Online Annex 1.1. How Will the COVID-19 Pandemic Affect Poverty and Inequality?[1]

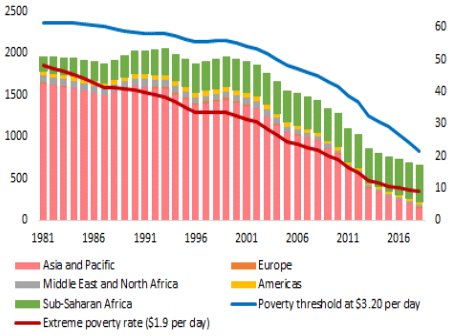
The COVID-19 pandemic could reverse decades-long progress in reducing poverty. Based on projected decline in per capita incomes and potential changes in income distribution, an additional of 100-110 million people globally would be expected to fall into extreme poverty relative to the pre-COVID-19 trend. The pandemic-related social assistance programs—supporting directly the poor and cushioning the growth slowdown—may contain the projected rise in poverty by about one-fifth. These estimates, however, are subject to a large degree of uncertainty depending on pandemic developments, designated poverty thresholds, the growth outlook, and fiscal policy responses. A full decomposition of fiscal policy impact is difficult given fiscal lifelines have cushioned the recession besides directly supporting the poor. At the same time, income inequality within countries, measured by Gini coefficients, is estimated to widen by 0.03 points on average, including in many advanced economies. Tackling rising inequality and poverty is now more urgent, which requires safeguarding essential social spending and building a strong and resilient social protection system against future shocks and pandemics.

The economic contractions across almost all countries have imperiled decades-long progress in reducing poverty. The global population of individuals who live in extreme poverty—defined as less than $1.90 per day—had fallen by two-thirds since 2000 to about 650 million people in 2018 (Online Annex Figure 1.1.1).

Online Annex Figure 1.1.1. Global Poverty Trend, 1981-2018

(Millions of people,left scale; percent, right scale)

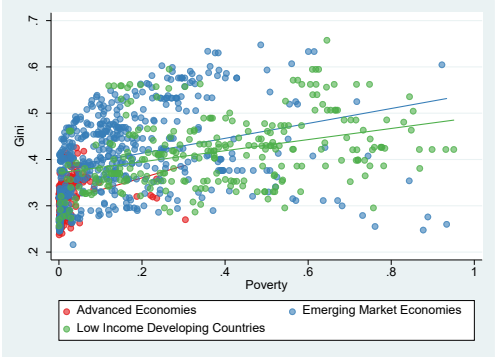
Poverty rates have declined over the last four decades.



Online Annex Figure 1.1.2. The Relationship between Poverty Rate and Income Inequality

(Percent and Gini coefficients)

Poor countries tend to have higher income inequality.



Sources: World Bank PovcalNet database; and IMF staff estimates.

The costs of the crisis are being borne disproportionately by poor and vulnerable individuals, adding to the deep social inequities that have long afflicted many countries. The nature of the pandemic has imposed large strains on labor-intensive, face-to-face services that employ a large share of low-income workers. Across all income groups, countries with higher poverty rates tend to have higher income inequality (Online Annex Figure 1.1.2) and greater poverty hardship—measured by the poverty gap, that is, the mean distance of incomes for poor individuals from the poverty line expressed as a share of the poverty line. This annex estimates the near-term effect of the COVID-19 pandemic on global poverty and income inequality, noting the uncertainty surrounding the estimates.

Estimation of Global Poverty and Income Inequality during COVID-19

The analysis starts with an estimation of the trend relationship between poverty rates and per capita output level (in purchasing power parity terms) and income inequality across 180 countries from 1981 to

[1] Prepared by W. Raphael Lam, Delphine Prady, and Baoping Shang.

2018, using the poverty data from the June 2020 vintage of World Bank PovcalNet database. The estimation uses a panel regression accounting for country fixed effects based on an unbalanced panel. Estimates show that lower per capita income levels, slower growth, and higher income inequality are associated with higher poverty rates. Results are robust across different poverty thresholds established by the World Bank (for example, extreme poverty for individuals living off of $1.90 per day, and at higher levels of income at $3.20 and $5.50 per day) (Online Annex Table 1.1.1). Additional specifications controlling for time effects point to qualitatively similar results. Our baseline specification does not account for the possible interactions between poverty-growth elasticity and income inequality—for example, the poverty reduction may be less responsive to growth when inequality rises (Ravailion 1997). The rise in poverty rates as per capita income falls is consistent with the literature that incomes of poor households (those in the lowest two quintiles) tend to change with the aggregate growth rates (Dollar, Kleineberg, and Kraay 2013)), as income shares across household deciles are not statistically significant different when growth varies over the medium term.

Online Annex Table 1.1.1. Regression Results on Relationships between Poverty and Per Capita Income

	Dependent variable: Poverty Headcount (in millions of people)								
Explanatory variables	Extreme Poverty ($1.90 per day)			Poverty Threshold ($3.20 per day)			Poverty Threshold ($5.50 per day)		
Per capita GDP (PPP; in logarithm terms)	-0.1278 ***	-0.1290 ***	-0.1419 ***	-0.1554 ***	-0.1561 ***	-0.1803 ***	-0.1482 ***	-0.1485 ***	-0.1830 ***
	(0.014)	(0.014)	(0.015)	(0.014)	(0.014)	(0.015)	(0.013)	(0.013)	(0.014)
Per capita GDP growth	-0.0009 **	-0.0008 **	-0.0006	-0.0006	-0.0005	-0.0003	-0.0004	-0.0003	0.0001
	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Income inequality (Gini coefficient)		0.0149 **	0.0149 ***		0.0093 *	0.0138 **		0.0038 *	0.0079 *
		(0.0055)	(0.0049)		(0.0058)	(0.0052)		(0.0018)	(0.0047)
Constant	1.3093 ***	1.3206 ***	1.4357 ***	1.6839 ***	1.6909 ***	1.9076 ***	1.7718 ***	1.7747 ***	2.0849 ***
	(0.121)	(0.121)	(0.128)	(0.120)	(0.121)	(0.133)	(0.115)	(0.115)	(0.121)
Country fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year effects			Y			Y			Y
Observations	2,264	2,264	2,028	2,264	2,264	2,028	2,264	2,264	2,028
R-squared									
Within	0.37	0.37	0.38	0.44	0.44	0.48	0.32	0.32	0.48
Between	0.68	0.68	0.66	0.79	0.78	0.77	0.84	0.84	0.84
Overall	0.64	0.64	0.63	0.75	0.74	0.75	0.77	0.76	0.80

Sources: World Bank PovcalNet database, IMF World Economic Outlook database; and IMF staff estimates.
Note: ***, **, * denote statistically significant levels at 1 percent, 5 percent, and 10 percent, respectively. Sample size spans across all countries from 1981 to 2018. Numbers in parentheses are standard errors. PPP = purchasing power parity. The table shows various specifications across different poverty thresholds set by the World Bank. Robustness check includes additional control variables on the share of temporary and informal employment, and the coverage and adequacy of social protection systems (not shown in the table). The qualitative results that per capita income and inequality affects poverty remain robust across specifications. The regression results in the second column of the extreme poverty regression is used for projection of global extreme poverty during the pandemic.

The estimated coefficients are then used to project poverty headcount across countries. A baseline scenario of projections on per capita output for 2020–23 is considered along with a projected rise in income inequality. The rise in income inequality is estimated using the pre–COVID-19 income distribution across income deciles of countries and the estimated coefficients of negative growth shocks on household income deciles (see below). The results suggest that the poverty rate is likely to rise during the pandemic for the first time in this century, reversing the decades-long declining trend of extreme poverty (Online Annex Figure 1.1.3). Under the baseline scenario in June 2020 *World Economic Outlook* (WEO) Update, the COVID-19 pandemic could push around 100-110 million people into extreme poverty (at $1.90 per day) during the pandemic, an equivalent of near 1.5 percentage point higher poverty

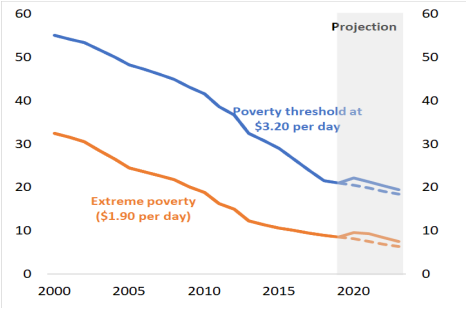
rates relative to pre–COVID-19 trends.[2] The estimates are comparable to those by World Bank in June 2020 that showed a rise of extreme poverty in 2020 of 70 to 100 million people, which show the rise relative to pre–COVID-19 levels and adjusted for 2019 growth revisions, and assuming no change in income distribution (World Bank 2020).[3] The number of people falling into poverty is subject to a wide range—in which the ongoing revision of data in a few countries with large populations could affect the global estimates—and could be higher if the pandemic outbreaks become more severe. Most of the projected rise in poverty headcounts is driven by countries in sub-Saharan Africa and South Asia. The 10 countries with the highest levels of extreme poverty account for more than half of the increase in global poverty headcounts (Online Annex Figure 1.1.4). Over three-quarters of countries are expected to see an increase in poverty, of which one-fifth of countries could see extreme poverty rates rising by more than 2 percentage points (Online Annex Figure 1.1.5).

Even before the health crisis, income was highly concentrated at the top deciles of households, particularly among countries with high poverty rates. In those countries, the bottom half of the population accounts for less than one-fifth of aggregate income and consumption (Online Annex Figure 1.1.6). The pandemic has had a disproportionate effect on low-income households in many countries because they are concentrated in the informal sectors, are more vulnerable to job losses, have lower financial savings, and have less access to healthcare. As a result, the crisis will likely widen income inequality within countries. In some countries, however, the pandemic tends to affect more adversely the urban households (usually in higher-income groups) than those in the rural areas partly because the infection rates are higher in areas with greater population density. This disproportionate impact could reduce income inequality in the near term, particularly after accounting for social benefits.

Online Annex Figure 1.1.3. Global Poverty Rates

(Percent)

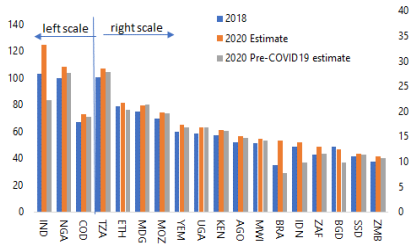
The declining trend of global poverty rates is likely to reverse as a result of the pandemic.



Online Annex Figure 1.1.4. Rising Levels of Extreme Poverty in Selected Countries

(Millions of people)

The rise in global poverty is driven largely by countries in sub-Saharan Africa and South Asia.



Sources: World Bank PovcalNet database; IMF, October 2020 *World Economic Outlook*; and IMF staff estimates.
Note: The term "extreme poverty" refers to the threshold of $1.90 per day across all countries. Estimates are based on the methodology in Online Annex Table 1.1 of top-down growth projections and poverty data from the World Bank PovcalNet database, which could be different from national authorities' estimates. For example, Uganda's authorities estimate that the precrisis poverty rate was 18.6 percent and could rise to 26 percent based on household income analysis. The solid lines in the

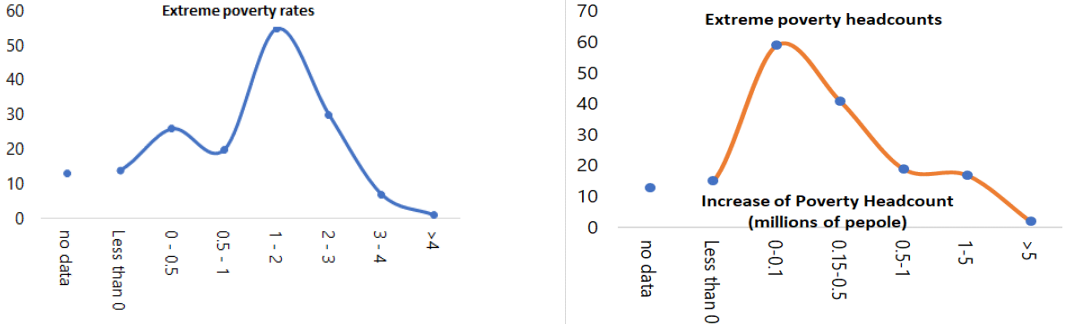
[2] In the baseline scenario, global extreme poverty is projected to rise by 108 million people during the pandemic relative to pre-COVID-19 trend based on the decline of per-capita income levels, per-capita growth, and potential rise of income inequality. The estimated range of 100-110 million, underscores the uncertainty surrounding the data in a few countries as well as evolving global developments. Based on the latest global developments as of mid-September, which has slightly improved relative to June, the global poverty estimates are likely to be about 9 million less, putting those at the lower end of the range. However, some individual countries would have seen an increase relative to June given the pandemic has turned more severe and growth has been revised downward. Overall, the poverty estimates vary significantly across growth outlook scenarios and alternative poverty thresholds defined by the World Bank (for example, $3.20 per day or $5.50 per day).

[3] The World Bank estimates have a wider range and higher estimates once considering changes in income distribution (World Bank 2020).

left panel refer to actual and projections based on the World Economic Outlook database, while the dotted lines refer to the projections prior to the health crisis.

Online Annex Figure 1.1.5. Distribution of Potential Rise in Extreme Poverty

(Number of countries)

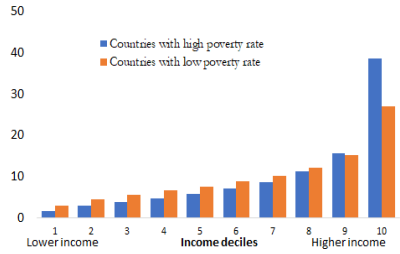


Sources: World Bank PovcalNet database, IMF World Economic Outlook, and IMF staff estimates.

Online Annex Figure 1.1.6. Income Share, by Household Income Deciles

(Percent of total aggerate income)

Income is highly concentrated in high-income households, particularly in poor countries.



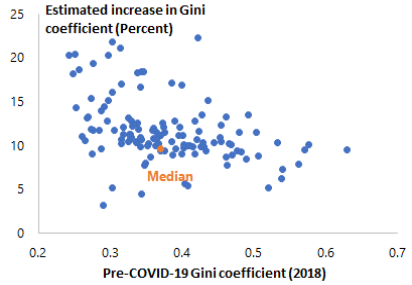
Sources: World Bank PovcalNet database; and IMF staff estimates.

Note: Countries with a high poverty rate refer to those with rates higher than 50 percent of the population, while countries with a low poverty rate have rates less than 10 percent of the poverty rate in 2015. Poverty lines vary according to country income group as in Annex Figure 1.1.3.

Online Annex Figure 1.1.7. Estimated Increase in Income Inequality

(Index)

The pandemic could widen income inequality within countries.



Sources: World Bank PovcalNet database; and IMF staff estimates.

Note: Pre-COVID-19 income inequality is based on 2018 data or the latest year available.

The estimates suggest that median income inequality within countries would rise from 0.38 to 0.41 on the Gini index (Annex Figure 1.1.7). Estimating the impact on income inequality starts with taking the pre-COVID-19 income distribution across countries and then estimating the pandemic impact on the income share of each income decile based on the changes in household income distribution in past recessions across countries. The estimates are subject to limitations in part because governments' social spending in response to the health crisis could mitigate the rise of income inequality. Overall, the magnitude of increases is comparable to those obtained through analysis using household surveys and indices on the ability to tele-work in selected European countries (Palomino, Rodriguez, and Sebastian 2020). Other studies have used selected household surveys (Bottan, Hoffmann, and Vera-Cossio 2020) and previous epidemic episodes (Furceri and others 2020) but applied them to a narrow set of countries.

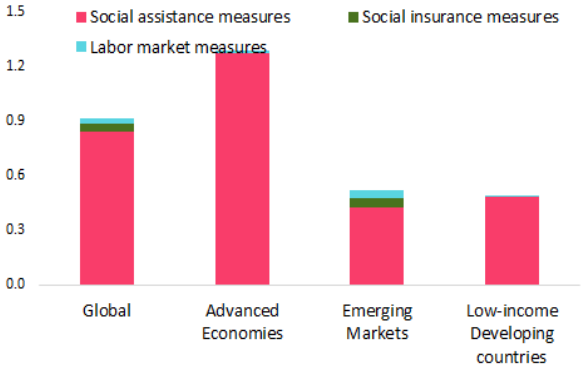
Many countries have appropriately provided emergency lifelines to vulnerable households, which supporting directly to the poor besides cushioning the magnitude of growth slowdown. Globally, over 1.7 billion people have received additional social assistance transfers in some form or another. Transfers for

recipients almost doubled on average from precrisis levels, representing one-third of monthly GDP per capita (Gentilini and others 2020a). On average, countries have spent close to an additional 1 percent of GDP on social protection and labor market measures in response to the pandemic, largely on social assistance programs, although the increase was modest at about 0.4 percent of GDP in low-income developing countries (Online Annex Figure 1.1.8).

Online Annex Figure 1.1.8. Additional Social Protection and Job Measures in Response to the COVID-19 Pandemic

(Percent of GDP)

Countries on average have spent 0.9 percent of GDP on social protection and labor market measures, most of which through social assistance programs.

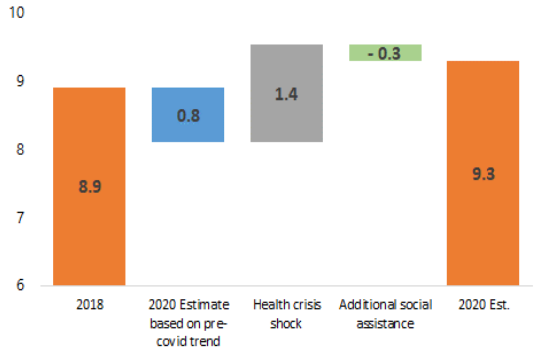


Sources: Gentilini and others (2020b); and IMF staff estimates.
Note: Weighted average by US dollar purchasing power parity GDP across countries with additional measures.

Online Annex Figure 1.1.9. The Impact of COVID-19-Related Social Assistance Measures on Global Extreme Poverty Rates

(Percent)

Social safety net lifelines have mitigated the rise in global extreme poverty.



Sources: World Bank PovcalNet database; IMF, October 2020 *World Economic Outlook*; Gentilini and others (2020b); and IMF staff estimates.

Additional social spending has helped mitigate partly the potential rise in global poverty in the face of the pandemic. Using World Bank ASPIRE data that simulate the sensitivity of spending on social assistance on poverty measures and Gini coefficients, Evans and Matsumoto (2020) show that 1 percentage point of GDP spending on social assistance would reduce the poverty headcount by around 6 percent on average.[4] As countries spend an additional 0.8 percent of GDP on social assistance on average during the pandemic, this would imply an average 5 percent reduction in the poverty headcount.[5] Applying this to the global poverty estimates illustrated above and using country-level data on COVID-19-related social spending in Gentilini and others (2020b), the estimates in this annex suggest that COVID-19-related social assistance programs have mitigated at most one-fifth of the projected rise in global extreme poverty rates. This implies that around 80-90 million people could fall into extreme poverty after accounting for the direct support of social assistance programs (Online Annex Figure 1.1.9)

[4] A detailed methodology can be found in Yemtsov and others (2018).

[5] Assumes the impact of social assistance on poverty reduction is the same across people who recently fall into poverty and those previously living in poverty. Some evidence suggests that the people who recently fall into the pandemic would be more difficult to reach or to be eligible for current social assistance program than people already under poverty according to the World Bank. This would imply our estimates could have overestimated the impact of COVID-19 related social assistance spending. On the other hand, most governments rolled out a range of measures, including progressive tax and benefit measures, which are not accounted in this estimate given it only considers social assistance program.

under the baseline.[6,7] If we consider the 100-110 million people range above, the rise in extreme poverty will likely be above 80-90 million people. The estimates, however, are subject to a large degree of uncertainty depending on pandemic developments, designated poverty thresholds, the growth outlook, and fiscal policy responses. A full decomposition of fiscal policy impact is difficult given lifelines have partly cushioned the growth slowdown besides providing direct support to the poor.

Policies to Tackle Rising Poverty and Inequality

Tackling rising inequality and poverty has become more urgent, which requires safeguarding essential social spending and building a strong, resilient social protection system against future shocks and epidemics. Specific steps include the following:

- *Phase out temporary lifelines cautiously, but safeguard essential social spending.* The pace of phasing out lifelines should depend on how the pandemic develops (reduction of health risks), the strength of the recovery, and the fiscal space. Governments should strike a balance between work incentives and adequate income support to contain poverty and mitigate inequality. Redesigned lifeline measures can become part of stronger social protection systems, which will need to be embedded in governments' medium-term fiscal strategies and require sustainable financing.

- Countries with fiscal space should expand social protection and labor market programs to improve their adequacy and coverage (Online Annex Figure 1.1.10). In economies where the pandemic and the lockdowns weigh heavily on informal workers, governments should invest in identification and delivery systems that will allow for reaching out to many workers and households currently not covered by social programs. This can be complemented by supporting local community organizations that step up timely delivery of food, medicine, and other essential supplies to households identified as being in need.

- In countries with limited fiscal space, it will be necessary to generate additional resources to scale up social spending. Measures could include removing inefficient and regressive subsidies and increasing broad-based taxes. In the wake of growing social protests, solidarity on fiscal policies becomes more important for all countries.

- *Build stronger social protection systems.* The crisis has exposed structural gaps in social protection systems.[8] Stronger systems will strengthen resilience against future shocks. The crisis may provide an opportunity to strengthen these systems by both expanding coverage and increasing benefits (Online Annex Figure 1.1.11). Priorities would be to strengthen the systems mainly along two dimensions: (i) "reachability" to effectively disburse social protection benefits (cash or in-kind) in a timely, secured, and adequate manner to ensure that eligible households receive the benefits to

[6] Based on the projected per-capita income and changes in income inequality, the projected rise of global extreme poverty as shown before would be expected to rise by 108 million, or around 100-110 million people as illustrated before. The COVID-19 related social assistance programs would be expected to mitigate by at most one-fifth of the potential rise (the initial projection already reflects impact of social assistance programs on GDP per capita).

[7] Other micro-data studies point to significant contributions of COVID-19 lifelines to mitigating poverty. For example, in the United States, federal aid through cash transfers and pandemic-related unemployment benefits have contained the rise in poverty rates across regions and demographic groups, preventing 12 million people from falling into poverty (Han, Meyer, and Sullivan 2020; Parolin, Curran and Wimer 2020).

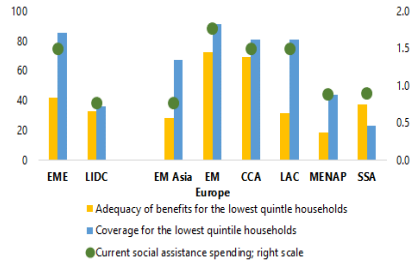
[8] Existing gaps in social protection systems have led countries to innovate in different ways to reach vulnerable populations, leveraging existing delivery infrastructure and finding alternatives, such as digital cashless transfers. A new cashless transfer program in Togo called Novissi has allowed subnational governments to make transfers to targeted adult workers in the informal economy, such as taxi drivers, affected by the lockdowns. Beneficiaries are identified through their voter IDs, which have much broader and reliable coverage than personal ID cards. Ecuador doubled the number of cash agents in two weeks. Malaysia expanded free mobile Internet access, while Nigeria identified vulnerable informal workers in urban areas by collaborating with mobile network operators under airtime purchase patterns. Emergency innovations enable various social protection programs to reach vulnerable individuals, and they should be reviewed and strengthened over the medium term.

which they are entitled; and (ii) "scalability," so that the social protection systems can be easily expanded (either by increasing generosity or coverage) to respond to adverse shocks and mitigate income losses.

Online Annex Figure 1.1.10. Adequacy and Coverage of Social Protection Programs across Regions

(Percent, left scale; percent of GDP, right scale)

Social protection programs have low coverage in low-income developing countries and provide insufficient benefits in emerging market developing economies.

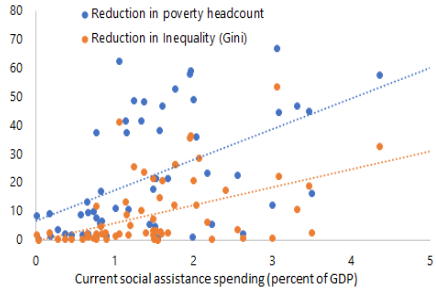


Sources: World Bank, ASPIRE and PovcalNet databases; and IMF staff estimates.
Note: Adequacy of benefits is the total transfers received by beneficiaries as a share of the pre-transfer total income in the lowest income quintile of individuals. Coverage is the share of the lowest quintile individuals who receive social protection benefits. EM = emerging markets; EME = emerging market economies; LIDC = low-income developing countries; LAC = Latin America and the Caribbean; MENAP = Middle East, North Africa, Afghanistan, and Pakistan; SSA = sub-Saharan Africa.

Online Annex Figure 1.1.11. Social Assistance Programs and the Reduction of the Poverty Headcount and Inequality

(Percent)

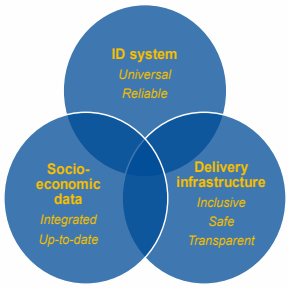
High social safety net spending has tended to contribute to reducing poverty and inequality across countries.



Sources: World Bank, ASPIRE and PovcalNet databases; and IMF staff estimates.
Note: The reductions in poverty headcounts and inequality (Gini) are driven by social assistance and likely other social insurance and labor market programs.

In terms of reachability, strengthening the capacity to reach, target, and deliver timely benefits would require (i) a comprehensive identification system to ensure inclusion and avoid fraud; (ii) integrated socioeconomic data that allow for effective targeting; and (iii) a delivery infrastructure to disburse benefits, particularly for people in more remote and deprived areas (Online Annex Figure 1.1.12). Governments can collect, maintain, and integrate information that enables automatic enrollment of large segments of the population that need support when adverse shocks occur, including through greater use of digital solutions to simplify application and raise the take-up of social protection programs (*Namibia, Pakistan, Saudi Arabia, Togo, United States*). Greater use of digital means should be accompanied by safeguards to prevent fraud and ensure data privacy to mitigate risks.

Online Annex Figure 1.1.12. Main Areas to Improve the Reach of Social Protection Systems



Source: Prepared by IMF staff.

Social protection systems can respond better to adverse shocks if they (1) have built-in triggers that adapt the social programs to adverse shocks and deliver timely benefits to vulnerable groups (for example, free school-meal programs can be transformed into in-house food distribution or cash transfers for vulnerable families when school is closed under lockdowns); (2) include benefits that are automatically conditioned to the shocks (for example, top-up of unemployment benefits in the *United States* or registering ineligible applicants in social programs (*Colombia*); and (3) are aligned with medium-term development needs.

At the same time, social protection systems need to limit exclusion errors to cover eligible low-income individuals, while encouraging productive behavior. This can be done by combining broad programs (such as child allowances or social pensions) and more complex, targeted programs (such as conditional cash transfers) to encourage school attendance and health check-ups—a form of progressive universalism. This can also be done by setting transparent and simple eligibility criteria for those who cannot participate (that is, targeting out). For example, *Namibia* has put in place a transfer for all adult informal workers and the unemployed that explicitly excludes formal workers and recipients of existing social benefits.

Countries should strengthen the systems building on the lifelines extended during the COVID-19 pandemic. In some cases, this would imply refining those programs that were rolled out as "quick fixes," as speed was crucial to save lives and protect people's livelihoods. Priorities are to consolidate those inefficient, fragmented programs with duplication of benefits or high administrative costs that existed before the crisis or were introduced in response to the pandemic. Certain provisions to expand social protection programs can be made more permanent. In other situations, new programs may need to be consolidated with pre-COVID-19 ones in order to align benefit levels and eligibility criteria (*the Philippines, Brazil*) while preserving work incentives.

Online Annex 1.2. Smart Strategies to Contain the COVID-19 Pandemic[1]

As countries reopen their economies and ease mobility restrictions, it is important to understand what approaches work best to contain the health and economic impact of COVID-19, not only to limit new waves of infections, but also to better prepare for future pandemics. This annex assesses the effectiveness of various containment measures in limiting the number of fatalities, as well as the expected output and fiscal costs associated with these measures.[2] The findings suggest that stringent containment measures such as mobility restrictions and public health policies implemented early on are associated with better health and expected economic outcomes. Experience from countries that successfully curbed COVID-19 at lower economic costs also suggests that a "smart" containment strategy should involve data-driven, targeted lockdowns and quarantines, underpinned by large-scale testing, contact tracing, and public information campaigns that promote voluntary compliance and trust.

Health Impact of Stringent Containment Measures

Several studies have found that containment measures have been, on average, effective in "flattening the pandemic curve," that is, in slowing the spread of the virus, especially when those measure are implemented early and result in less mobility (Deb and others 2002b). Complementing these studies, this section analyzes the effectiveness of various containment measures in limiting the number of fatalities, accounting not only for the timing of these measures but also for their stringency and duration. Specifically, the annex compares COVID-19 deaths in countries that implemented stringent containment measures during the course of January through May on average versus countries that implemented such measures early on—when the country reached 100 COVID-19 cases. The analysis controls for country specificities, such as median age, population density, and health system preparedness (proxied by hospital beds per 1,000 persons), as well as GDP per capita. Containment measures include internal and international mobility restrictions, such as curfews, bans on travel, public events, or gatherings, and closures of schools, workplaces, and transport, as well as public health policies such as large-scale testing, contact tracing, and public information campaigns.

The evidence in Online Annex Table 1.2.1 suggests that stringent containment measures implemented early on are associated with significantly lower fatalities. Since many containment measures are often implemented at the same time, it is difficult to disentangle their effects. Nevertheless, assessing different containment measures individually shows that most are associated with lower COVID-19 death rates (Online Annex Table 1.2.2). When controlling for the overall stringency of these measures, however, signs reverse for those measures that are highly correlated, illustrating the challenge in identifying the relative effectiveness of different measures. Notably, in the case of international travel controls, where the timing was often different from domestic measures, as well as cancellation of public events, the evidence seems to be strongly in favor of these measures reducing fatalities

Country success stories in containing the virus have largely stemmed from acting early (including by monitoring international travel), implementing large-scale testing, and contact tracing. Notably, governments with experience in containing SARS coronavirus outbreaks (*Hong Kong SAR, Singapore, Taiwan Province of China*, and *Vietnam*) acted fast and "smart" and were able to successfully contain COVID-19, with a lower death toll and lower expected output and fiscal costs (see next section). An early and smart containment strategy, based mainly on mass testing, contract tracing, and public information campaigns allowed these governments to successfully curb the spread of the virus. In contrast with

[1] Prepared by Alexandra Fotiou and Andresa Lagerborg, based on Fotiou and Lagerborg (forthcoming-a).

[2] See Chapter 2 of the October 2020 World Economic Outlook for a discussion on the economic consequences of containment measures.

others, successful governments (1) quickly imposed international travel restrictions, closed schools, and cancelled public events; (2) proactively implemented stronger health policies such as testing, contact tracing, and public information campaigns; and (3) only later implemented stay-at-home orders, closures of workplaces and transport, and restrictions on gatherings and internal travel. Because of past pandemic experience, public information campaigning seems to have been enough for people to act cautiously.[3] *Nepal* and *Korea* are also success stories, adopting response plans similar to the rest of the Asian region.[4] Interestingly, *Korea* was one of the countries highly affected by MERS outbreaks in 2015. A set of smaller countries, including *Cyprus, Georgia, Greece, Malta*, and the *Slovak Republic*, were also effective in containing the virus by acting fast. Learning from other countries' experiences, and given their concerns with limited healthcare capacity, these countries imposed international travel restrictions and bans on public event early on.

The lack of experience from other epidemics is associated with less preparedness not only by governments, but also by citizens. In countries with no experience, governments had to force people to stay at home and restrict their mobility, imposing stricter stay-at-home orders and bans on gatherings . Evidence from the Ebola experience shows that supporting the health system in a smart way can make a difference. The impact of the Ebola outbreak was profound in both its human toll and severe socioeconomic effects that included job and education losses. Health systems were severely compromised by overwhelming demand, healthcare worker deaths, resource diversion, and closure of health facilities. These, together with the fear of getting infected, lowered trust in health systems, with large reductions in health care utilization. Since the Ebola experience, studies have suggested that the best strategy to successfully control an outbreak involves early, aggressive, and supportive healthcare, including contact tracing, preventive initiatives, active surveillance, effective isolation and quarantine procedures, and timely response to patients (Kalra and others 2014; Wojda and others 2015). These measures, combined with public health education, point-of-care diagnostics, a vaccine, and coordinated efforts from the international community, made a big difference in the fight against Ebola.

Economic Impact of Stringent Containment Measures

Stringent containment measures can have potentially large macroeconomic costs.[5] This section assesses the expected output and fiscal costs of containment measures. The analysis is based on the revision of GDP and primary balance projections for 2020 between the vintages of the IMF's World Economic Outlook database in October 2019 and July 2020.[6] The regressions suggest that countries that have more successfully contained COVID-19 (specifically, certain countries in Asia) may also experience lower output losses and milder deteriorations in fiscal balances on average (Online Annex Tables 1.2.3 and 1.2.4). On the other hand, advanced economies and countries with larger fiscal stimulus packages also saw larger downward revisions in GDP growth and fiscal balances.[7]

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[3] Chen and others (forthcoming) provide supportive evidence on how the voluntary decision to social distance and take precautions matters compared with de jure non-pharmaceutical interventions.

[4] A country is classified as successful if the number of deaths per 1 million population is below 20, and if the number of tests per 1 million population is above 10,000.

[5] See Deb and others (2020a), Coibion, Gorodnichenko, and Weber (2020), and Gourinchas (2020).

[6] See Fotiou and Lagerborg (forthcoming-a) for more details regarding the analysis, for robustness checks when looking into January 2020 versus July 2020 projections , and for effects on the debt-to-GDP ratio.

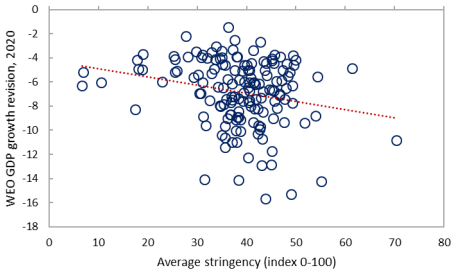
[7] No relation is observed between stronger COVID-19 containment measures, on average, and the size of fiscal packages (Fotiou and Lagerborg, forthoming-b). The evidence suggests, however, that countries that acted swiftly in putting in place strong COVID-19 containment measures ultimately deployed smaller fiscal packages.

Countries with stricter containment measures, on average, saw larger downward revisions to growth and primary balance projections for 2020 between October 2019 and July 2020.[8] However, countries that put stringent containment measures in place earlier (rather than later and for longer) saw smaller downward revisions (Online Annex Figure 1.2.1). This applies mainly to mobility restrictions (such as workplace closures and stay-at-home orders), while stronger public health policies are associated with better expected outcomes for GDP growth and fiscal balances regardless of these policies being implemented earlier or later (Online Annex Figure 1.2.2). Large downward revisions to GDP growth in 2020 will be only partially offset by a stronger expected rebound in 2021 for countries with stricter average containment measures. In the medium term, the implications of costly containment measures are expected to be long-lasting particularly in the case of public debt (Online Annex Figure 1.2.3, panel 1).

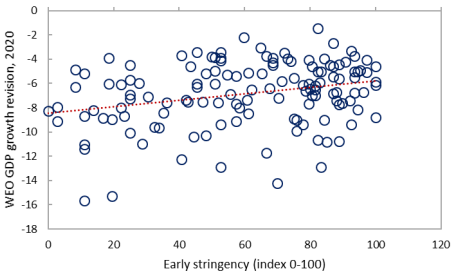
Online Annex Figure 1.2.1. Stringency of Containment Measures and World Economic Outlook Database Revisions to GDP Growth and the Primary Balance, 2020

(Percentage points)

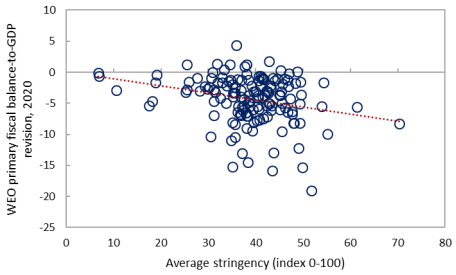
1. GDP Growth Revision versus Average Stringency



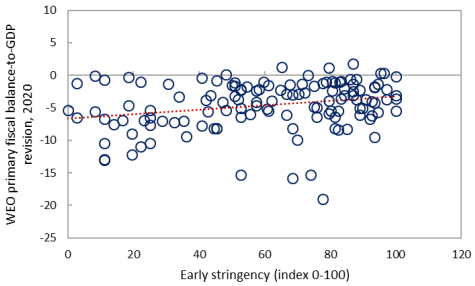
2. GDP Growth Revision versus Early Stringency



3. Primary Balance Revision versus Average Stringency



4. Primary Balance Revision versus Early Stringency



Source: Fotiou and Lagerborg (forthcoming-a).
Note: WEO = IMF, World Economic Outlook database.

Online Annex Figure 1.2.4 shows that the governments that successfully contained the virus, but without past SARS experience, had a larger downward revision of GDP growth and primary balances (*Cyprus, Georgia, Greece, Malta, New Zealand*) than governments in the Asian region with past SARS experience (*Hong Kong SAR, Korea, Nepal, Singapore, Taiwan Province of China, Vietnam*).[9] The former were governments that acted early but implemented stricter stay-at-home orders and on average announced larger fiscal stimulus packages. Governments with less experience in containing epidemics, which usually were less prepared to implement effective testing policies and contact tracing, in many cases resorted to

[8] This is in line with evidence on Sweden's containment strategy from Bricco, Misch, and Solovyeva (forthcoming), who find that a less-stringent strategy can soften economic effects temporarily but have unclear medium-term effects.

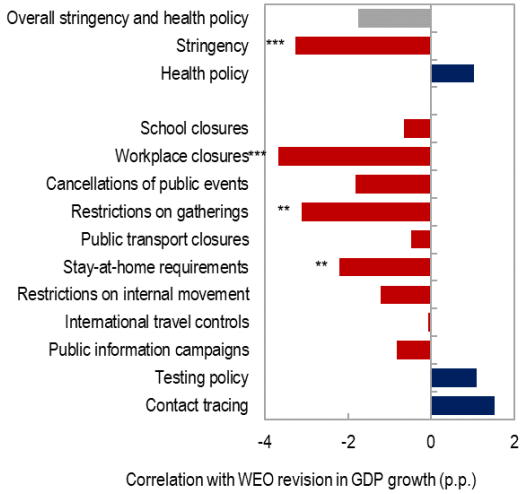
[9] Large revisions of the non-SARS sample could also correspond to other drivers, such as a sudden stop in tourism, which is a key economic sector for Cyprus and Greece, for example.

stronger mobility restrictions over a longer period as a way to save lives. These measures have come with substantial economic and fiscal costs. Debt-to-GDP ratios for these countries were drastically revised in July 2020 compared with October 2019.[10] Large revisions correspond to the high costs of virus containment measures and fiscal stimulus for economic revival after strict lockdown measures are eased.

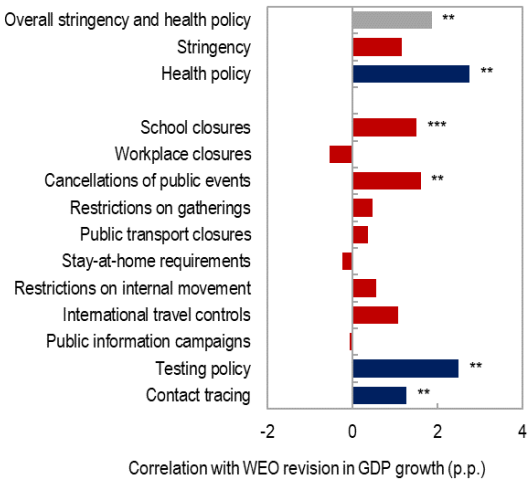
Online Annex Figure 1.2.2. Stringency of Individual Containment Measures and World Economic Outlook Database Revisions to GDP Growth, 2020

(Percentage points)

1. Correlation of Average Containment Measures with GDP Growth Revisions



2. Correlation of Early Containment Measures with GDP Growth Revisions



Sources: Fotiou and Lagerborg (forthcoming-a); OxCGRT Database; IMF staff calculations; and IMF World Economic Outlook (WEO) database.

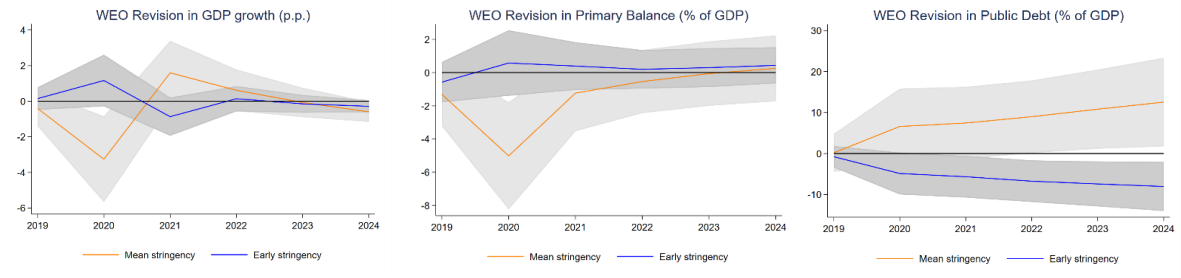
Note: The correlations refer to estimated coefficients when regressing World Economic Outlook database projection revisions on individual containment measures normalized on a [0,1] scale, one at a time, controlling for GDP per capita (purchasing power parity in US dollars). Health policy corresponds to the principal component of tracing, testing, and public information campaigns. These panels are produced from a standard ordinary least squares analysis in which the regression includes a constant variable. The constant is negative and significant, implying on average a downward revision of GDP growth for all countries. In the panels, a negative correlation means that the expected average downward revision is larger compared with the October 2019 World Economic Outlook database forecasts. If the correlation is instead positive, it means that the downward revision is smaller. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

[10] Results are robust to considering projection revisions between January and July 2020.

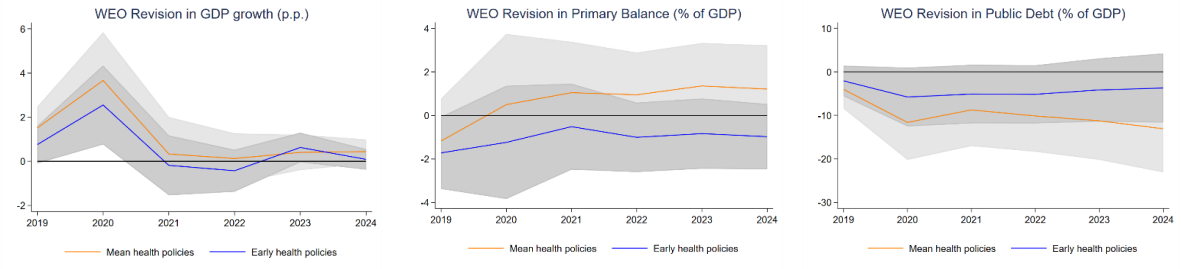
Online Annex Figure 1.2.3. Stringency of Containment Measures and World Economic Outlook Database Revisions to Medium-Term Forecasts, 2020–24

(Percentage points)

1. Effect of Average and Early Mobility Restrictions on GDP Growth, Primary Balance, and Public Debt Forecasts



2. Effect of Average and Early Public Health Policies on GDP Growth, Primary Balance, and Public Debt Forecasts



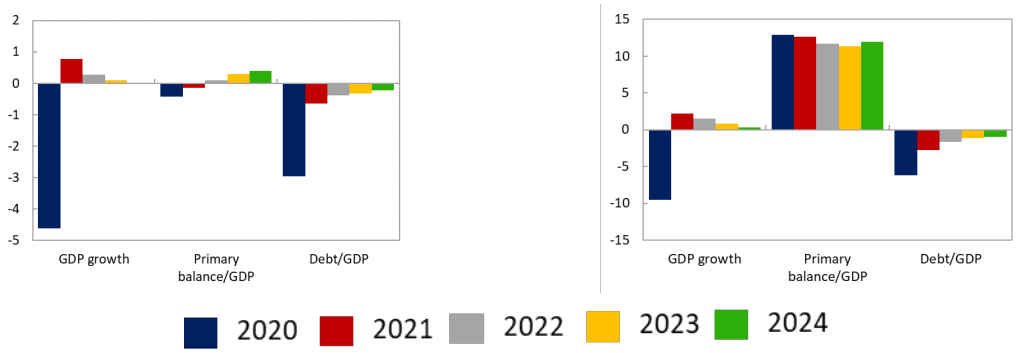
Source: Fotiou and Lagerborg (forthcoming-a).
Note: p.p. = percentage point; WEO = IMF, World Economic Outlook database.

Online Annex Figure 1.2.4. Average World Economic Outlook Database Forecast Revisions for Different Country Groups, 2020–24

(Percentage points)

1. SARS-Experienced Countries: Average Forecast Revision, July 2020 – October 2019

2. Other Successful Countries: Average Forecast Revision, July 2020 – October 2019



Source: Fotiou and Lagerborg (forthcoming-a).

Online Annex Table 1.2.1. Effect of Containment Measures on Death Rates: Average versus Early Stringency

	(1) Deaths/Population	(2) Deaths/Population	(3) Deaths/Population	(4) Deaths/Population
Stringency (average)		-0.991		
		(1.11)		
Stringency and health policies (average)	-0.993			
	(1.069)			
Stringency (at 100 cases)				-1.205***
				(0.416)
Stringency and health policies (at 100 cases)			-1.268**	
			(0.49)	
Median age	7.612***	7.582***	6.603***	6.572***
	(1.838)	(1.843)	(1.925)	(1.897)
Hospital beds / 1,000 population	-13.574**	-13.798**	-12.221**	-12.425**
	(5.468)	(5.452)	(5.599)	(5.539)
GDP per capita (USD PPP)	0.001	0.001	0	0
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-127.796**	-125.640**	-54.552	-52.056
	(52.382)	(53.318)	(62.647)	(59.459)
Observations	135	136	123	124
R-squared	0.234	0.231	0.267	0.274

Sources: Fotiou and Lagerborg (forthcoming-a); and IMF staff estimates.
Note: Standard errors in parentheses. USD PPP = purchasing power parity in US dollars. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Online Annex Table 1.2.2. Effect of Individual Containment Measures (One at a Time) on Death Rates: Average versus Early Stringency

	Average Response		Early Response		
	Deaths/Pop. (1)	Deaths/Pop. (2)	Deaths/Pop. (3)	Deaths/Pop. (4)	Stringency Correlation
Containment measures:					
School closures	-29.096	-20.519	-27.892***	-17.43	0.67
Workplace closures	26.051	76.028**	-15.282*	8.788	0.71
Cancellations of public events	-18.069	-19.96	-54.756***	-46.806**	0.69
Restrictions on gatherings	12.612	35.289	-7.34	12.169	0.66
Public transport closures	-39.421	-38.819	-17.088	13.701	0.63
Stay-at-home requirements	5.176	38.623	-8.877	26.633*	0.72
Restrictions on internal movement	6.975	43.553	-8.579	37.718**	0.62
International travel controls	-46.014***	-56.767***	-31.482***	-27.360**	0.40
Public information campaigns	-14.863	-0.888	-39.475*	-18.043	0.55
Testing policy	-26.57	-23.436	-10.699	-1.952	0.38
Contact tracing	-26.493	-23.813	12.484	15.956	0.28
Controls:					
Overall stringency	No	Yes	No	Yes	
Median age	Yes	Yes	Yes	Yes	
Hospital beds / 1,000 population	Yes	Yes	Yes	Yes	
GDP per capita (USD PPP)	Yes	Yes	Yes	Yes	
Constant	Yes	Yes	Yes	Yes	

Sources: Fotiou and Lagerborg (forthcoming-a); and IMF staff estimates.
Note: Standard errors in parentheses. USD PPP = purchasing power parity in US dollars. *** p < 0.01, ** p < 0.05, * p < 0.10.

Online Annex Table 1.2.3. Effect of COVID-19 Containment Measures on World Economic Outlook Database Revisions to GDP Growth, 2020

	(1) GDP Growth	(2) GDP Growth	(3) GDP Growth	(4) GDP Growth	(5) GDP Growth	(6) GDP Growth	(7) GDP Growth	(8) GDP Growth
Stringency (average)	-0.067**	-0.104***	-0.089***	-0.088***				
	(0.03)	(0.026)	(0.025)	(0.026)				
Health policies (average)	0.059	0.578***	0.321*	0.350*				
	(0.188)	(0.174)	(0.185)	(0.186)				
Stringency (at 100 cases)					0.026***	-0.009	-0.007	-0.008
					(0.008)	(0.009)	(0.008)	(0.008)
Early health policies					0.186	0.501***	0.343**	0.368**
					(0.186)	(0.165)	(0.163)	(0.16)
GDP per capita (USD PPP)		-0.007	-0.005	-0.007		-0.007	-0.008	-0.01
		(0.012)	(0.012)	(0.012)		(0.012)	(0.011)	(0.011)
Advanced economy = 1		-3.581***	-3.709***	-2.842***		-3.575***	-3.770***	-2.797***
		(0.607)	(0.59)	(0.696)		(0.596)	(0.571)	(0.648)
SARS experience = 1			3.195**	3.643***			3.258***	3.228***
			(1.237)	(1.363)			(1.099)	(1.215)
SARS-mimicking Asia			3.993**	3.757**			3.852**	3.650**
			(1.635)	(1.624)			(1.484)	(1.449)
COVID-19 fiscal measures				-0.084**				-0.101***
				(0.037)				(0.034)
Constant	-4.232***	-1.884*	-2.579**	-2.362**	-8.335***	-5.160***	-5.370***	-4.963***
	(1.16)	(1.032)	(1.023)	(1.043)	(0.544)	(0.701)	(0.671)	(0.668)
Observations	153	152	152	149	134	133	133	131
R-squared	0.04	0.331	0.379	0.405	0.091	0.363	0.43	0.468

Sources: Fotiou and Lagerborg (forthcoming-a); and IMF staff estimates.
Note: Standard errors in parentheses. Negative coefficients imply a stronger downward revision compared with the October 2019 World Economic Outlook database projections. USD PPP = purchasing power parity in US dollars. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Online Annex Table 1.2.4. Effect of COVID-19 Containment Measures on World Economic Outlook Database Revisions to Primary-Balance-to-GDP Ratio, 2020

	(1) Primary Balance	(2) Primary Balance	(3) Primary Balance	(4) Primary Balance	(5) Primary Balance	(6) Primary Balance	(7) Primary Balance	(8) Primary Balance
Stringency (average)	-0.07	-0.093**	-0.088**	-0.082**				
	(0.043)	(0.039)	(0.039)	(0.038)				
Health policies (average)	-0.456	0.119	-0.036	0.021				
	(0.28)	(0.266)	(0.28)	(0.275)				
Stringency (at 100 cases)					0.042***	0.004	0.004	0.004
					(0.012)	(0.014)	(0.014)	(0.013)
Early health policies					-0.457*	-0.123	-0.201	-0.187
					(0.273)	(0.259)	(0.265)	(0.263)
GDP per capita (USD PPP)		-0.065***	-0.060***	-0.063***		-0.064***	-0.062***	-0.063***
		(0.018)	(0.018)	(0.018)		(0.019)	(0.019)	(0.019)
Advanced economy = 1		-1.649*	-1.784**	-0.869		-1.399	-1.558*	-0.657
		(0.881)	(0.881)	(1.023)		(0.925)	(0.927)	(1.067)
SARS experience = 1			1.831	1.623			1.165	1.1
			(2.423)	(2.372)			(2.4)	(2.383)
SARS-mimicking Asia			4.094*	3.799			3.85	3.663
			(2.429)	(2.38)			(2.398)	(2.384)
COVID-19 fiscal measures				-0.085				-0.093*
				(0.054)				(0.056)
Constant	-1.575	0.949	0.629	0.653	-7.090***	-3.033***	-3.130***	-2.766**
	(1.698)	(1.567)	(1.571)	(1.537)	(0.798)	(1.089)	(1.091)	(1.105)
Observations	147	147	147	146	129	129	129	129
R-squared	0.078	0.279	0.295	0.31	0.091	0.245	0.262	0.279

Sources: Fotiou and Lagerborg (forthcoming-a); and IMF staff estimates.
Note: Standard errors in parentheses. Negative coefficients imply a stronger downward revision compared with the October 2019 World Economic Outlook database projections. USD PPP = purchasing power parity in US dollars. *** p < 0.01, ** p < 0.05, * p < 0.10.

Online Annex 1.3. From Lockdown to Recovery: Spending Measures to Support Livelihoods during the COVID-19 Crisis[1]

Many countries have swiftly introduced a diverse range of measures to support incomes for households and protect jobs as unemployment rises and incomes fall. As economies start to reopen, the design of spending measures needs to be geared more toward facilitating recovery and building resilience against future shocks, including the possibility of renewed infection waves and lockdown restrictions.

General Considerations

- Countries should have clear objectives to inform policy responses. The primary objective during the lockdown phase is to provide lifelines to maintain employment and business links.2 Priorities should focus on a speedy response, while economic incentives such as work disincentives are less of a concern. However, as economies reopen, the design of the measures will need to be refined to ensure appropriate incentives.
- Countries should prioritize measures that are consistent with their medium-term development needs. In countries where existing social protection systems are underdeveloped, the crisis provides an opportunity to strengthen these systems (see Online Annex 1.1).
- Targeting policy responses to specific households and firms involves tradeoffs that need to be carefully managed. Targeted measures can provide better protection for a given spending envelope or help contain fiscal costs. They can contribute to supporting aggregate demand, since the most vulnerable are often those who have a higher propensity to consume. However, targeted measures can inadvertently exclude some who are in need of support, and they require more time to design and implement. Targeting may distort work incentives by increasing the implicit marginal tax rate when benefits are withdrawn as earnings rise.
- Policy measures should be closely aligned with existing infrastructure to accelerate deployment. Governments in advanced economies can take advantage of well-developed tax and benefits systems and governments in emerging market developing economies can take advantage of existing social program structures. Mobile or digital payment systems may provide a broad and timely mechanism for delivering the support in some countries.

Fiscal Support during the Lockdown

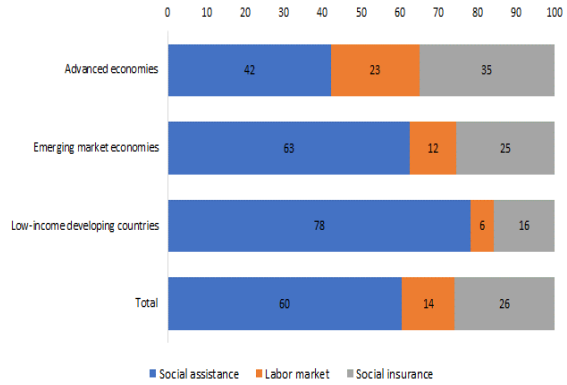
The unprecedented fiscal policy responses to the pandemic have mostly been on the expenditure side. Country experiences have provided various lessons (Shang, Evans, and An 2020):

- Countries have relied on a broad range of measures. The designs vary across countries, reflecting the severity of the pandemic, the availability of fiscal space, and the level of administrative capacity. Variations include the following: (1) the overall spending responses are much larger in advanced economies; (2) liquidity support accounts for a relatively larger share in advanced economies; and (3) advanced economies and emerging and developing Europe rely more on social insurance and labor market measures, while sub-Saharan Africa relies more on social assistance measures (Online Annex Figure 1.3.1).

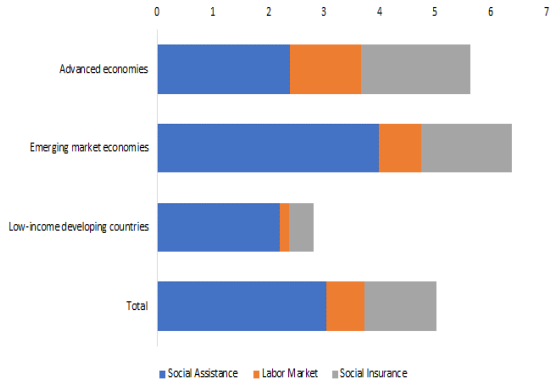
[1] Prepared by Baoping Shang, Brooks Evan, Delphine Prady, and Zhiyong An.

[2] As defined in Chapter 1, the three phases of the pandemic are broadly classified into (1) the Great Lockdown; (2) partial and gradual reopening; and (3) pandemic under full control with effective vaccines and treatment.

Annex Figure 1.3.1. Spending Measures to Support Workers and Households
(Number of measures as a percent share of total)



Online Annex Figure 1.3.2. Average Number of Measures to Support Workers and Households
(Number of measures)



Sources: Gentilini and others (2020b); and IMF staff estimates.

- Short-time work programs or job retention schemes are often used to protect jobs during recessions.[3] They are common in Europe and are being used in other emerging market economies during the COVID-19 crisis (*Brazil, Egypt, Uruguay*). These programs covered from one-fourth to one-third of private sector employees in several European countries as of mid-2020. Evidence points to large positive effects of such programs on reducing layoffs of permanent workers, and the programs can be cost-effective. For example, one-fifth of jobs are saved for every worker on short-term work, while the cost per saved job is only 7 percent of the average labor cost, which outweighs the fiscal cost when workers lose their jobs (25 percent of the average labor cost).[4]

- Providing support to people in the informal sector has been a challenge, as these workers are not covered by unemployment benefits and they are difficult to reach. Some governments have taken innovative approaches and channeled support to informal sector firms by working with existing institutions that serve these groups, such as micro-credit institutions and informal sector organizations. However, in many emerging market developing economies, given the large informal sector and limited fiscal space, these workers can be more effectively covered by social assistance programs.

- Capacity constraints have made it difficult to rapidly expand existing social assistance programs in some countries. In such cases, countries often resort to alternative (less effective) ways of targeting, including cash transfers targeted at specific regions or population groups (that is, the elderly, families with children, or informal sector workers, as in *India* and *Bolivia*), or subsidies for key goods and services such as food, health, transportation, and utilities (*Jordan*). Some countries identify beneficiaries by using databases maintained by various government entities and private organizations or by distributing benefits through local governments and community organizations (*Rwanda, Nepal, Egypt, Peru*). Universal (or near-universal) transfer programs have only been used as one-offs because

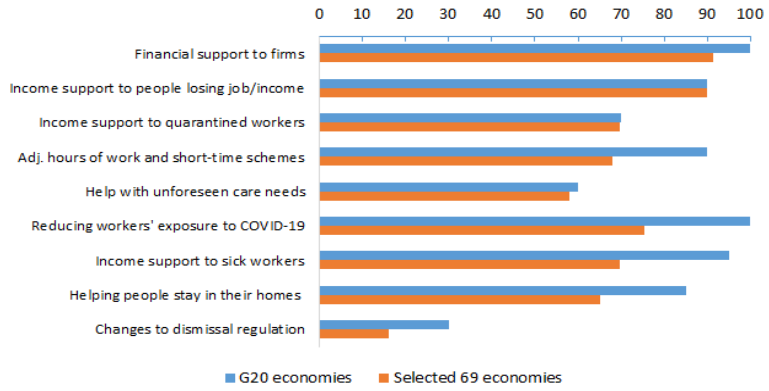
[3] These initiatives compensate for the reduced working hours while maintaining employment links: employees receive a wage subsidy from the government proportional to their lost working hours. This allows firms hoarding labor to keep specific firm human capital and avoid costly separation and then rehiring and training as recovery takes place. For workers, it avoids search and layoffs.

[4] See Cahuc, Kramarz, and Nevouss (2018), Guipponi and Landais (2018), and Kopp and Siegenthaler (2019).

of the difficulties of ensuring adequate support for the most vulnerable within a reasonable fiscal cost (*Japan, Singapore, Korea, Malaysia, Bolivia*) (Prady 2020).

- Rapid expansion of existing and new programs may have resulted in duplication of benefits and high administrative costs. Many countries have utilized multiple cash transfer and in-kind benefit programs for income support (Online Annex Figure 1.3.2) and support for workers (Online Annex Figure 1.3.3). For example, in *Indonesia*, in addition to expanding the existing social assistance program, the food assistance program, and the pre-work card program, central and local governments have also introduced two new cash transfer programs, electricity fee reductions, public works, and a number of programs targeted at the local levels. Ensuring that eligibility rules are clearly communicated and aligned with programs that were functioning well before the COVID-19 crisis would reduce administrative costs and help enhance effectiveness.[5]

Online Annex Figure 1.3.3. Country Fiscal Measures in Selected Areas
(Percent of total)



Sources: OECD (2020); and IMF, Fiscal Monitor database of Fiscal Policy Measures in Response to COVID-19.
Note: Results are based on a sample of 69 countries, including all Organization for Economic Co-operation and Development economies, G20 economies, and selected economies in the Fiscal Monitor database.

Improving Economic Incentives as Economies Reopen

As activity resumes, the focus switches to redesigning measures to better support the return to work. Measures such as waiving the need for job search, training, and other requirements for unemployment benefits (*Austria, Canada, United States*), increasing benefit levels (*Australia, Belgium, United States*), and extending the duration of benefit eligibility (*Greece, Japan, United States*) can be changed to promote greater job search efforts. For example, at the outbreak of the pandemic in the *United States*, many unemployed were eligible for benefits larger than their lost earnings (Xie 2020),[6] while in *Canada*, the application for unemployment benefits were substantially simplified with a flat benefit of CAD$2,000 per month, resulting in high replacement rates for low-wage earners.

Support measures need to gradually move away from protecting current jobs to protecting workers. For example, keeping short-time work schemes in place for too long could prevent the reallocation of labor from low-productive firms to growing ones as the recovery gains steam, and eventually lead to inefficiency and output losses. Among various options countries can:

[5] As the COVID-19 crisis unfolded, the government in Brazil first leveraged its conditional cash transfer, Bolsa Familia, to include 1.2 million new families. It also introduced a temporary program called Auxilio Emergencial targeted mainly at informal and own-account workers that provides a three-month transfer more generous than the Bolsa Familia benefit (later extended by two months). Ninety-five percent of Bolsa Familia beneficiaries opted to temporarily enroll in the more generous Auxilio Emergencial.

[6] The US Congressional Budget Office estimates that roughly five of every six recipients would receive benefits that exceeded the weekly amounts they could expect to earn from work during those six months.

- *Transition gradually away from job retention schemes.* This should be coupled with in-work benefits or hiring subsidies to help get people back to work. For, example, the *United Kingdom* unveiled measures to pay employers a bonus per each reinstated furloughed worker and similar incentives to train and hire apprentices.
- Gradually reduce the generosity of unemployment benefits to preserve work incentives if their replacement rates are too high relative to precrisis work incomes (Fang, Nie, and Xie 2020). In the event that the precrisis social protection benefits were inadequate, making some provisions of temporary expansion more permanent would help strengthen the social protection systems and build resilience to future shocks. For example, in Canada, when the government restores capacity to process unemployment benefits, the flat lump-sum unemployment benefits could be replaced by formula-based benefits.
- *Strengthen activation policies for unemployment benefits.* For example, training and job search requirements that were relaxed during the lockdown phase should be reinstated, and the expansion of benefit periods rolled back.
- *Target active labor market policies (for example, training, employment services and public works) to specific groups.* There may be opportunities for public works to be directed towards "green jobs" such as reforestation, soil and water conservation, and flood protection.

Policy Responses to Potential Second Waves

The course of the pandemic is still highly uncertain. Governments will need to prepare for potential renewed waves of infections. Some considerations include the following:

- Policy responses should be targeted at the specific localities where the resurgence occurs helping limit the adverse impact on economic activity and contain fiscal costs.
- Refining measures to restore economic incentives may need to be postponed. Short-time work schemes will again be useful, especially for workers in the sectors most affected. The duration of unemployment benefits can be extended.
- This, however, does not imply that countries should restore the same lifelines used during the initial phase. The design of the fiscal support should draw on lessons learned and adapt to changing circumstances. For example, limited budget resources imply that targeted measures are preferred, and improving the institutional capacity to reach the vulnerable and deliver benefits is even more important. The focus will be on achieving wide coverage, not just increasing benefit levels. A stronger social safety net will help build resilience against future shocks.

Online Annex 1.4. Determining the Size of Fiscal Stimulus for Sustained Recovery

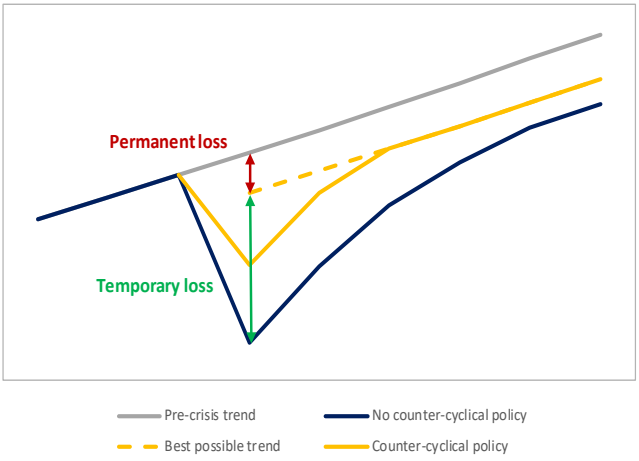
The COVID-19 crisis has generated both a deep downturn and increased debt, intensifying the tension between supporting growth and debt sustainability. A protracted recession has substantial costs. It can damage human capital (as the unemployed lose their skills) and physical capital (as firms scale down their investment plans). This may warrant a debt-financed fiscal stimulus, but elevated debt would increase risks of future fiscal crisis (Moreno-Badia and others 2020), which are associated with output losses (Medas and others 2018; Trebesch and Zabel 2017). This annex thus explores the appropriate balance between stabilization and debt sustainability in determining the fiscal stance. The first section briefly describes the model used, and the next section presents an illustrative example of the optimal fiscal stance for a country in the post-COVID recovery.

A Buffer-Stock Model for the Government

The analysis uses the "Buffer-Stock" model to analyze the tradeoffs governments face when pursuing economic stabilization and ensuring debt sustainability. Specifically, governments maximize utility under a debt constraint (Fournier 2019). For this purpose, governments choose the fiscal stance, defined as a change in the structural primary balance, through discretionary policies. Economic output is affected by exogenous shocks, which can persist for some time. The government can loosen the fiscal stance to boost output at the cost of eroding its fiscal buffers, or tighten it to build buffers at a cost of lower output. Adverse recessionary shocks reduce potential output, reflecting human and physical capital losses (hysteresis effect). The model thus features a permanent negative effect of large negative output gaps on the level of potential output. Countercyclical fiscal policy is constrained by a one-year decision-making delay, as annual budgets are voted on before the year starts, as well as by adverse effects of higher debt such as higher borrowing costs, and greater risks of losing market access. Low debt levels enable the government to borrow without substantially raising borrowing costs or risk of debt distress.

This Buffer-Stock model shows that the choice of fiscal stance would depend on both debt levels and short-term economic fluctuations. The utility maximization framework provides a normative view on the fiscal stance. It recommends a higher fiscal surplus at higher debt levels to preserve sustainability, and a countercyclical fiscal stance to smooth fluctuations. Rising interest rates add to the motive to reduce debt. At low debt levels, hysteresis reinforces the motive to counter negative shocks.

Online Annex Figure 1.4.1. Output Losses during a Crisis: Temporary and Permanent Effects



Sources: Fournier (2019); and IMF staff estimates.

- Importantly, fiscal stimulus should focus on stabilizing the cyclical downturns (shown in green in Online Annex Figure 1.4.1) to mitigate the downturn and the subsequent potential permanent costs from hysteresis (the yellow line above the blue line). However, part of the long-term costs could be induced by a supply shock that cannot be offset (the difference between the gray line and the yellow line). As such, fiscal policies will

have to adjust to permanent output losses. In practice, governments may not be able to fully differentiate the cyclical component in real time—this is especially true in cases of large shocks such as the current pandemic. Policies will need to adjust the size of stimulus to the changing circumstances and may rely more on automatic stabilizers. Many governments have implemented rule-based measures that are directly linked to economic outcomes, such as larger unemployment insurance or support to firms triggered by a significant drop in turnover.

- Highly indebted governments should react less to shocks. The debt buffer (difference between the current debt level and levels at which sustainability is at risk) has an insurance value—it is the "reserve" of debt that the government can issue to smooth shocks. When the buffer is small, the probability of market stress is high. This implies that when debt is high, the optimal countercyclical fiscal stimulus to offset a negative shock is smaller than when debt is low. Beyond these stylized cases, the model can be calibrated with country-specific parameters to tailor fiscal stance recommendations (Fournier and Lieberknecht, 2020; IMF 2020b).

Fiscal Stance Advice for the Post-COVID Recovery

In countries with fiscal space, high unemployment in the wake of the COVID-19 crisis warrants large and sustained fiscal stimulus to avoid long-term scars from the crisis. In many countries, the benefits of a stimulus outweigh the cost of increasing public debt. A baseline analysis is applied to a hypothetical advanced economy, using unweighted average data to calibrate parameters and macroeconomic conditions.[1] Magnitudes are thus illustrative, showing the reasoning and providing directions. The negative output gap is assumed to be about 7 percent of potential GDP in 2020, and the public-debt-to-GDP ratio is close to 80 percent. The interest rate is below the growth rate for a protracted period of time and goes up to marginally above the growth rate in the long run. In the absence of stimulus, the phasing out of emergency lifelines would imply a fiscal tightening of almost 3 percent of GDP.

Model-based analysis shows that governments with fiscal space should take advantage of low interest rates to borrow to finance stimulating the economy. An additional 4 percent of GDP support would not only offset phasing out of emergency measures but also provide a timely boost to sustain the recovery. This fiscal expansion would not necessarily increase the debt-to-GDP ratio in 2021 because of higher projected growth. Given the depth of the health crisis, the fiscal expansion can continue but gradually wind down so that cumulative stimulus over 2021–24 is about 9 percent of GDP. This sustained effort to avoid a protracted recession or a double dip from renewed lockdowns would shift the debt level up, as the boost to growth would eventually fade. The results are highly dependent on the depth of the negative output gap. For example, a 1 percentage point higher negative output gap would suggest that a cumulative stimulus should be larger—on the order of 11 percent instead of 9 percent of GDP.

The sustained stimulus is optimal to avoid long-term costs of hysteresis. In an alternative scenario in which this channel is shut down, the recommended cumulative discretionary fiscal stimulus would be shorter (three years instead of the five years in the baseline) and smaller (less than 3 percent of GDP), resulting in a lower medium-term debt-to-GDP ratio (Online Annex Figure 1.4.2.).

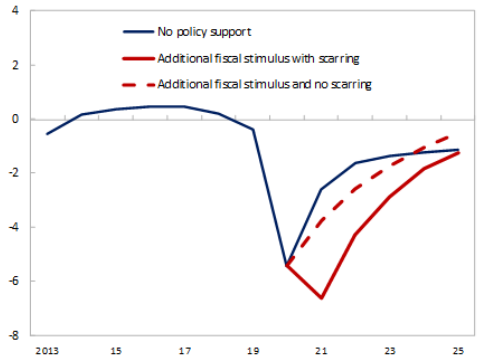
However, countries with high debt and interest rates should take a more cautious fiscal stance to preserve debt sustainability given the risks of debt distress would be higher. In an alternative scenario with debt at about 140 percent instead of 80 percent of GDP and all else being equal, the model suggests that the fiscal stimulus for 2021 should only be 2 percent of GDP and that the country should turn to a fiscal consolidation starting in 2023 (Online Annex Figure 1.4.3). In this high-debt scenario, the priorities would be to reduce the debt-to-GDP ratio by 4.5 percent of GDP by 2025 to prevent a large surge of

[1] The calibration follows Fournier and Lieberknecht (2020).

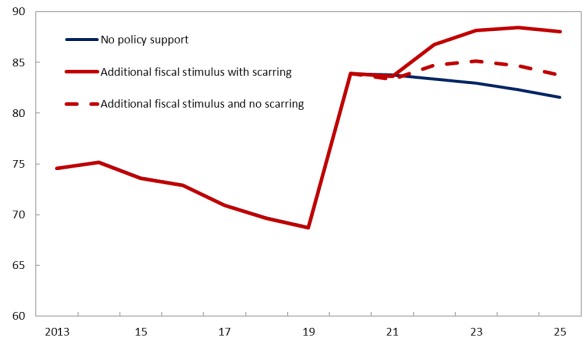
interest payments and reduce the risks of a future fiscal crisis. At this high debt level, with an interest rate level 1 percent above the baseline, a progressive consolidation plan should start sooner, in 2022.

Online Annex Figure 1.4.2. Simulated Fiscal Adjustments across Countries with Different Levels of Debt and Interest Rates

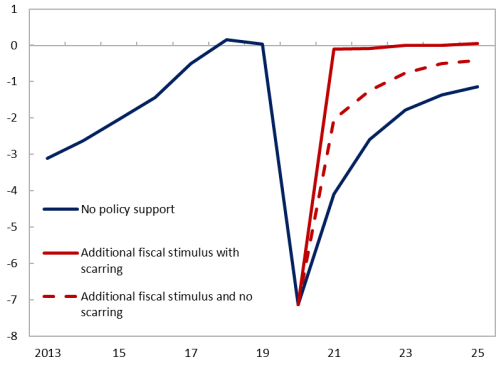
1. Normative Structural Primary Balance
(Percent of potential GDP)



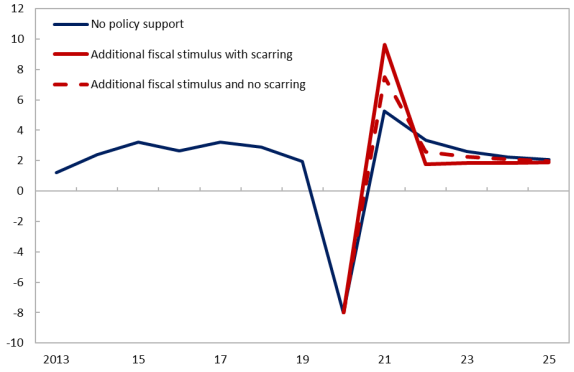
2. General Government Gross Debt
(Percent of GDP)



3. Output Gap
(Percent of GDP)



4. Output Growth
(Percent change)

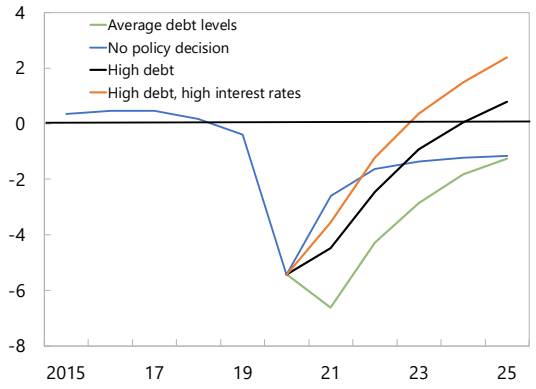


Source: IMF staff estimates.
Note: Panel 1 shows a normative fiscal adjustment path with discretionary stimulus in the first few years for an advanced economy with an average debt level (baseline) at 80 percent of GDP.

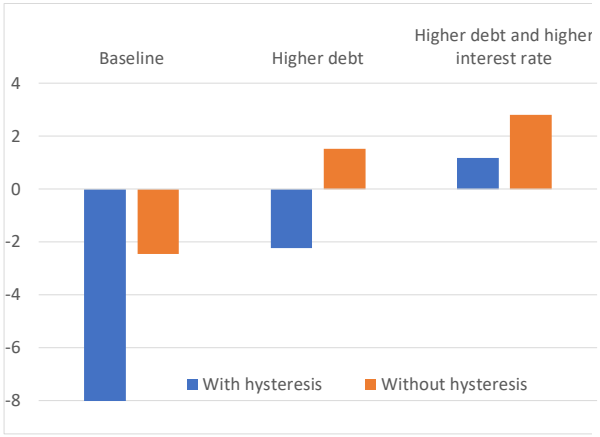
The presence of hysteresis does not always warrant an expansionary fiscal stance, particularly in cases of high, and expensive, debt (Online Annex Figure 1.4.3, panel 2). If the costs from protracted recessions are large—implying lower potential economic growth—it would make it harder to manage elevated debt levels and increase the risk of a fiscal crisis. As a result, the more debt is high and costly, the less governments should stimulate the economy even in the presence of hysteresis. In 2021, hysteresis warrants about 1 additional GDP percentage point of stimulus—compared to a scenario without hysteresis—in a country with debt at about 140 percent of GDP and an interest rate 1 percent above the baseline, against 3 additional GDP percentage points of stimulus to counter hysteresis effects in the baseline with debt at about 80 percent of GDP. For countries already facing prohibitive interest rates and high foreign exchange exposure, the scope of further fiscal stimulus would be more limited. The focus should be on restoring macroeconomic stability (Fournier 2019).

Online Annex Figure 1.4.3. Discretionary Fiscal Support, Hysteresis, and Debt

1. Illustrative Pace of Fiscal Adjustment in the Case of Long-Term Scarring from the Pandemic (Structural primary balance in percent of potential GDP)



2. Cumulative Change in Structural Primary Balance relative to a No-Policy Change Scenario over 2021–23 (Percent of potential GDP)

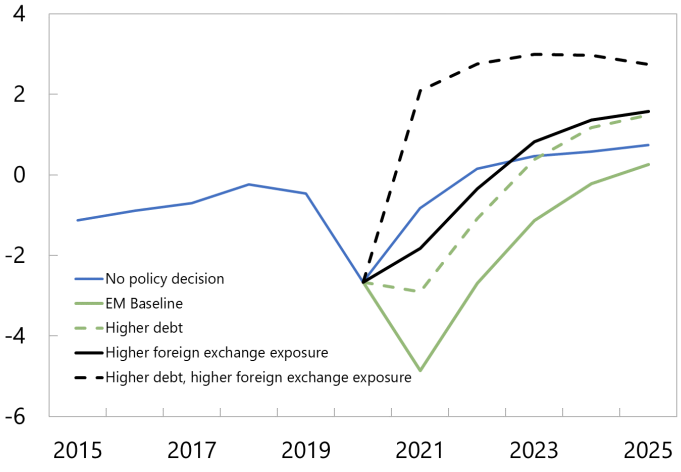


Sources: Fournier (2019); and IMF staff estimates.
Note: Average debt levels are assumed to be 80 percent of GDP (simple average across advanced economies). In the simulations, a high debt level is assumed to be about 140 percent of GDP (75th percentile of the weighted distribution among advanced economies), and high interest rates refers to an addition of 1 percent more than in the baseline.

Countries with a large share of foreign-currency-denominated debt will also be constrained because of possible effects of a currency depreciation. The value of public debt as a share of GDP could change significantly during the crisis. This concern is common for emerging markets, where fiscal pressures can be accompanied by pressures in the balance of payments and large currency depreciations. To reflect this risk, alternative simulations with a calibration reflecting emerging markets assume that the public-debt-to-GDP ratio is affected by a depreciation when the government loses market access, on top of the effect of economic activity on the debt-to-GDP ratio. When the change in value because of currency effects is moderate and debt is close to the emerging market average, then the government should stimulate the economy (Online Figure 1.4.4). If debt is higher or the risk of depreciation is higher, government would have limited scope for additional stimulus. And

Online Annex Figure 1.4.4. Discretionary Fiscal Support and Foreign-Currency-Denominated Debt

(Illustrative pace of fiscal adjustment, structural primary balance in percent of potential GDP)



Source: IMF staff calculations based on the Buffer-Stock model (Fournier 2019).
Note: The emerging market baseline reflects an average emerging market country with initial debt at 64 percent of GDP. Higher debt refers to public debt at the 75th percentile of emerging markets, 16 percent of GDP above the baseline. Higher foreign exchange exposure is associated with an increase of public debt by 10 percent if a fiscal crisis occurs, against 5 percent in the baseline. EM = emerging market.

if high debt is combined with depreciation risk, governments would need to tighten fiscal policy early to reduce risks of a future crisis.

Online Annex 1.5. Policy Options to Support the Economic Recovery

This annex discusses the revenue or expenditure measures, or mix of measures, that countries can adopt to help support the recovery from the COVID-19 pandemic in a cost-effective manner. The focus is on measures better directed to support the recovery once the pandemic is under control (phase 3) but some could potentially be applied earlier.[1] In phase 3, fiscal policies should rebalance to facilitate recovery if fiscal space permits. The main objectives of fiscal policy are to facilitate recovery from a deep recession, restore debt sustainability, and protect the most vulnerable groups. With reduced or limited fiscal space, it is important to choose among measures that are cost-effective, that is, that have large output multipliers. In addition, policies will need to help protect the most vulnerable groups, since the poor and low-skilled workers have been hit the hardest (Furceri and others 2020; Kikuchi, Kitao, and Mikoshiba 2020). In developing countries with little fiscal space for stimulus, fiscal policy should strive to provide essential public services and support the vulnerable. Both of these measures are crucial to maintaining economic stability (Loayza and Pennings 2020).

Cost-effectiveness of Various Spending and Revenue Measures

To assess the cost-effectiveness of various policy tools, this annex compares multipliers of different spending and tax measures.[2] A model-based simulation is conducted using a revised model based on Traum and Yang (2015) to quantify the multipliers of various spending and revenue measures that are commonly used to facilitate economic recovery.[3] The model features two types of households: those that are liquidity-constrained and consume all the disposable income each period, representing the poorer income group; and the higher-income group, which is comprised of asset holders who have both labor and capital income.[4] As the health and economic crisis has resulted in a drop in the living standard of the poor with little savings and wealth (Bangham and Leslie 2020), the analysis examines the effects of measures (spending and revenue) that target liquidity-constrained households. These are compared to untargeted transfers and tax cuts, which also benefit higher-income households that have accumulated savings. The simulations are mainly focused on those instruments that can be deployed quickly.

The baseline scenario (without additional fiscal measures) largely captures qualitatively the current economic and macroeconomic policy conditions of most economies: a severe recession, and monetary policy constrained at the effective lower bound.[5] For illustrative purposes, the model is calibrated to a hypothetical economy, and the public-debt-to-GDP ratio before the recession is calibrated to be 83 percent of GDP, which is the weighted average of the world economy in 2019. The policy scenarios inject a stimulus measure, one at a time, to the baseline scenario. For illustrative purposes, the size of a

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[1] As defined in Chapter 1, the three phases of the pandemic are (1) the outbreak with lockdowns; (2) partial reopening; and (3) a high degree of control of the virus through medical advances.

[2] Multipliers calculated in this simulation are the discounted, cumulative change of output or consumption over a horizon per US dollar change in government spending or tax revenue over the same horizon.

[3] Key revisions relative to the model in Traum and Yang (2015) include (1) modeling fiscal measures to target liquidity-constrained households, (2) allowing for the binding of the effective lower bound in monetary policy, and (3) delaying fiscal adjustment, as governments are less likely to address high-debt issues in the early stage of recovery.

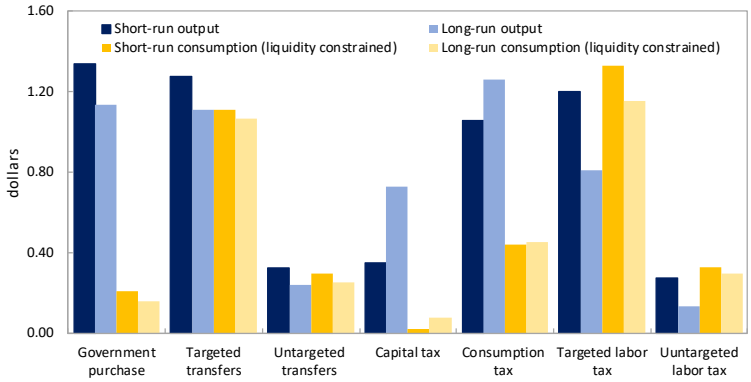
[4] The model calibration closely follows those used in the Chapter 2 of April 2020 Fiscal Monitor for the global economy. Some calibration deviations include a stickier nominal wage, as nominal wage rigidity is likely to prevent a large adjustment in the nominal wage in the recovery stage from the pandemic-led recession. Also, reflecting quick action on interest rate policy in response to the pandemic, the output coefficient in the policy interest rate is revised upward to drive the economy immediately to the effective lower bound during the first quarter when the macroeconomic shock hits.

[5] The model does not feature a health shock. Instead, it relies on a negative demand-side shock that has a negative effect on consumption, private investment, and labor. While the pandemic also disrupts the supply side of the economy during the lockdown phase, the weak demand is likely to dominate the macroeconomic dynamics in the gradual-reopening and recovery phases. The effective lower bound is modeled as the zero lower bound, as in many advanced economies. In emerging market economies and developing countries, the effective lower bound is typically above the zero policy rate.

stimulus is set to be about 1 percentage point of GDP for two years and then to gradually unwind as the economy recovers from a deep recession. To ensure that the public debt increase is limited over time, the simulations assume that the consumption tax rate adjusts slightly upward in two years after a stimulus is implemented, but that the adjustment is insufficient to lower the public-debt-to-GDP ratio.

The simulations show that all the measures can help raise output, but they differ greatly in the size of their multipliers (Online Annex Figure 1.5.1).[6] Government purchases and transfers to liquidity-constrained households stand out to be the most effective measures to boost output in the short run: the two-year cumulative output multipliers are about 1.4 and 1.3, respectively; that is, a cumulative $1 increase in government purchases and targeted transfers will lead to a $1.4 and $1.3 increase, respectively, in output cumulatively over two years.[7] As monetary policy is at the effective lower bound, an increase in government purchases does not have the typical crowding-out effect on private investment and hence the output multipliers can be significantly above 1.[8]

Online Annex Figure 1.5.1. Cumulative Multipliers of Various Fiscal Measures



Source: IMF staff estimates.
Note: Original tax multipliers are negative for expansionary effects. To facilitate comparison, the original tax multipliers are multiplied by -1 as plotted here; thus, a positive number indicates an increase in a variable as a result of the tax stimulus.

Between the two measures that have large multipliers, an increase in targeted transfers has additional benefits because it is effective in raising the income and consumption of liquidity-constrained households (yellow bars, Online Annex Figure 1.5.1). Another instrument suitable to support liquidity-constrained households is a targeted labor income tax cut. In addition to directly boosting the income of liquidity-constrained households, both measures increase labor demand because of higher demand for goods.[9]

In contrast, untargeted transfers and labor income tax cuts have much smaller multipliers of around 0.2 to 0.3, as a large part of additional income is saved, rather than spent, by the higher-income households. This result is consistent with the empirical literature, which generally finds that output multipliers for broad-based transfers are small (Gechert and Rannenberg 2018).[10] In practice, however, targeted

[6] The multipliers are calculated based on the response differences between the baseline scenario (a severe recession without additional fiscal stimulus) and a policy scenario (a recession with one of the fiscal stimulus measures).

[7] This result is consistent with Coenen and others (2012), who find that government purchases and targeted transfers to liquidity-constrained households are most effective in boosting output when monetary policy is expected to remain accommodative for a prolonged period. The average multipliers from several structural models used in other institutions (including the US Federal Reserve, the European Central Bank, and the Organization for Economic Co-operation and Development) in Coenen and others (2012) are also in line with the simulation results here.

[8] Note that the multipliers simulated in the analysis may not be directly applicable to country-specific stimulus measures because they may differ in size, design, and macroeconomic conditions from those assumed in the model and policy specifications.

[9] The labor income tax cut has an additional positive supply-side effect of enhancing work incentives. This effect on labor supply, however, reduces the magnitude of the real wage increase, generating an overall smaller increase in households' income and hence produces a slightly smaller output multiplier than the increase in targeted transfers.

[10] The relatively small output multiplier also holds for broad-based transfers provided in recessions. Shapiro and Slemrod (2003) find that only 22 percent of households report a spending increase from the 2001 US federal income tax rebate in response to the dot-com bubble crisis. Agarwal, Liu, and Souleles (2007) estimate that about 40 percent of this rebate was consumed. Kan, Peng, and Wang (2017) estimate that the 2009

measures unavoidably exclude some of those in need of support, especially when administrative capacity is low, as in many developing countries (IMF 2020a). Thus, their benefits in terms of cost-effectiveness need to be weighed against the possibility of insufficient coverage and delayed distribution of funds.

Among all the measures, a capital income tax cut is the least effective in supporting liquidity-constrained households and has relatively small output multipliers, particularly in the near term. Different from normal times, when cutting capital income tax rates provides strong incentives to invest, the trickle-down effect of a capital income tax cut is particularly weak in a deep recession, especially when it is expected to last a long time. This result is driven by suppressed demand. As demand gradually recovers, the output multipliers can increase over time. Under the consumption tax rate cut, the output multipliers are slightly above 1 in the short run and increase more in the longer run as demand recovers further.[11] Since a consumption tax cut also benefits the liquidity-constrained households, it is reasonably effective in boosting their consumption, helping to alleviate poverty.

The effectiveness of these measures will also depend on the timing, especially if countries decide to adopt them while the pandemic is not fully under control and social distancing restrictions are still in place (or may be tightened because of new infections). The simulations here assume that there are no supply constraints as a consequence of social distancing (including lockdowns). Some measures—such as increasing government purchases and targeted transfers to liquidity-constrained households—may also be appropriate during gradual reopening, although the multipliers are likely to be smaller for the following reasons:

- As many sectors remain closed during the gradual reopening phase, the effectiveness of broad-based measures could be significantly lower. For example, labor income tax cuts will fail to encourage labor supply in those sectors that are affected by social distancing restrictions or where demand remains depressed because of health concerns. Also, before effective vaccines are available and widely accessible, renewed infection waves can result in new restrictions and lockdowns, undermining the stimulus measures.
- Increases in government purchases, given the difficulty in only increasing demand in those sectors that do not have production constraints, can drive up production costs of those sectors with supply constraints. In this circumstance, a higher production cost reduces private demand of the same goods, thus offsetting the effectiveness of government purchases in boosting aggregate demand (Baqaee and Farhi 2020).
- Because of precautionary saving motives in a deep recession with high uncertainty about the recovery and concerns regarding employment, transfers to households in general may have a lower impact during the gradual reopening stage (Auerbach, Gorodnichenko, and Murphy 2020). However, transfers to those in need during the crisis serve an important objective—to save lives—and should be implemented if necessary.
- The power of supply-side stimulus such as a labor income tax cut is unlikely to work well because labor inputs in some sectors can be determined by governments' or firms' considerations based on public health concerns during the gradual reopening stage.

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shopping vouchers distributed in Taiwan Province of China in response to the global financial crisis had a marginal propensity to consume of 0.25.

[11] The consumption tax cut has been adopted by several countries, including Germany and the United Kingdom, in response to COVID-19. The sizes of multipliers implied by the simulations here, however, may not be directly applicable to country-specific consumption tax cut measures, as the policy design and country conditions may not be captured by the simulations and model calibration.

Uncertain Fiscal Multipliers

In the current crisis, assessing fiscal multipliers is subject to an unusually high degree of uncertainty. On the one hand, fiscal multipliers are expected to be larger in the recovery from a recession (Auerbach and Gorodnichenko 2012, 2013; Canzoneri and others 2016) and also when monetary policy is accommodative, with advanced economies at the effective lower bound (Christiano, Eichenbaum, and Rebelo 2011; Erceg and Lindé 2014).[12] This is because a demand stimulus under accommodative monetary policy does not drive up the real interest rate as in normal times. On the other hand, high levels of public debt are likely to offset the expansionary effects, possibly because of expectations of fiscal consolidation or rising sovereign risk premia (Ilzetzki, Mendoza, and Végh 2013; Bi, Shen, and Yang 2016; Fotiou, Shen, and Yang 2020; Huidrom and others, forthcoming).

These factors are further intertwined with unfamiliar and unpredictable trajectories of virus transmission, which could magnify precautionary saving motives in anticipation of a worsening and prolonged health and economic crisis. Historically, strong precautionary saving motives following a pandemic tend to suppress the real interest rate (Jordà, Singh, and Taylor 2020). Although this provides some breathing room for governments with constrained fiscal space, precautionary savings dampen the expansionary effects of fiscal stimulus. During the lockdown phase, the saving rates in the *euro area* and the *United States* soared. Although part of the savings was "forced" because people could not consume as in normal times, some of it was likely a result of precautionary savings, which can persist if unemployment declines slowly, as observed after the global financial crisis (Mody, Ohnsorge, and Sandrei 2012). If, however, effective treatment and vaccines become available quickly, repressed consumption could be unleashed, producing an initial boost to the recovery.

Facilitating Economic Recovery with Limited or No Fiscal Space

After the delivery of unprecedented fiscal firepower in response to the COVID-19 pandemic, global gross public debt is projected to reach similarly unprecedented levels approaching 100 percent of GDP in 2020. A challenge for many governments is to find additional resources to support the recovery and avoid a too-abrupt fiscal adjustment as the exceptional lifelines are eliminated. For countries with limited or no fiscal space, an option is to consider a productive stimulus measure that can be jointly implemented with an adjustment measure in order to achieve dual objectives of facilitating the economic recovery in the short run while keeping debt under control over the medium term. For example, to revive the economy, the government of *Spain* proposed using a €10 billion fund to increase the capital of companies in strategic sectors that are considered viable after the pandemic. The measure is combined with a tax reform that will increase taxes on larger companies.

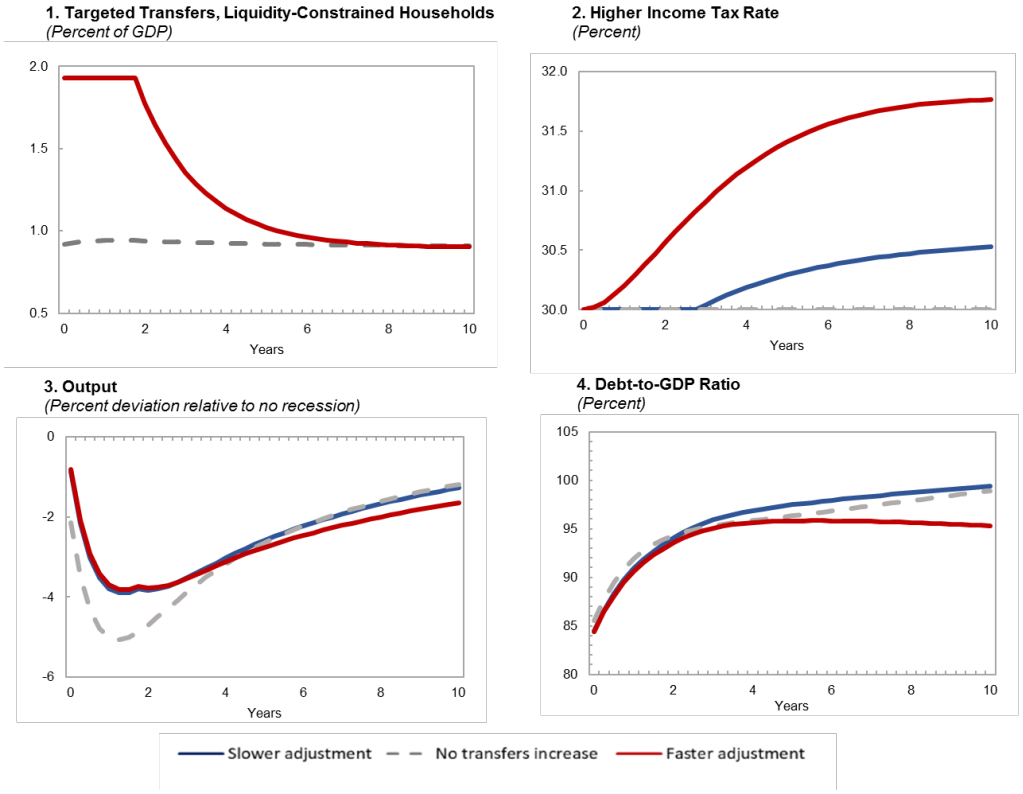
To illustrate the potential benefits of combining instruments, the impact of a targeted transfer increase combined with an increase in progressive labor income taxes is simulated. The targeted transfer increases by about 1 percentage point for the first two years in a deep recession and then declines over time as the economy improves. The fiscal adjustment via the progressive tax increase is imposed on the higher-income group under two adjustment speeds (Online Annex Figure 1.5.2): the slow-adjustment scenario assumes the tax rate is increased three years after the stimulus by a relatively small magnitude; and the fast-adjustment scenario assumes the tax rate is increased immediately by a bigger magnitude. For computing multipliers, a third scenario without a transfer increase is also simulated.[13] In this scenario, the

[12] The empirical evidence that supports higher multipliers in low interest rates or at the effective lower bound includes Miyamoto, Nguyen, and Sergeyev (2018) and Amendola and others (2020). See also Chapter 2 of the April 2020 World Economic Outlook.

[13] This third scenario is similar to the baseline scenario simulated earlier, which has a macroeconomic shock that generates a deep recession and no fiscal stimulus. The baseline simulated earlier, however, has the consumption tax rate as the fiscal adjustment instrument. The scenario here, instead, has the labor income tax rate on the higher-income group as the fiscal adjustment instrument.

progressive labor income tax rate does not increase within the first 10 years (although an adjustment would eventually be needed to contain debt).

Online Annex Figure 1.5.2. Different Fiscal Adjustment Plans: Targeted Transfers

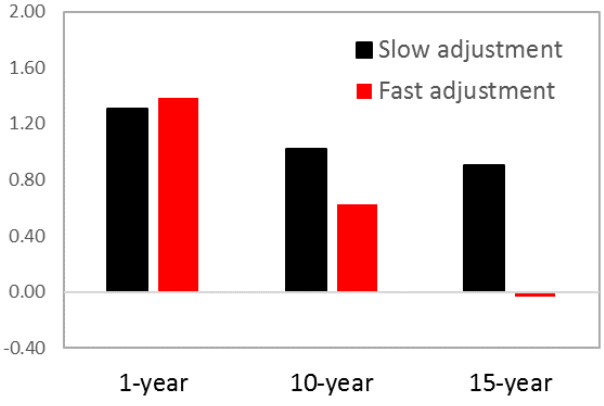


Source: IMF staff estimates.
Note: Output is in percent deviations from the path without the recession and additional transfer stimulus. The x axes are years.

The two adjustment speeds have similar short-run expansionary effects: the one-year output multipliers are 1.3 to 1.4, respectively (Online Annex Figure 1.5.3). With a fast speed, the labor income tax rate on the higher-income group begins to rise earlier by a larger magnitude (panel 2, Online Annex Figure 1.5.2), which discourages labor supply to a greater degree. Over a longer horizon, the output benefits from higher demand of liquidity-constrained households are largely offset by a fast adjustment speed because of a higher labor income tax rate on the higher-income group, leaving a longer-run cumulative output multiplier at about zero. A fast adjustment speed puts public debt on a downward path in the medium term (red line in panel 4, Online Annex Figure 1.5.2). Meanwhile, fiscal adjustments through a progressive income tax help protect the income of the vulnerable and mitigate after-tax income inequality. The slow adjustment speed, on the other hand, produces a multiplier around 1 in the longer

Online Annex Figure 1.5.3. Cumulative Output Multipliers for Targeted Transfers under Different Adjustment Speeds

(Percent of GDP)



Source: IMF staff estimates.

horizon (black bars, Online Annex Figure 1.5.3) because the increase in the labor income tax rate is delayed and relatively small. The public-debt-to-GDP ratio, however, is higher and could require further adjustment in the long run (blue line in panel 4, Online Annex Figure 1.5.2).

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