32 deaths per 100,000 people, while successfully leveraging its strong macroeconomic fundamentals. As a result, China has been among the handful of countries that are estimated to have achieved positive growth in 2020.

Fiscal response

We also find support for the positive effect of fiscal stimulus on economic activity. While fiscal stimulus is negatively correlated with GDP revisions – as countries whose economies were more severely affected also employed larger fiscal measures – we find a positive relationship once we control for other covariates. The coefficients are significant when the IMF's WEO revisions are used as the dependent variable. In this case, one standard deviation in the log of total fiscal per capita support is associated with a rise of about 0.9 percentage points in the

2020 GDP growth estimates.[17] Thus, many developed economies would likely have faced even more severe economic contractions if they had not provided massive fiscal support. A case in point is the United States, where the per capita stimulus amounted to $12,178. According to our estimates, this was associated with output equivalent to 2.5 percentage points in GDP growth, potentially reducing the downward revision from about 8.0 to 5.5 percentage points.

Governance

In addition to the effects of fiscal stimulus, we also find some support for the hypothesis that good governance helped mitigate the economic shock. All six governance indicators are positively related to economic resilience in 2020 although the respective coefficients are only statistically significant in some cases. We obtain the strongest effects when using 'voice and accountability' as a measure of governance. The 'voice and accountability' factor indicates to what extent a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media. In times of crisis, these aspects are crucial to hold governments accountable for their actions, prevent misallocation of resources, and promote trust in institutions and public information. We find that one standard deviation in the governance indicator is associated with a revision of GDP growth of 1.3 percentage points. This places governance among the largest and most important channels in our regressions. We also obtain a statistically significant effect when including 'political stability and no violence' as a governance measure (see appendix 2).

Structural and macroeconomic vulnerabilities

Our regression results suggest that macroeconomic and structural vulnerabilities have significantly amplified the shock. Most notably, the COVID-19 pandemic revealed the risks of heavy dependence on a single economic sector and a non-diversified export structure. Countries with a high dependency on tourism experienced especially sharp economic downturns in 2020. One standard deviation in tourism's share of GDP (6.9 per cent) is associated with GDP growth revisions of 1.5 percentage points. This makes tourism dependency the channel with the largest impact on economic activity in all our regressions. The impact has been particularly devastating for small island developing States (SIDS), such

[17] Lack of statistical significance in the regressions that use data from *WESP 2020* and *2021* may be due to data limitations, as we cannot control for all channels, or unobservable dynamics, which drive the negative correlation between GDP revisions and fiscal support.

as the Maldives, Vanuatu or the Bahamas, where the tourism sector makes up 60 per cent, 31 per cent and 25 per cent of total GDP, respectively. For the Maldives, we estimate that the direct effect of the collapse in international tourism could account for approximately 13 percentage points of the total GDP revision (28.4 percentage points) all else equal.

Fuel dependency is similarly linked to the downward adjustments of GDP. The effect is, however, considerably smaller than for tourism. One standard deviation in oil rents' GDP share (7.5 per cent) is associated with a GDP growth revision of about one percentage point. In part, this weaker effect may be explained by the faster-than-expected recovery of oil prices in the second half of 2020, which limited the damage to oil-exporting countries. Nonetheless, heavily oil-dependent countries such as Iraq (41.3 per cent) and Algeria (14.1 per cent), were disproportionately affected by the crisis.

Finally, we find evidence that strong macroeconomic fundamentals have helped countries to better withstand the impacts of the crisis. Economies that had experienced faster economic growth in the three years before the pandemic (2017–19) were more resilient and experienced smaller downward revisions in GDP growth. One standard deviation in GDP per capita growth (5.3 per cent) is associated with an increase in revised GDP growth of up to 1.1 percentage points across our four model specifications. Similarly, countries with lower debt service payments as a share of government revenues (or, alternatively, lower public debt-to-GDP- and debt-service-expenditure ratios) have, all else equal, performed better. Here, one standard deviation in the debt servicing share of government revenues is associated with GDP growth revisions of 1.0 percentage points. According to these estimates, Greece's debt servicing, which exceeds total government revenues by 62 per cent – equivalent to 2.0 standard deviations – could account for up to 2.0 percentage points of the total GDP reduction in 2020 (10.3 per cent) all else equal.

V Conclusion

Throughout the twentieth century, three influenza pandemics have disrupted lives on a global scale; similarly, COVID-19 will likely not constitute the last global health crisis in many people's lifetimes. Hence, it is crucial to learn from the unique challenges the COVID-19 pandemic has

posed for governments worldwide. Our analysis underscores three key steps governments can take to build capacities for limiting economic damage from future pandemics. First, countries should strive to reduce heavy dependency on single economic sectors. As in many other crises, lack of economic diversification – reflected in overreliance on the tourism sector or oil production – has become a major vulnerability during the COVID-19 pandemic. In fact, tourism dependency is the factor most strongly associated with downward revisions in GDP growth in our analysis. Second, having built macroeconomic resilience has been key in weathering the COVID-19 storm. Good governance, provision of fiscal support, low debt burdens and strong macroeconomic fundamentals all helped cushion the economic impact. Setting up or expanding social protection systems as part of the recovery can further contribute to strengthening economic resilience against future shocks by acting as an automatic stabilizer. Developing countries – particularly those lacking comprehensive social protection systems – should carefully consider how they prioritize their spending and seek to build up such social safety nets as that will reduce their dependence on donor countries when the next crisis hits. In the meantime, multilateral efforts that aim to increase resilience in developing and least developed countries will be crucial in cushioning future crises' shocks to the global economy. Lastly, balancing the trade-offs between health and economic concerns is among the biggest challenges governments are facing. Both COVID-related deaths (per 100,000 people) and stringency of containment measures are strongly correlated with a country's economic performance. It is vital to identify and implement measures that both curb the spread of the disease and limit unnecessary disruption to the economy. Further research on the effectiveness of different closure- and containment measures will be needed to optimally strike such a balance.

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Appendix Table A.1. List of variables and data sources

Category	Exp. Sign	Source
Dependent variables		
UN WEFM revision of 2020 GDP forecast		World Economic Outlook (2019, 2020)
IMF WEO revision of 2020 GDP forecast		*World Economic Situation and Prospects* (2020, 2021)
Exposure to the pandemic		
COVID-19 cases per 100,000 in 2020	-	Johns Hopkins University
COVID-19 deaths per 100,000 in 2020	-	Johns Hopkins University
Stringency of containment measures		
Average stringency in 2020	-	Oxford's Coronavirus Government Response Tracker
Fiscal support		
Total fiscal support per capita	+	IMF: Fiscal Monitor Database
Fiscal support | Additional fiscal spending per capita	+	IMF: Fiscal Monitor Database
Fiscal support | Deferred revenue per capita	+	IMF: Fiscal Monitor Database
Fiscal support | Liquidity support per capita	+	IMF: Fiscal Monitor Database
Total fiscal support as a share of GDP	+	IMF: Fiscal Monitor Database
Fiscal support | Additional fiscal spending as a share of GDP	+	IMF: Fiscal Monitor Database
Fiscal support | Deferred revenue as a share of GDP	+	IMF: Fiscal Monitor Database
Fiscal support | Liquidity support as a share of GDP	+	IMF: Fiscal Monitor Database
Economic support index	+	Oxford's Coronavirus Government Response Tracker
Governance		
Governance: voice and accountability	+	The Worldwide Governance Indicators project
Governance: political stability / no violence	+	The Worldwide Governance Indicators project
Governance: government effectiveness	+	The Worldwide Governance Indicators project
Governance: regulatory quality	+	The Worldwide Governance Indicators project
Governance: rule of law	+	The Worldwide Governance Indicators project
Governance: control of corruption	+	The Worldwide Governance Indicators project
Structural and macroeconomic vulnerabilities		
Tourism receipts as a share of GDP	-	WDI Database

Tourism receipts as a share of exports	-	WDI Database
Oil rents as a share of GDP	-	WDI database
Oil share of exports	-	UN staff estimates
Past GDP per capita growth	+	WDI database
GDP per capita level	+	WDI database
Merchandise exports as a share of GDP	-	WDI database
Debt servicing as a share of total government revenue	-	World Economic Outlook April 2021
Debt servicing as a share of total government expenditure	-	World Economic Outlook April 2021
Debt to GDP ratio	-	WDI database
Debt to GNI ratio	-	WDI database

Appendix Table A.2. Summary Statistics

Variable	Obs	Mean	St.dev.	Min	Max
WEFM revision of 2020 GDP forecast	173	-8.29	3.77	-31.00	-0.30
WEO revision of 2020 GDP forecast	168	-8.33	3.92	-25.86	-1.03
COVID deaths per 100,000	163	28.30	37.03	0.00	169.23
Stringency of containment measures	163	49.59	12.77	0.00	76.93
Fiscal support	173	$1,741.39	$3,691.30	$0.00	$19,968
Governance: voice and accountability	169	-0.10	1.00	-2.19	1.69
Tourism share of GDP	170	4.7%	6.9%	0.0%	60.1%
Oil rents share of GDP	167	2.9%	7.5%	0.0%	42.0%
Past GDP per capita growth	173	4.4%	5.3%	-33.3%	29.4%
Merchandise exports share of GDP	157	70.5%	21.6%	9.4%	110.8%
Debt servicing share of government revenue	125	44.5%	80.06%	0.4%	770.3%

Appendix Table A.2. List of countries included in regression analysis

Afghanistan	Cyprus	Kenya	Republic of Korea
Albania	Czech Republic	Kuwait	Republic of Moldova
Algeria	Democratic Republic of the Congo	Kyrgyzstan	Romania
Angola	Denmark	Lao People's Democratic Republic	Russian Federation
Argentina	Djibouti	Latvia	Rwanda
Australia	Dominican Republic	Lebanon	Saudi Arabia
Austria	Ecuador	Lesotho	Senegal
Azerbaijan	Egypt	Liberia	Serbia
Bahamas	El Salvador	Lithuania	Sierra Leone
Bahrain	Estonia	Luxembourg	Singapore
Bangladesh	Eswatini	Madagascar	Slovakia
Barbados	Ethiopia	Malawi	Slovenia
Belarus	Fiji	Malaysia	Solomon Islands
Belgium	Finland	Mali	South Africa
Belize	France	Malta	Spain
Benin	Gabon	Mauritania	Sri Lanka
Bhutan	Gambia (Islamic Republic of the)	Mexico	Suriname
Bolivia (Plurinational State of)	Georgia	Mongolia	Sweden
Bosnia and Herzegovina	Germany	Morocco	Switzerland
Botswana	Ghana	Mozambique	Tajikistan
Brazil	Greece	Myanmar	Thailand
Brunei Darussalam	Guatemala	Namibia	Timor-Leste
Bulgaria	Guinea	Nepal	Togo
Burkina Faso	Haiti	Netherlands	Trinidad and Tobago
Burundi	Honduras	New Zealand	Tunisia
Cambodia	Hong Kong Special Administrative Region of China	Nicaragua	Turkey
Cameroon	Hungary	Niger	Uganda
Canada	Iceland	Nigeria	Ukraine
Central African Republic	India	Norway	United Arab Emirates
Chad	Indonesia	Oman	United Kingdom of Great Britain and Northern Ireland
Chile	Iran (Islamic Republic of)	Pakistan	United Republic of Tanzania
China	Iraq	Panama	United States of America
Colombia	Ireland	Papua New Guinea	Uruguay
Comoros	Israel	Paraguay	Uzbekistan
Congo	Italy	Peru	Vanuatu
Costa Rica	Jamaica	Philippines	Viet Nam
Côte D'Ivoire	Japan	Poland	Yemen
Croatia	Jordan	Portugal	Zambia
Cuba	Kazakhstan	Qatar	Zimbabwe

Appendix Table A.3. Alternative model specifications

Dependent variable:	WEFM Revision of 2020 GDP forecast			
	(1)	(2)	(3)	(4)
COVID Deaths per 100,000	-0.833***	-0.742**	-0.812***	-0.848***
	(0.231)	(0.376)	(0.239)	(0.241)
Stringency	-0.771***	-0.658**	-0.710***	-0.810***
	(0.214)	(0.247)	(0.213)	(0.231)
Fiscal support	0.200	0.030	0.315	0.351
	(0.457)	(0.416)	(0.468)	(0.477)
Governance: political stability / no violence	0.794**	0.504	0.908**	0.783*
	(0.394)	(0.366)	(0.397)	(0.457)
Tourism share of GDP	-2.358***	-1.960***	-2.290***	
	(0.360)	(0.383)	(0.338)	
Tourism share of exports				-1.757***
				(0.312)
Oil rents' share of GDP	-0.205	-0.593**	-0.206	0.072
	(0.358)	(0.304)	(0.338)	(0.445)
Past GDP growth	0.935***	0.488	0.740***	0.958***
	(0.644)	(0.266)	(0.574)	(0.640)
Merchandise exports share of GDP	-0.021	0.163	-0.069	-0.404*
	(0.229)	(0.388)	(0.221)	(0.245)
Debt servicing share of government Revenue		-1.450***		
		(0.319)		
Debt to GDP ratio			-0.549**	
			(0.235)	
Observations	153	114	151	143
R^2	0.451	0.567	0.474	0.414
Adjusted R^2	0.416	0.525	0.437	0.374

Sources Data are taken from United Nations (2020), United Nations (2021), International Monetary Fund (2019), International Monetary Fund (2020), Oxford's Coronavirus Government Response Tracker, World Development Indicator database, the IMF fiscal support database, the World Governance Indicators Project, and UN DESA staff calculations.

Note: Robust White standard errors are shown in parenthesis. The regression further controls for logged GDP per capita levels. Fiscal support is included in logged form. For tourism share of GDP, oil rents share of GDP, past GDP per capita growth, merchandise exports share of GDP, and debt servicing share of government revenue, 2017–2019 averages are used.

Significance levels: *p < 0.1; ** p < 0.05; *** p < 0.01