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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 use cross-country regression 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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CONTENTS

I Introduction 3

II COVID-19: determinants of economic performance 4

Growth revisions 4

Explanatory variables 5

III Descriptive evidence: regional trends 7

Growth revisions 7

COVID-19 exposure 7

Containment measures 10

Fiscal responses 11

IV Methodology and regression results 12

V Policy implications and conclusion 16

Bibliography 18

Appendix tables 20

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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, experienced GDP contractions of historic proportions in 2020. 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.[1] In the updated projections of the *WESP as of mid-2021*, China's GDP growth was revised downward by 3.6 percentage points, whereas India's growth was revised downward by over 13 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.

The purpose of our study is twofold. First, we aim to provide a succinct regional overview of the twin public health and socio-economic crisis caused by the COVID-19 pandemic in 2020. Specifically, we provide a regional breakdown for the pandemic's impact on economic activity, countries' epidemiologic exposure to the pandemic and key public policy responses, such as stringency in countries' closure and containment measures and the fiscal stimulus provided.

Second, 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 activity in 2020. We focus on revisions in annual 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 over 150 developed, developing and transition economies. This allows us to identify the variables that are most strongly correlated with the observed 2020 output losses.

Our findings underscore three 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 output losses. 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

1 See United Nations (2020). All annual figures refer to the calendar year.

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 output losses in 2020. Third, our regression results provide suggestive evidence that fiscal support measures have helped limit the economic damage. Causal inference is in this case hampered by potential endogeneity bias as countries may have responded to weak economic activity by providing more fiscal support. Nonetheless, the positive and significant coefficient in our regressions suggests that fiscal stimulus provided some support for economic activity.

Our results complement those of other recent studies on the determinants of output losses during the COVID-19 pandemic, which use different country samples, time periods and modelling frameworks. Several studies focus particularly on the role of government policies prior and during the crisis. König and Winkler (2020) analyze the 2020 growth revisions in a sample of 47 developed and emerging countries, showing that the quality of government policies constituted an important determinant of economic performance. Similarly, Monsod and Gochoco-Bautista (2021) find for a sample of 21 Asian countries that efficient and prepared government institutions mattered for the outcomes. Glocker and Piribauer (2021) examine actual contractions in GDP, rather than downward revisions, for 130 countries, using Bayesian model averaging. In line with one of our major findings, they identify adverse initial conditions as a main driver of cross-country differences. Finally, Furceri (2021) et al. focus on the initial contractions in the first half of 2020, based on quarterly data for a sample of 96 countries. Applying model-averaging techniques for a wide range of potential determinants, they find that the level of GDP per capita had a particularly large effect on resilience, with poorer countries having higher economic costs of containment measures and less effective macro policy stimulus.

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 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. A complete list of variables and data sources can be found in the appendix table A.1.

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.[2] We use two alternative sources for the growth data: projections made in the United Nations' *World Economic Situation and Prospects (WESP) 2020* (released in January 2020) and the *WESP as of mid-2021* (released in May 2021); and projections made in the International Monetary Fund's (IMF's)

2 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.

World Economic Outlook (WEO) in October 2019 and April 2021.[3] 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.[4]

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.[5]

Exposure to the pandemic

We use the number of confirmed COVID-19 cases and deaths per 100,000 as reported by Johns Hopkins University to account for countries' relative exposure to the pandemic. The two indicators help assess 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).[6] To account for both the intensity and the durations of lockdowns in our analysis, we primarily use countries' average stringency index ratings. However, we also investigate other measures, such as countries' total number of days in severe lockdown[7], alongside disaggregated stringency indices on the five government-response dimensions discussed above.

3 For a subset of countries, official full-year GDP estimates for 2020 are available and included in the WESP as of mid-2021 and the WEO April 2021. Many national statistical offices will, however, only release official 2020 GDP figures in the third or fourth quarter of 2021.

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

5 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.

6 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.

7 We classify the closure and containment policies on any given day as a severe lockdown, if that day's stringency index is among the top decile of all recorded daily stringency responses in 2020 globally.

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 support data is the IMF's 'Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic' (International Monetary Fund, 2021b). This database summarizes key fiscal measures globally, distinguishing between different types of fiscal responses and quantifying their size. Fiscal support measures are grouped into three categories, which have different budgetary implications in the short and long term (International Monetary Fund, 2020b): (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 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.

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.

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.

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 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 3.6 per cent in 2020 (United Nations, 2021) – a downward revision by 6.1 percentage points compared to the pre-pandemic growth forecast of 2.5 per cent.

The impact on economic activity has differed vastly across countries (figure 1). While about a quarter of the 179 countries covered by United Nations (2021) saw relatively mild GDP growth revisions between 0 and 5 percentage points, 17 countries experienced growth revisions of more than 15 percentage points. While East Asia and the United States registered comparatively small downward revisions of 4.4 and 5.2 percentage points, respectively (Figure 2), Latin America and the Caribbean (8.1 ppt), Europe (8.3 ppt), and particularly South Asia (11.0 ppt) were hit extremely hard.

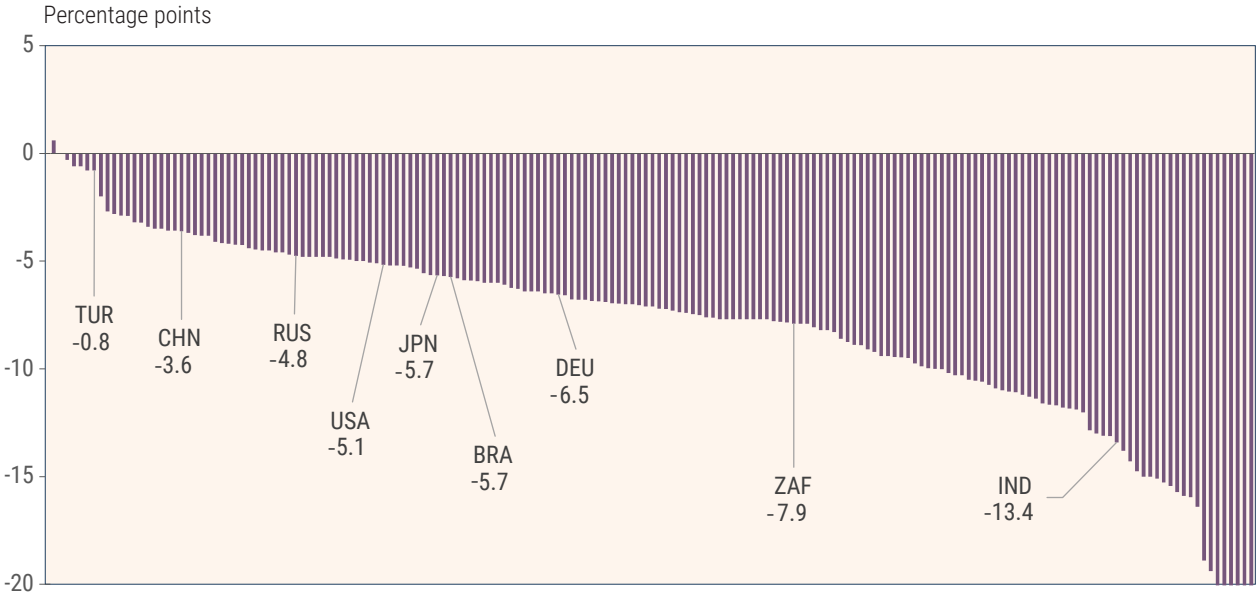
COVID-19 exposure

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]

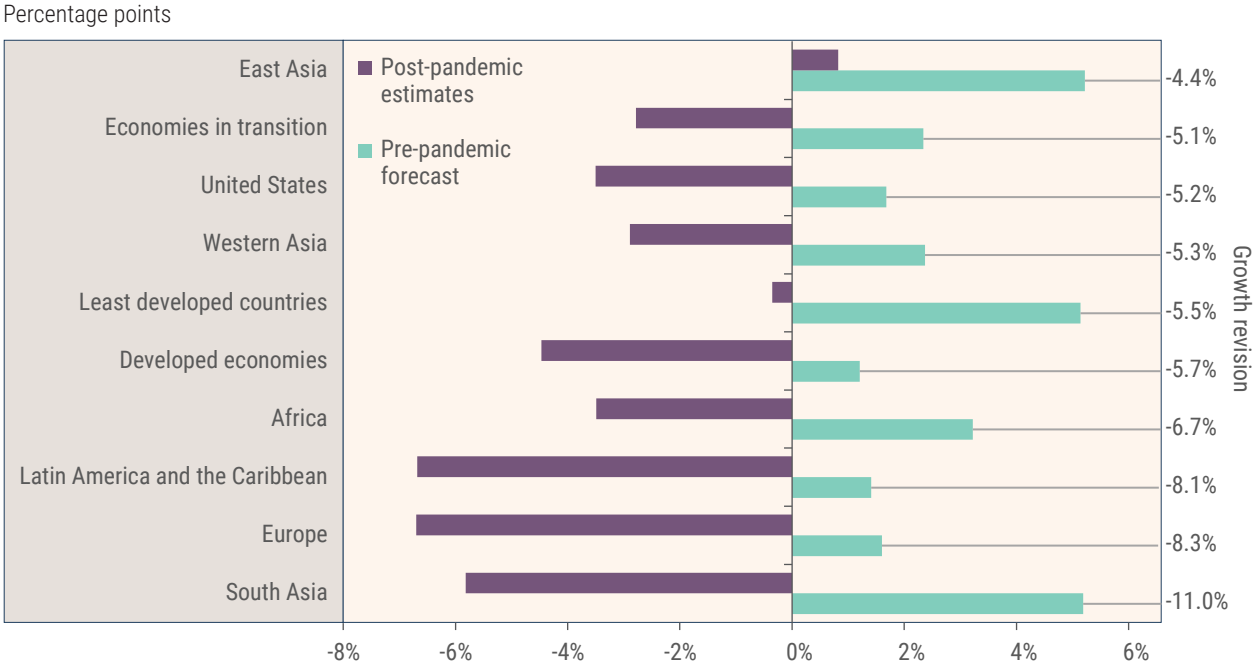
11 Regional averages are only computed when at least 75 per cent of the region's countries have data available for the respective epidemic phase.

Figure 1
Revisions of GDP growth for 2020 by country



Source: United Nations (2020) and United Nations (2021).
Note: GDP revisions are cut off at -20% for better readability. Outliers, whose GDP revisions are not displayed include: Panama (-21.7 ppt), Fiji (-22.4 ppt), Lebanon (-31.5 ppt), The Maldives (-36.1 ppt), Guyana (-42.6 ppt) and Libya (-72.1 ppt).

Figure 2
Revisions of GDP growth for 2020



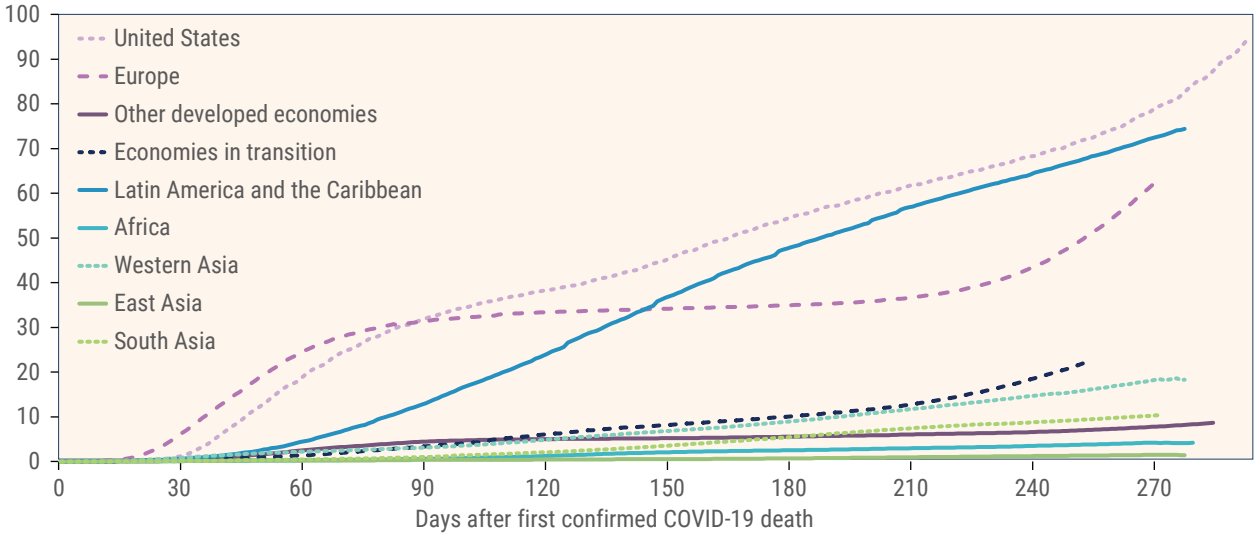
Source: United Nations (2020) and United Nations (2021).
Note: Regional averages are calculated as GDP weighted averages of individual country growth rates, using market exchange rates for aggregation.

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 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 example, was able to reduce the prevalence of COVID-19 to an extent that allowed for 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]

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.

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.

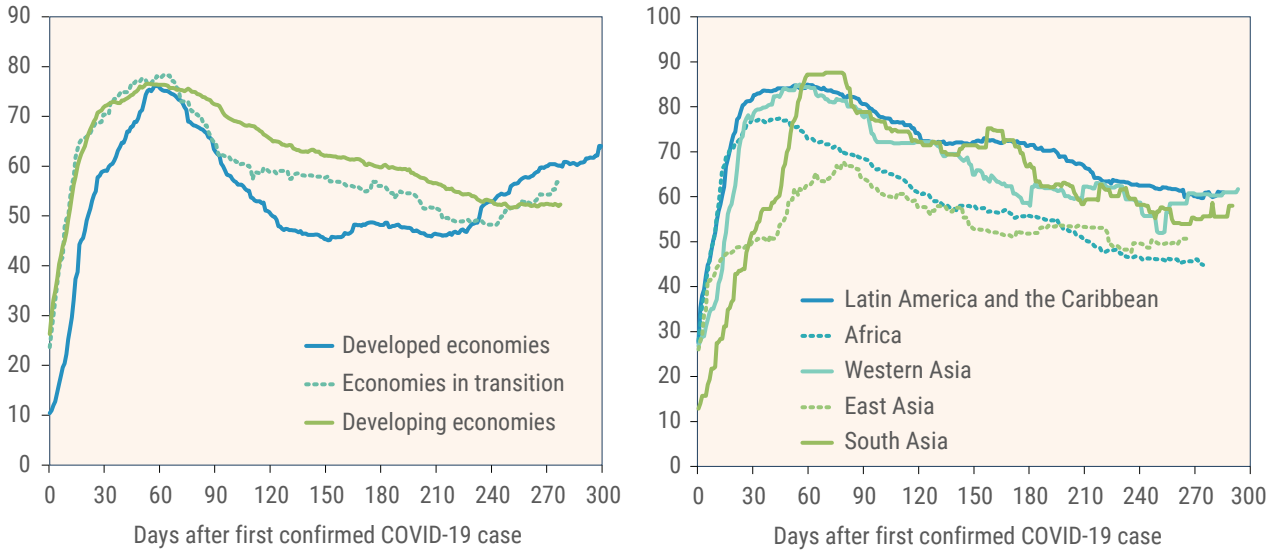
13 See for example Han et al. (2020) and Yang (2021).

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 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 over 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.

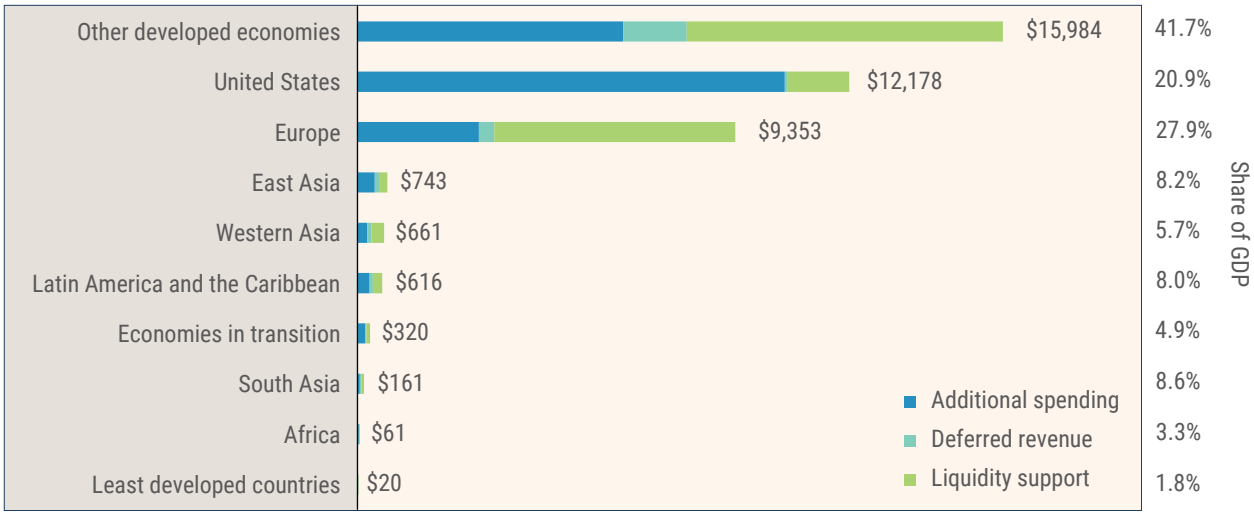
14 Regional figures are unweighted averages of country-level data. Due to the large number of countries, Europe dominates the category 'developed economies'. Using population- or GDP-weighted averages would bias the results strongly towards a region's largest economies (such as China for East Asia and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

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 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, 2021b). 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 provided in the LDCs, over $580 were spent in developed ones. While the United States, Europe and other developed countries spent between 21 and 41 per cent of GDP on total fiscal stimulus in 2020, this figure stood at 3 per cent in Africa and at only 1.8 per cent in the least developed countries.

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.

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 A.2 and a list of countries included in the regression analysis is provided in appendix table A.3.

Like other cross-country studies on economic growth, we face the problem of potential endogeneity of explanatory variables. Broadly speaking, endogeneity occurs in an OLS setting when an explanatory variable is correlated with the error term. Common causes for this issue are omitted variable bias, simultaneity bias, or measurement errors.

A possible fix for endogeneity in a cross-sectional setting is the lagging of independent variables (Christ, 1994). This particularly helps with the problem of simultaneity, as last periods' independent variable is not expected to be causally affected by current changes in the dependent variable. While lagging explanatory variables does not always suffice to derive causal and unbiased estimates (Bellemare et al., 2017), the necessary conditions to rule out endogeneity are met for our structural variables, including macroeconomic fundamentals and governance indicators. Specifically, it is plausible to assume that there is (1) serial correlation in the potentially endogenous explanatory variable; (2) no serial correlation among the unobserved sources of endogeneity due to the unprecedented nature of the crisis.[16]

However, the same rationale is not applicable to variables that we cannot lag due to the recentness of events, notably per capita deaths, stringency, and fiscal support. In this case, simultaneity and omitted variable bias cannot be ruled out.[17] For example, it seems plausible that governments who feared large GDP contractions were more cautious in enacting stringent closure and containment measures. Similarly, reduced economic activity may have impacted the healthcare system, which in turn could directly affect mortality rates and total deaths. Fiscal spending is the variable with the most severe endogeneity issue – countries that fear a larger downturn in economic activity may implement larger fiscal stimulus packages.[18]

16 Most unobserved sources of endogeneity, which are linked to revisions in GDP forecasts, were either drastically different or even no-existent prior to the pandemic and should thus not exhibit substantial serial correlation.

17 One way to resolve endogeneity problems is the use of instrumental variables – variables that are correlated with the actual value of the independent variable, but uncorrelated with the residuals. However, in our case, it is not possible to find valid instruments.

18 We therefore report separate regression results, with and without the fiscal variable.

Our results on fiscal support, stringency and exposure should therefore be interpreted with caution, suggesting correlation rather than causation. But as argued by Mankiw (1995) and Wacziarg (2002), even if causal statements are almost impossible to make in some areas of economics, partial correlations can still be informative. Namely, under endogeneity, estimates can still be causally informative if we can comment on the direction of the bias they suffer from.

In the case of fiscal support, our estimate likely represents a lower bound for the true causal effect. Both omitted variable and simultaneity bias are expected to lead to an underestimation of fiscal support's true effect. [19] Hence, while we cannot confidently assess the impact of fiscal support on GDP revisions, we can conclude that it is likely as big or bigger than our estimate.

In our cross-country OLS regressions, we take the logarithm of fiscal support and GDP per capita levels to better account for their functional form.[20] All other variables enter the model in linear form. We then further standardize all explanatory variables, which 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 44 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 table A.4). The White robust standard errors account for the possibility of heteroskedasticity in our data.

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.[21]

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 0.7 percentage point.

19 Possible omitted variables that are negatively correlated with GDP revisions, will exhibit positive correlation with fiscal support if governments anticipate them – likewise those positively correlated with GDP revisions will exhibit negative correlation with fiscal support. The inverse signs of these two channels lead to negative omitted variable bias, underestimating the coefficient for fiscal support.

20 It seems unlikely that fiscal support and GDP per capita have a linear effect – that is, that one dollar of fiscal support or GDP per capita at very low levels common in least developed countries have the same effect as the same additional dollar in higher income countries. Rather it seems plausible, that a 1 per cent increase in these two channels has a constant effect across their distribution, which is reflected by taking the logarithm. Subsequently standardizing the variables only scales the coefficient but does not affect the functional form.

21 When indicating the size of the respective coefficient, we focus on the baseline regressions for the United Nations GDP forecast, unless noted otherwise.

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

	Dependent variables					
	UN revision of 2020 GDP forecast			IMF revision of 2020 GDP forecast		
	Baseline	Fiscal	Debt	Baseline	Fiscal	Debt
COVID deaths per 100,000	-0.695**	-0.781**	-0.351	-0.639**	-0.720**	-0.338
	(0.281)	(0.285)	(0.358)	(0.311)	(0.307)	(0.404)
Average stringency of containment measures	-1.296***	-1.357***	-1.157***	-1.252***	-1.331***	-1.119***
	(0.300)	(0.313)	(0.306)	(0.277)	(0.289)	(0.299)
Governance: voice and accountability	0.859**	1.021**	1.300***	1.280***	1.401***	1.801***
	(0.388)	(0.376)	(0.392)	(0.360)	(0.363)	(0.420)
Tourism share of GDP	-2.961***	-2.850***	-2.094***	-2.886***	-2.769***	-2.055***
	(0.539)	(0.566)	(0.429)	(0.498)	(0.532)	(0.411)
Oil rents share of GDP	-0.682**	-0.554*	-0.950***	-1.012***	-0.842***	-1.164***
	(0.364)	(0.355)	(0.316)	(0.297)	(0.300)	(0.267)
Past GDP per capita growth	0.965***	0.875***	0.245	0.807***	0.696**	0.163
	(0.783)	(0.702)	(0.306)	(0.565)	(0.491)	(0.343)
Merchandise exports share of GDP	-0.111	-0.166	-0.146	-0.210	-0.246	-0.242
	(0.227)	(0.227)	(0.375)	(0.226)	(0.223)	(0.411)
GDP per capita (levels)	1.056***	0.431	1.171***	1.216***	0.491	1.028**
	(0.341)	(0.465)	(0.396)	(0.286)	(0.431)	(0.340)
Fiscal support		1.009**			1.093**	
		(0.621)			(0.593)	
Debt servicing share of government revenue			-1.930***			-1.591***
			(0.316)			(0.384)
Observations	153	153	114	152	152	114
R^2	0.440	0.456	0.594	0.452	0.470	0.575
Adjusted R^2	0.409	0.422	0.559	0.421	0.436	0.539

Sources: Data from United Nations (2020), United Nations (2021), International Monetary Fund (2019), International Monetary Fund (2021a), Oxford's Coronavirus Government Response Tracker, the World Development Indicators 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. Fiscal support and GDP per capita levels are logged to better reflect their functional 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. A more granular breakdown of different stringency measures is available in the annex.
Significance levels: *p < 0.1; ** p < 0.05; *** p < 0.01.

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 1.3 percentage point reduction in 2020 growth estimates all else equal. As we control for exposure, our approach does not account for stringencies' complex and multifaceted mitigating effect on the spread of the virus, which in turn impacts economic activity; rather we observe

that countries with more stringent responses are much more at risk of facing severe economic contractions compared to less stringent ones with similar macroeconomic fundamentals and health outcomes.

The association between stringency and GDP revisions also remains highly statistically significant for a wide range of measures such as the number of days in extreme lockdown, or the disaggregated indices of the Oxford COVID-19 government response tracker. A detailed breakdown of the effect of different measures can be found in appendix tables A.5 and A.6.

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 almost 6 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 support on economic activity when including it. While fiscal stimulus itself is negatively correlated with GDP revisions – as countries whose economies were more severely affected also employed larger fiscal measures – we find a strong positive relationship once we control for other covariates, which – as we argued earlier – is likely an underestimate of fiscal support's true effect. We find that doubling fiscal support is associated with a rise of about 0.4 percentage points in 2020 GDP estimates[22] and that one standard deviation in the log of total fiscal per capita support is associated with a rise of about one percentage point in the 2020 GDP growth estimates. 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 3.3 percentage points in GDP growth, potentially reducing the downward revision from about 8.5 to 5.2 percentage points. Even smaller stimuli in developing countries, albeit limited in absolute size, are estimated to have had a substantial impact.

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 0.9 percentage points. Across all six regressions, governance is among the largest and most important channels. We also obtain a statistically significant effect when including 'political stability and no violence' as a governance measure (see appendix table A.4).

22 Not standardizing logged fiscal support, and thereby not rescaling the coefficient for better comparability, allows for a more intuitive interpretation of the coefficient and yields estimates of 0.36 and 0.39 for the WESP and IMF model specifications respectively.

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 nearly 3 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 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.

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. Interestingly, past growth's coefficient declines and loses significance once we control for debt servicing, even though it does remain positive. This indicates that one of the key reasons why growing economies have fared better economically, were smaller debt burdens. When we control for debt, we find that 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 over 1.5 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 3.0 percentage points of the total GDP reduction in 2020 (10.3 per cent) all else equal.

Lastly, we find that countries with higher levels of GDP per capita have weathered the COVID storm better than low-income countries. Similar to what we observed with regards to past growth, the effect becomes smaller and even statistically insignificant when we control for fiscal support in per capita terms. Again, this indicates that one of the key reasons why comparable high-income countries saw smaller revisions than low-income countries all else equal, was their ability to employ larger amounts of stimulus.

V Policy implications and 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 several key steps governments can take to build capacities for limiting economic damage from future pandemics. First, countries should strive to reduce dependency on a single economic sector. 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. For governments which currently heavily rely on tourism or natural resources, the pandemic should be a call to action. Developing concrete roadmaps for the coming decades to reduce dependency on single sectors and boost investments that diversify economic exposure should be a key target. Secondly, having built macroeconomic resilience before the pandemic and utilizing the available policy space have been key for weathering the COVID-19 storm. Good governance, low debt burdens and strong macroeconomic fundamentals all helped cushion the economic impact. Provision of fiscal support has also been associated with reduced output losses. Fiscal packages have provided lifelines for workers and firms, supporting economic activity and employment. Setting up or expanding social protection systems as part of the recovery can further strengthen economic resilience against future shocks by acting as an automatic stabilizer. Developing countries – particularly those lacking comprehensive social protection systems – should consider how to prioritize their spending and build up social safety nets to reduce their vulnerability in coming crises. In the meantime, multilateral efforts that aim to increase resilience in developing and least developed countries are crucial for mitigating the impacts of future shocks. Thirdly, 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 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. Lastly, the pandemic has illustrated that accurate, reliable and timely data are critical for economic analysis that can inform policy decisions. Due to lack of available data, low-income countries are often excluded from empirical studies, biasing the results and policy implications towards high-income countries. Investment in data collection, management, and reporting is key to improve evidence-based policymaking in low-income countries and to avoid skewing global crises responses towards developed and less vulnerable economies.

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Appendix Table A.1
List of variables and data sources

Category	Source
Dependent variables	
UN WEFM revision of 2020 GDP forecast	World Economic Situation and Prospects 2020, World Economic Situation and Prospects as of mid-2021
IMF WEO revision of 2020 GDP forecast	World Economic Outlook October 2019, World Economic Outlook April 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	World Development Indicators (WDI) Database
Tourism receipts as a share of exports	WDI Database
Oil rents as a share of GDP	WDI Database
Oil share of exports	UNCTAD Comtrade Database
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
UN revision of 2020 GDP forecast	173	-8.29	3.77	-31.00	-0.30
IMF 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	$3,691	$0	$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.3
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.4
Alternative model specifications

	Dependent variable			
	UN revision of 2020 GDP forecast			
	(1)	(2)	(3)	(4)
COVID deaths per 100,000	-0.833*** (0.231)	-0.742** (0.376)	-0.812*** (0.239)	-0.848*** (0.241)
Stringency	-0.771*** (0.214)	-0.658** (0.247)	-0.710*** (0.213)	-0.810*** (0.231)
Fiscal support	0.200 (0.457)	0.030 (0.416)	0.315 (0.468)	0.351 (0.477)
Governance: political stability / no violence	0.794** (0.394)	0.504 (0.366)	0.908** (0.397)	0.783* (0.457)
Tourism share of GDP	-2.358*** (0.360)	-1.960*** (0.383)	-2.290*** (0.338)	
Tourism share of exports				-1.757*** (0.312)
Oil rents' share of GDP	-0.205 (0.358)	-0.593** (0.304)	-0.206 (0.338)	0.072 (0.445)
Past GDP growth	0.935*** (0.644)	0.488 (0.266)	0.740*** (0.574)	0.958*** (0.640)
Merchandise exports share of GDP	-0.021 (0.229)	0.163 (0.388)	-0.069 (0.221)	-0.404* (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

Appendix Table A.5
Stringency Breakdown I

	Dependent variables					
	UN revision of 2020 GDP forecast					
	(1)	(2)	(3)	(4)	(5)	(6)
COVID deaths per 100,000	-0.555** (0.276)	-0.993*** (0.301)	-0.743** (0.291)	-0.651** (0.312)	-0.743** (0.296)	-0.843*** (0.305)
Number of days in extreme stringency	-1.451*** (0.283)					-1.119*** (0.299)
Average stringency 30 days after first death		-0.37 (0.338)				
School closings			-0.950*** (0.277)			
Workplace closings				-1.107*** (0.263)		
Cancelation of public events					-1.071*** (0.27)	
Restrictions on gatherings						-0.789*** (0.288)
Governance: voice and accountability	0.957*** (0.369)	0.693* (0.405)	0.914** (0.403)	0.812** (0.394)	0.963** (0.393)	0.712* (0.39)
Tourism share of GDP	-2.739*** (0.476)	-2.792*** (0.489)	-2.770*** (0.469)	-2.762*** (0.483)	-2.810*** (0.498)	-2.795*** (0.51)
Oil rents share of GDP	-0.597* (0.314)	-0.880** (0.355)	-0.759** (0.38)	-0.821** (0.347)	-0.841** (0.373)	-0.821** (0.369)
Past GDP per capita growth	0.892 (0.794)	0.97 (0.845)	0.974 (0.812)	0.943 (0.801)	1.017 (0.795)	1.049 (0.826)
Merchandise exports share of GDP	-0.211 (0.205)	0.009 (0.213)	-0.124 (0.237)	-0.062 (0.215)	-0.102 (0.225)	-0.033 (0.215)
GDP per capita (levels)	0.765** (0.316)	0.788* (0.416)	0.944*** (0.341)	1.085*** (0.352)	1.211*** (0.348)	1.055*** (0.357)
Observations	153	153	153	153	153	153
R^2	0.457	0.366	0.404	0.414	0.411	0.387
Adjusted R^2	0.427	0.33	0.371	0.381	0.378	0.353

Sources: Data from United Nations (2020), United Nations (2021), International Monetary Fund (2019), International Monetary Fund (2021a), Oxford's Coronavirus Government Response Tracker, World Development Indicator database, the world governance indicators project, and UN DESA staff calculations.
Note: Robust White standard errors are shown in parenthesis. GDP per capita levels are logged to better reflect their functional form. For tourism share of GDP, oil rents share of GDP, past GDP per capita growth, and merchandise exports share of GDP, 2017–2019 averages are used.
Significance levels: *p < 0.1; ** p < 0.05; *** p < 0.01.

Appendix Table A.6
Stringency Breakdown II

	Dependent variable			
	UN revision of 2020 GDP forecast			
	(7)	(8)	(9)	(10)
COVID deaths per 100,000	-0.730**	-0.740***	-0.765***	-1.174***
	(0.288)	(0.283)	(0.291)	(0.302)
Closure of public transport	-1.317***			
	(0.299)			
Stay at home requirements		-1.092***		
		(0.29)		
Restrictions on international movement			-1.120***	
			(0.243)	
International travel controls				-0.864***
				(0.304)
Governance: voice and accountability	1.093***	0.899**	0.958**	0.665*
	(0.402)	(0.405)	(0.391)	(0.389)
Tourism share of GDP	-2.851***	-2.840***	-2.842***	-2.853***
	(0.521)	(0.49)	(0.52)	(0.56)
Oil rents share of GDP	-0.676*	-0.757**	-0.783**	-0.807**
	(0.349)	(0.36)	(0.371)	(0.385)
Past GDP per capita growth	1.075	0.893	0.997	0.991
	(0.803)	(0.829)	(0.811)	(0.827)
Merchandise exports share of GDP	-0.371	-0.19	-0.339	0.033
	(0.241)	(0.22)	(0.22)	(0.231)
GDP per capita (levels)	1.050***	0.923***	1.003***	1.136***
	(0.329)	(0.351)	(0.342)	(0.363)
Observations	153	153	153	153
R^2	0.434	0.418	0.415	0.398
Adjusted R^2	0.402	0.386	0.382	0.364

Sources: Data from United Nations (2020), United Nations (2021), International Monetary Fund (2019), International Monetary Fund (2021), Oxford's Coronavirus Government Response Tracker, World Development Indicator database, the world governance indicators project, and UN DESA staff calculations.
Note: Robust White standard errors are shown in parenthesis. GDP per capita levels are logged to better reflect their functional form. For tourism share of GDP, oil rents share of GDP, past GDP per capita growth, and merchandise exports share of GDP, 2017–2019 averages are used.
Significance levels: *p < 0.1; ** p < 0.05; *** p < 0.01.