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Output Losses in Europe During COVID-19: What Role for Policies?

Anil Ari, Jean-Marc B. Atsebi, Mar Domenech Palacios

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Prepared by Anil Ari, Jean-Marc B. Atsebi, Mar Domenech Palacios*

Authorized for distribution by Ivanna Vladkova Hollar
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ABSTRACT: We use a decomposition methodology to analyze the factors underlying the differentiated output losses of European countries in 2020. Our findings are fourfold: First, 2020 growth outcomes can be explained by differences in mobility, underlying growth trends, and pre-pandemic country fundamentals. Second, fiscal and monetary policies helped alleviate output losses during the pandemic in all European countries but to a varying extent. Third, shallower recessions in emerging market economies in Europe can be attributed to higher underlying growth and younger populations. Fourth, fiscal multipliers were higher in countries where above-the-line measures accounted for a larger share of the total fiscal package, the size of the total fiscal package was smaller, and inequality and informality were greater, as well as in countries with IMF-supported program during the pandemic.

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Author's E-Mail Address:	AAri@imf.org; JAtsebi@imf.org; mdmd3@cam.ac.uk

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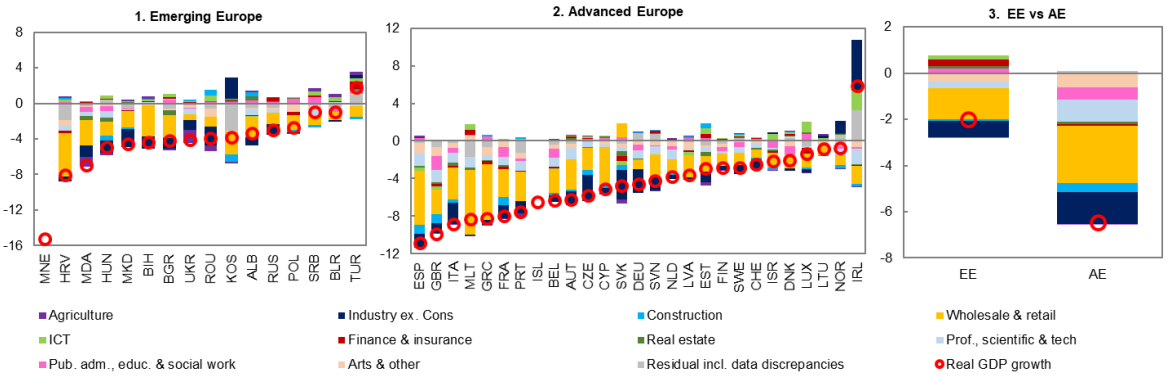
Contents

I. Introduction

The COVID-19 pandemic has caused substantial and unprecedented disruption (see, e.g., Baldwin and Weder di Mauro, 2020; Gopinath, 2020). Its growth impact has been highly uneven across Europe (Figure 1), as countries have pursued different containment and economic policies, and differed in their social, economic, and demographic characteristics. While real activity contracted by more than 10 percent in the worst-hit countries, a few managed to avoid a recession in 2020. On average, emerging economies in Europe experienced significantly shallower recessions, with real GDP contracting by 2.1 percent, on average, compared to the 6.7 percent average decline in advanced economies.[2]

Figure 1. Real GDP Growth by Sectors, 2020
(Percentage points)



Sources: Haver Analytics; Eurostat; and IMF, *World Economic Outlook*.
Note: ISL and MNE do not have a decomposition in panels 1 and 2 and are excluded from panel 3 due to lack of sectoral data. PPP-weighted averages are shown in panel 3. Excluding Turkey and Russia from the averages reduces the GDP contraction gap between EE and AE by half.

During the pandemic, many European countries enacted large fiscal stimulus packages to mitigate economic scarring, to ensure the functioning of essential sectors and to sustain household and corporate balance sheets. Monetary policies were also quick to react, with several central banks reducing their policy rates, employing unconventional monetary policies, and providing liquidity support to the financial system.

This paper aims to shed light on the causes of growth differentials during the pandemic and the role of fiscal and monetary policies in alleviating output losses. To this end, we seek to answer the following questions:

[2] For the remainder of the paper, we refer to emerging and advanced European economies following the IMF WEO classification (https://www.imf.org/-/media/Files/Publications/WEO/2021/April/English/stasapp.ashx).

- What explains the large heterogeneity in growth outcomes across Europe?
- To what extent can differentials in growth outcomes be attributed to differences in countries' sectoral composition?
- Were other country fundamentals at the onset of the pandemic, including macroeconomic and health conditions, a quantitatively important factor for growth outcomes?
- How important was the role of economic policies in mitigating the pandemic's adverse impacts?
- What was the efficacy of different policy instruments?

To address these questions, we decompose 2020 GDP growth outcomes for 43 European countries (including 27 advanced and 16 emerging economies) into the impact of i) the underlying growth momentum, ii) sectoral composition, iii) fiscal and monetary policies, and iv) country fundamentals at the onset of the pandemic (such as trade openness, informality, inequality, the current account balance, and health factors).

In addition to the decomposition analysis, we also employ a calibration approach to estimate the policy contributions by relying on fiscal and monetary multipliers identified in prior literature. This method allows for heterogeneity in multipliers based on the composition of policy support and country characteristics, yielding significantly higher estimated effects of announced measures.

Finally, we study heterogeneities in the fiscal multipliers across countries by analyzing the relationship between the magnitude of the fiscal multipliers and certain country fundamentals. These fundamentals include income inequality, the degree of informality, whether the country had an IMF-supported program in 2020, and the size and composition of fiscal support measures.

Our findings suggest that differences in 2020 growth outcomes can be largely explained by differences in mobility, underlying growth trends, pre-pandemic fundamentals, and macroeconomic policies. The decline in mobility in 2020 contributes the most to output losses in all countries, while differences in sectoral composition have a more limited role. We also find that the shallower recessions in emerging economies can be attributed to higher underlying growth and demographic and health factors that may have reduced the population's vulnerability to the pandemic (such as a lower median age). While economic

policies played an important role in cushioning the impact of the pandemic, their quantitative contribution varies across countries, reflecting the size of policy support measures and differences in fiscal multipliers.

Regarding fiscal support measures, our analysis further suggests that multipliers were higher in countries where above-the-line measures accounted for a larger proportion of the total fiscal package; and where the size of the total fiscal package was smaller, indicating diminishing returns to fiscal stimulus. We also show that the marginal fiscal multiplier tends to be larger where inequality and informality are greater, likely reflecting a larger share of liquidity-constrained consumers and relatively weak enforcement of pandemic containment measures. Finally, we find larger fiscal multipliers in countries where there was an IMF-supported program during the pandemic. Altogether, these factors help explain relatively larger fiscal multipliers in emerging economies.

There are three important caveats to our findings. First, our methodology may fall short of capturing the causal effects of macroeconomic policies due to endogeneity, omitted variable bias and anticipation effects. For example, countries that were more vulnerable to the pandemic and its economic fallout may have deployed larger policy support measures, while households and firms might have adjusted their behavior in anticipation of transfers and liquidity support that they expected to receive from policymakers. Second, in exploiting the variation across countries, our methodology is unable to capture the impact of easy financial conditions that policymakers around the world ensured through their synchronous actions (e.g., loans provided by international financial institutions, spillovers from coordinated interest rate cuts, asset purchase programs and stimulus packages). Third, as our study covers only 2020, it is silent on the important role of vaccinations in contributing to the economic recovery.

Our paper contributes to a growing literature on the effects of the COVID-19 pandemic. Several studies find that the output contractions and economic losses due to the pandemic can be explained by the uncertainty it creates, notably by increasing subjective uncertainty in business expectations, household spending, and financial markets (see e.g., Alfaro et al., 2020; Baker et al., 2020; Hanke et al., 2020, Andersen et al., 2020a, 2020b; Chen et al., 2020; Bartik et al., 2020, Fetzer et al., 2020). For instance, Andersen et al. (2020a) use data on credit card spending from Denmark to show that total card spending was reduced by 25 percent during the early phase of the pandemic. Chen et al. (2020) use high-frequency indicators to analyze the economic effects of the COVID pandemic in European countries and the United States during the early phase of the pandemic and conclude that larger outbreaks

are associated with more considerable economic losses. These economic losses are mainly driven by a voluntary reduction in people's mobility rather than containment measures. Similarly, Aum et al. (2020) present causal evidence on the effects of the spread of the pandemic on labor markets. They show that the number of infections, regardless of lockdown policies, result in job losses, which underlines the role of voluntary social distancing and health and demographic factors.[3]

Our paper also relates to studies analyzing the effectiveness of economic policies during the COVID-19 pandemic. Chudik et al. (2021) find that fiscal policy played a key role in mitigating the effects of the pandemic with countries that provided larger fiscal support experiencing less output contraction. In addition, countries have benefited from the spillovers of synchronized fiscal actions. In the United States, the Hutchins Center on Fiscal and Monetary Policy show that the local, state, and federal tax and spending policy contributed to raising GDP growth in the second quarter of 2020 by 3.6 percentage points when large swaths of the economy were shut down because of the COVID-19 pandemic.[4]

Finally, our paper relates to a broader literature on economic contractions. Becker and Mauro (2006) examine output drops in a large panel of countries since 1970 and estimate the likelihood and size of output drops associated with a variety of shocks. Cerra and Saxena (2008, 2017) show that recessions lead to permanent output losses. Ari, Chen and Ratnovski (2021) focus on systemic banking crises and show that elevated and unresolved non-performing loans are associated with larger output losses. Our paper contributes to this literature by analyzing output losses in a deep economic contraction that was also highly synchronized across the world. Notably, the peak-to-trough decline in global output during the COVID-19 crisis was about thrice as large as the decline during the global financial crisis, with the decline taking place in about half the time.

The rest of our paper is organized as follows. Section II presents the data and selected stylized facts. Section III describes the decomposition methodology employed to quantify the

[3] A subset of this literature has focused on the effects of containment measures and voluntary social distancing using the Susceptible Infected Recovered (SIR) epidemiology model by Kermack and McKendrick (1927) (see, e.g., Acemoglu et al. 2020; Alvarez et al., 2020; Bricco et al., 2020; Eichenbaum et al., 2020; Favero et al. 2020; Jones et al., 2020, Deb et al., 2020; Maloney and Taskin, 2020). A key insight from this literature is that targeted mitigation policies (e.g., targeting risks/age groups) outperform uniform policies in reducing the pandemic's economic and human costs. These studies also show that the absence of testing, contact tracing, social distancing could result in higher economic costs of the pandemic, lower welfare, and higher deaths.

[4] See https://www.brookings.edu/interactives/hutchins-center-fiscal-impact-measure/

importance of each factor and our main findings. Section IV proposes a calibration exercise to quantify the impact of policies in each country. Section V analyzes the determinants of fiscal multipliers across countries. Section VI concludes.

II. Data and stylized facts

A. Data

We use quarterly data from 2020. Our main data source is the IMF World Economic Outlook, from where we obtain real GDP, trade openness (defined as the sum of imports and exports divided by GDP) and current account balance data.[5] Data on sectoral GVAs is based on Eurostat, where available, and IMF staff calculations based on national sources otherwise. We use data for the size of the shadow economy as a share of official GDP in 2017 from Medina and Schneider (2018). Other initial conditions such as the Gini coefficient for inequality, hospital beds per 1000 people, share of smokers in population and population density (average number of people by square km. of land) are obtained from the World Development Indicators database of the World Bank.

We use the IMF COVID-19 Policy Survey to retrieve fiscal support measures, reflecting the announced measures as a percent of 2019 GDP, and where time variation reflects different vintages of the survey. Real interest rate data and central bank assets as a percentage of 2019 GDP are obtained from Haver Analytics, Eurostat, the European Central Bank and national sources.

Regarding mobility measures, we use the stringency measure provided by the Blavatnik School of Government at the University of Oxford. We also construct an indicator of *de facto* mobility by retaining the residuals from a regression of Google mobility indicators for retail, recreation and workplaces on the stringency of containment measures and country-quarter fixed effects.

B. Stylized facts

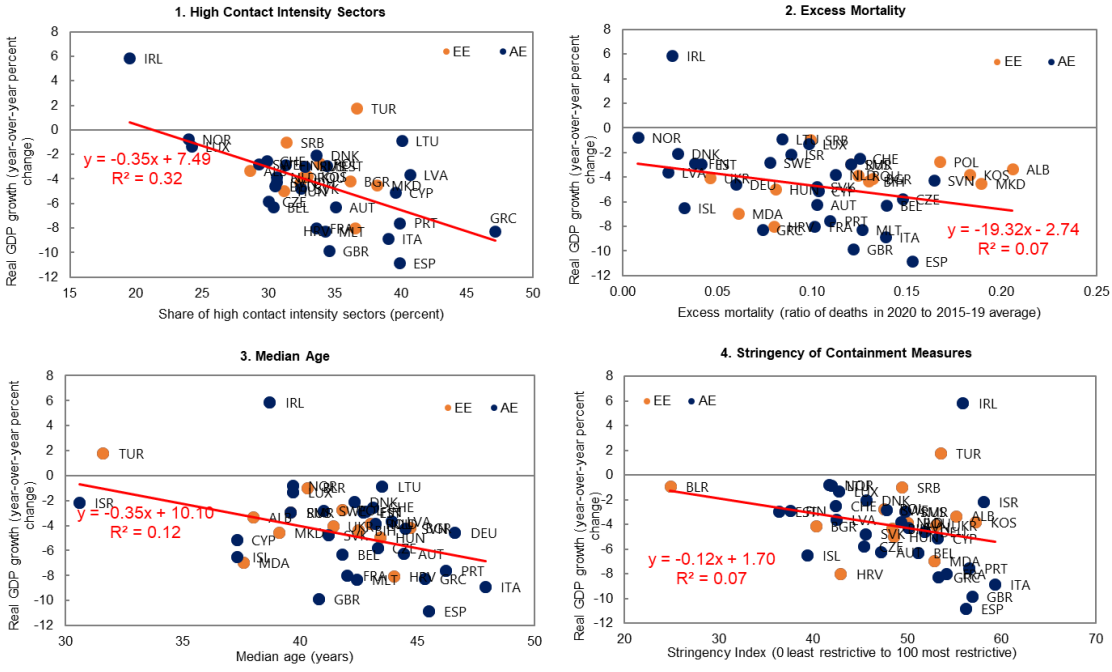
Several factors were likely at play in causing the observed growth differentials in Europe. As widely documented, the pandemic's impact varied significantly across sectors (Figure 1;

[5] See Table A1 in the Appendix for more information on data sources and the construction of variables.

Figure 2). The wholesale and retail sectors were the largest contributor to the recession in nearly all countries, followed by industry and professional services, while the expansion in information and communications technologies (ICT) helped mitigate the recession in many countries. Hence, differences in economic structure might explain the observed growth differentials.

Growth outcomes during the pandemic were also associated with a range of other country fundamentals at the onset of the pandemic, as well as containment policies. Countries hit worse by the pandemic (as measured by a sharper rise in excess mortality) and those that introduced more stringent containment measures experienced a deeper recession. On the other hand, lower median age was associated with better growth outcomes (Figure 2).

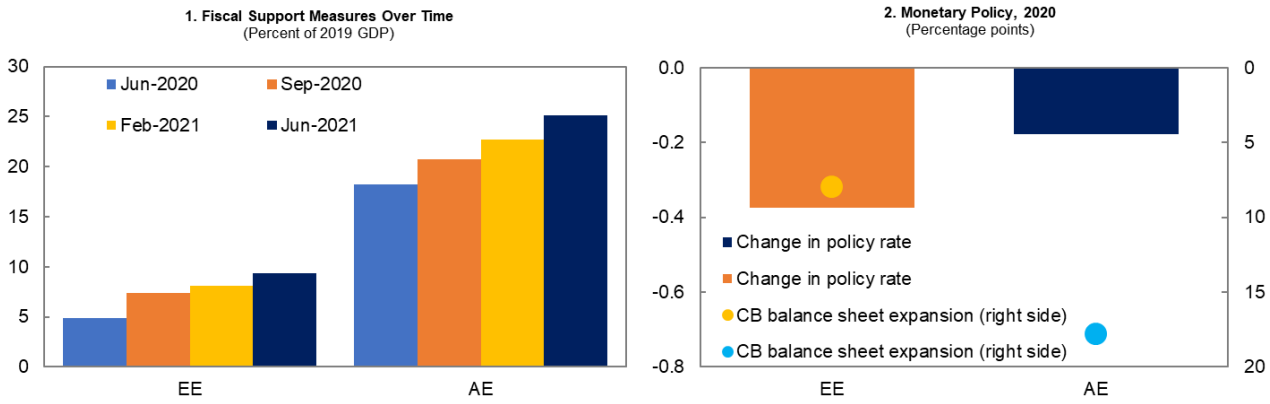
Figure 2. Correlates of Real GDP Growth, 2020



Source: Haver Analytics; Eurostat; Karlinsky & Kobak, 2021; Blavatnik School of Government at the University of Oxford; and IMF, World Economic Outlook.

While all countries responded to the pandemic with fiscal and monetary accommodation, the extent and form of policy support also differed across Europe, and in turn influenced economic activity (Figure 3). Fiscal support measures, most of which were announced by June 2020 and augmented over the course of the pandemic, were substantially larger in advanced countries. Emerging economies were able to cut policy rates further, while advanced economies relied to a greater extent on unconventional monetary policy instruments, as they entered the pandemic at or near the effective lower bound constraint.

Figure 3. Policy Support during the Pandemic



Sources: Haver Analytics; European Central Bank; National authorities; IMF policy tracker; and IMF staff calculations.
Note: Total fiscal support measures include above-the-line, below-the-line, and liquidity measures.

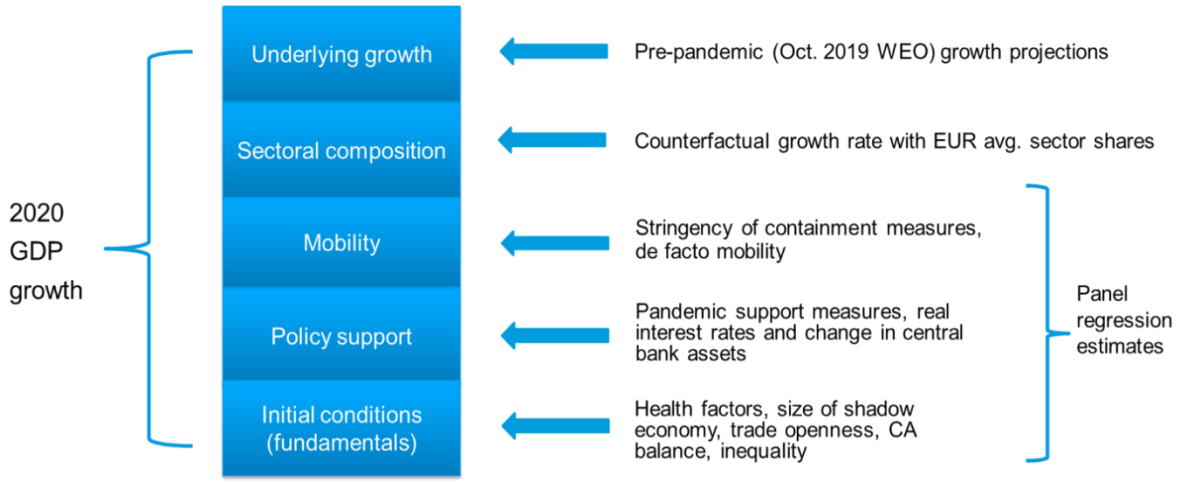
III. Decomposition exercise

A. Methodology

This section presents the technical details of the growth decomposition analysis (see Figure 4). The analysis builds upon the methodology of Caceres et al. (2021) and extends it to all European countries to analyze the role of policy support and pre-pandemic country fundamentals.

While the analysis is conducted at quarterly frequency over 2020Q1-Q4, the quarterly time dimension is not denoted in the remainder of this section in the interest of simplifying exposition, and the results are presented in the form of 2020 annual values in the next section.

Figure 4. Decomposition Approach



Starting with 2020 real GDP growth outcomes, g_{2020}, the first step of the analysis deducts pre-pandemic growth trends g^*, proxied with October 2019 WEO growth projections for the same period. This yields the first layer of the decomposition, which accounts for differences in underlying growth between countries and captures output losses due to the pandemic.[6]

$$g_1 \equiv g_{2020} - g^*$$

The second step focuses on the contribution of sectoral composition to output losses, as some sectors (e.g., retail and hospitality) were affected more by pandemic containment measures than others, leading to higher output losses for countries where such sectors account for a larger share of GDP. To this end, output losses are first de-constructed to the sectoral level such that

$$g_1 = \sum_{i=1}^{N} w_i (g_{2020,i} - g_i^*)$$

where i denotes sectors, of which there are $N = 10$ (see Figure 1), w_i represents sector i's weight, given by its share in gross value added in 2019 and $g_{2020,i}$ represents sector i's growth rate in 2020. g_i^* is the pre-pandemic growth trend for sector i. Given the absence of WEO

[6] The difference between growth realizations and prior forecasts may also capture forecast errors. However, for many countries, the output losses caused by the pandemic are of an order of magnitude larger than typical forecast errors in normal times.

projections at the sectoral level, g_i^* is proxied with the sectoral growth rate that would have led to the same annual shift in sector shares as observed between 2015-2019, that is

$$g_i^* = \left(\frac{w_{i,2019} - w_{i,2015}}{4w_{i,2015}} + 1\right) g^*$$

where $w_{i,2019}$ and $w_{i,2015}$ are the 2015 and 2019 sector shares.[7]

The contribution of sectoral composition, g_2, is then attained by benchmarking actual output losses of each country against a counterfactual output loss where each sector's weight in GDP is equal to the PPP-weighted average sectoral weight of European countries, $\widetilde{w}_i$, such that

$$g_2 \equiv \sum_{i=1}^{N} (w_i - \widetilde{w}_i)\left(g_{2020,i} - g_i^*\right)$$

$$= g_1 - \sum_{i=1}^{N} \widetilde{w}_i\left(g_{2020,i} - g_i^*\right)$$

This yields the second layer of the decomposition, where the difference between the actual and counterfactual output losses indicates the contribution of sectoral mix.

The third layer of the decomposition uses panel regressions to estimate contributing factors to within-sector output losses $\left(g_{2020,i,c,t} - g_{i,c,t}^*\right)$. The aim is to estimate the relative role of the decline in mobility, policy support and initial country conditions at the onset of the pandemic.

A separate panel regression is run for each sector i, each with country-time dimensions (c, t) over 2020Q1-2020Q4 such that

$$\left(g_{2020,i,c,t} - g_{i,c,t}^*\right) = \alpha_i + \beta_i X_c + \gamma_i P_{c,t-1} + \phi_i M_{c,t} + \varepsilon_{i,c,t}$$

where α_i is the intercept, X_c is a vector of pre-pandemic fundamentals (i.e. initial conditions from 2019), $P_{c,t-1}$ is a vector of lagged policy variables, $M_{c,t}$ is a vector of contemporaneous mobility variables, $\varepsilon_{i,c,t}$ is the residual, and β_i, γ_i and ϕ_i are coefficients to be estimated.[8]

[7] g_i^* is calculated at quarterly frequency using the data from the corresponding quarters in 2015 and 2019. If sectoral data for 2015 is not available for a country, the latest year that has available data for all quarters is used instead.

[8] Policy variables are lagged to alleviate endogeneity, while mobility variables are included in contemporaneous time to fully capture the effects of containment measures.

Initial conditions are standardized such that their contribution can be interpreted as the outcome of differentials from the sample average. Policy support measures and variables capturing mobility are not standardized so that their contribution captures their changes from 2019 in absolute terms, rather than against an average benchmark.

Table A2 in the Appendix displays the estimated coefficients from sectoral panel regressions. The contributions are calculated by aggregating the products of independent variables and corresponding coefficients across sectors.[9] For example, the contribution of mobility variables in each quarter t are given by

$$\sum_{i=1}^{N} \tilde{w}_i \hat{\phi}_i M_{c,t}$$

where counterfactual sector weights are used instead of actuals since the second layer already captures the contribution of sectoral composition.

Finally, as the dependent variable is already net of pre-pandemic growth trends, the sum of the intercept and residuals together constitute the unexplained portion, given by:

$$\sum_{i=1}^{N} \tilde{w}_i \left(\alpha_i + \varepsilon_{i,c,t}\right)$$

The unexplained portion also captures any data discrepancies between sectoral and aggregate, or quarterly and annual growth rates.

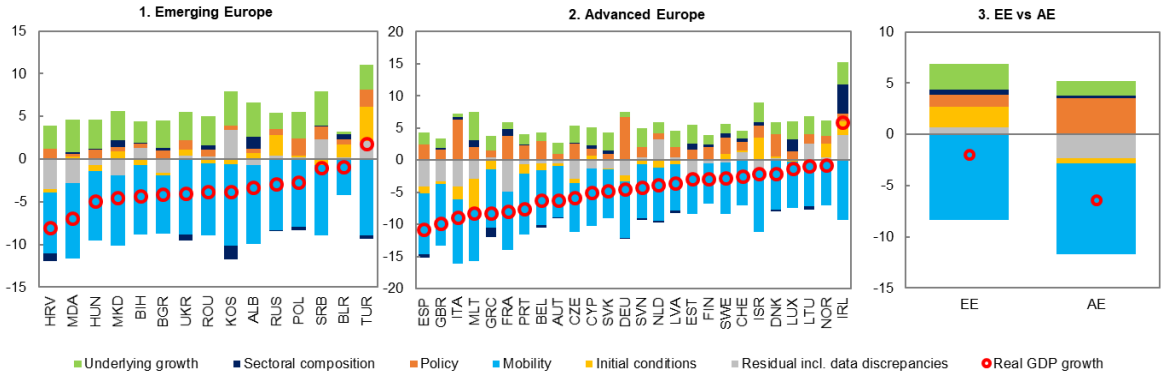
B. Results

Figure 5, Panels 1 and 2 display the results of the decomposition analysis by country. Panel 3 of the same Figure compares the relative importance of the drivers of output performance on average in advanced and emerging countries.

[9] This makes the contributions invariant to the scaling of independent variables. We include all independent variables (including statistically insignificant ones) while calculating contributions.

Figure 5. Decomposition of Real GDP Growth, 2020

(Percentage points)



Source: Haver Analytics; and IMF staff calculations
Note: PPP-weighted averages are shown in panel 3.

The growth decomposition exercise reveals several key patterns. First, output losses due to the pandemic are significantly larger than the GDP contraction observed in 2020 given the positive contribution of underlying growth. The stronger underlying growth momentum in emerging market economies at the onset of the pandemic is an important contributor to their relatively mild recession.

As expected, the single largest contributor to output losses in all countries is the decline in mobility. However, with similar contributions of mobility across Europe, it accounts for a relatively minor share in the differential outcomes across emerging and advanced economies.

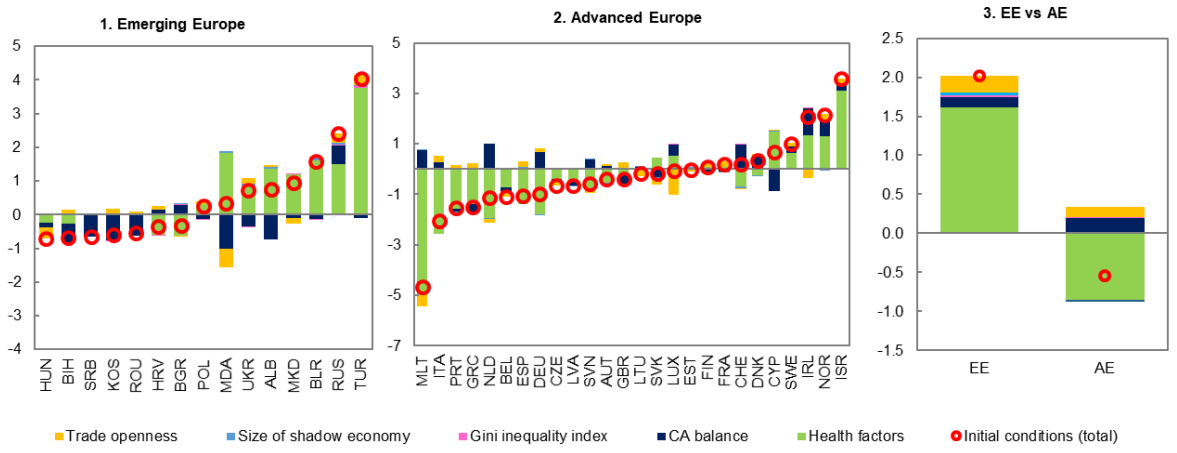
The contribution of sectoral composition is negative for economies with large tourism sectors, such as Croatia, Spain or Greece, but its quantitative contribution to aggregate outcomes is of a limited magnitude in most countries. As this finding may be counterintuitive, various caveats and clarifications are in order. First, our exercise aims to determine the role of sectoral composition in explaining growth differentials within Europe. Therefore, we calculate the contribution of sectoral composition by benchmarking actual output loss of each country against a counterfactual output loss where each sector's weight in GDP is equal to the PPP-weighted average sectoral weight of European countries. This differs from analyzing the contribution of sectors to the economic contraction. For example, in the case of tourism, the latter approach would call for a comparison against a no-tourism benchmark, whereas our counterfactual has a relatively high sector weight on tourism given the large tourism sectors in some large European economies such as Turkey and Spain. Second, the negative correlation between the weight of contact-intensive sectors and industry, another sector hit hard by the pandemic in the first half of 2020, leads to offsetting effects, reducing the net

contribution of sectoral composition in many countries. Third, due to data constraints, we are only able to use a 10-sector breakdown. A more granular sectoral breakdown may uncover a larger role for sectoral composition.[10] Finally, since our methodology is based on benchmarking rather than regressions, cross-sectoral spillovers are not captured within the contribution of sectoral composition.

Initial conditions contribute significantly to the greater resilience in emerging market economies. Among those, demographic and health factors stand out in their importance, with the younger populations in emerging market economies likely limiting their vulnerability to the pandemic (Figure 6). Higher informality, which may have reduced the impact of containment measures on economic activity, also contributes positively to the growth differentials. Conversely, higher pre-pandemic current account surpluses in advanced economies somewhat offsets the advantage of emerging market economies possibly because it reflects a lower reliance on domestic demand, which was hit hard by containment measures.

Figure 6. Decomposition of Initial Conditions

(Percentage points)



Source: IMF staff calculations
Note: PPP-weighted averages are shown in panel 3. Health factors is the sum of contributions from median age, hospital beds per capita, share of smokers in population and population density

Finally, regarding the role of policies, the empirical analysis confirms the important role in cushioning the impact of the pandemic. The quantitative contribution of policies varies across countries, reflecting the size of policy support measures, but the analysis suggests that policies helped mitigate the crisis in all countries covered in this analysis.

[10] For example, tourism falls into the category "Wholesale and retail trade, transport, accommodation, and food service activities." This lack of granularity, together with the absence of highly tourism-dependent small island countries from the sample, explains the differences between this paper's findings and those of studies that find that the share of tourism in GDP was a strong predictor of 2020 growth (see, for example, Milesi-Ferretti 2021).

As shown in the stylized facts section, advanced economies enjoyed more substantial fiscal and monetary policy support than emerging economies. Consequently, the role of policy measures in mitigating the crisis is considerably larger in advanced economies, also helping reduce the gap in economic performance between the two country groups.[11]

An important caveat, however, is that empirical estimates of fiscal and monetary policy multipliers underlying the growth decomposition analysis are likely to be biased downward due to a range of identification issues, including reverse causality, omitted variable bias, and anticipation effects. For example, countries that were more vulnerable to the pandemic and its economic fallout likely deployed larger policy support measures. Households and firms might have also adjusted their behavior in anticipation of the transfers and liquidity support they expected to receive from policymakers. Finally, by exploiting the variation across countries, the analysis is unable to capture the full effect of the easy financial conditions that policymakers around the world ensured through their synchronous actions (e.g., policy rate cuts, asset purchase programs). Thus, the estimated policy contributions in Figure 5 should be interpreted as a lower bound.

IV. Calibration exercise

A. Methodology

In view of the downward bias in our regression estimates for the contribution of policy measures, we also undertake a calibration exercise. For this, we rely on data on the composition of announced fiscal support measures, which are available from the IMF COVID-19 Policy Survey. Particularly, the survey data permits a breakdown of fiscal support measures between above-the-line measures, liquidity measures, and below-the-line measures.[12] For each country and in every quarter, an average fiscal multiplier, $F_{c,t}$, is calculated using the following expression

[11] Our analysis focuses on discretionary fiscal support measures and is therefore silent on the role of automatic stabilizers in explaining the variation in 2020 growth.

[12] Above-the-line measures refer to additional spending and forgone revenue in both the health sector and in areas other than health sector. This includes additional government spending such as health services and unemployment benefits; capital grants and targeted transfers (for example, wage subsidies or direct transfers) or tax measures, such as tax cuts or other reliefs. Liquidity measures refer to accelerated spending and deferred revenue in areas other than health. The category "other fiscal measures" contains below-the-line measures (equity injections, asset purchases, loans, debt assumptions, including through extra-budgetary funds) and contingent

(continued…)

$$F_{c,t} = M_{ATL}P_{ATL,t} + M_{LIQ}P_{LIQ,t} + M_{BTL}P_{BTL,t}$$

where P_{ATL} , P_{LIQ} and $P_{BTL} = 1 - P_{ATL} - P_{LIQ}$ are respectively the share of above-the-line, liquidity and below-the-line measures and M_{ATL}, M_{LIQ} and M_{BTL} are the corresponding multipliers, which are calibrated according to recent literature on fiscal multipliers during the COVID-19 pandemic:

- M_{ATL} is calibrated to 0.83 as an average of the multipliers for spending, unconditional transfers, payroll tax cuts and unemployment insurance provided by Bayer et al. (2020), Guerrieri et al. (2020), and Faria-e-Castro (2021).[13]
- M_{LIQ} is calibrated to 0.45 according to the multiplier for liquidity assistance given by Faria-e-Castro (2021).
- M_{BTL} is set to $M_{BTL} = \tau M_{LIQ}$ where the take-up coefficient, τ, is set to $1/3$ in view of the low take-up of below-the-line measures in many countries.

Note that the average fiscal multipliers vary over country and time due to the shifting compositions of fiscal measures. For each country, the contribution of fiscal policy is calculated by multiplying fiscal measures with the average multiplier for the corresponding quarter, and then using the four quarters to attain annualized values for 2020.

The calibration of monetary policy multipliers differentiates between policy rate cuts and an increase in the central bank balance sheet, which captures unconventional monetary policy instruments. In view of the impact of country characteristics (such as financial depth) on monetary policy transmission, the multipliers applied are differentiated between countries to the extent that the existing literature permits.[14] Table A3 in the Appendix provides detailed information on the multipliers used for each country and monetary policy instrument, and their sources.

liabilities (guarantees on loans, deposits, etc., and quasi-fiscal operations such as non-commercial activity of public corporations on behalf of the government). These various types of fiscal support have different implications for public finances. See Box 1.1 of IMF's April 2020 Fiscal Monitor for further details.

[13] We rely on multipliers estimated by these studies as they pertain to the COVID-19 pandemic, during which fiscal multipliers may have differed from "normal" times (e.g., due to containment measures). A potential drawback of our approach is that these studies rely on data from the US, which may have a different fiscal multiplier than Europe.

[14] Given the unavailability of estimates for each country in our sample, literature estimates are extrapolated to countries with similar characteristics whenever needed.

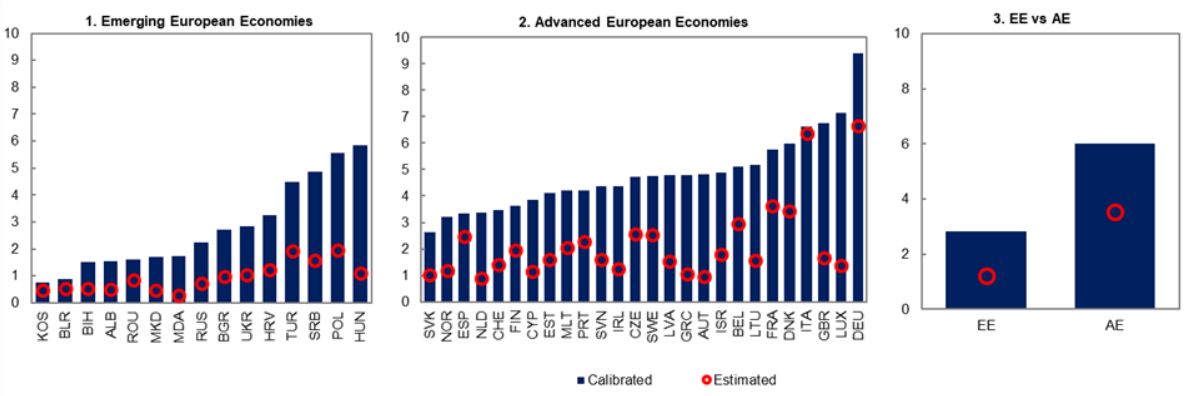
Finally, the calibrated policy contributions are attained by adding up the contributions of fiscal policy, policy rate cuts, and the expansion in central bank balance sheets.

B. Results

The calibration analysis allows for heterogeneity in policy contributions based on the composition of policy support. Figure 7 contrasts the results obtained with the calibration analysis with the previously estimated contributions of policy measures and shows significantly higher effects of announced measures in mitigating output losses, raising the potential contribution of policies by over 70 percent in advanced economies and more than doubling it in emerging market economies.

Figure 7. Policy Contributions to Real GDP Growth, 2020

(Percentage points)



Source: IMF staff calculations
Note: Country abbreviations are International Organization for Standardization country codes. PPP-weighted averages are shown in panel 3. AE = advanced European economies; EE

V. An analysis of the determinants of fiscal multipliers

While the previous sections depict the extent to which policies helped mitigate the economic effects of the pandemic, what explains the differences in the effectiveness of these policies remains unexplored. This section aims to provide a better understanding of several factors that could explain differences in the efficacy of fiscal policies across countries in Europe.

The aim is twofold: on the one hand, we aim to understand what types of policies contributed more to mitigating the crisis and whether IMF-supported programs helped amplify the effects of these policies. On the other hand, we want to know whether different country characteristics

(such as inequality and informality) contributed to making fiscal policy more effective at tackling the crisis.

To this end, the econometric specifications are similar to those in the decomposition analysis. The dependent variable is output performance during 2020 at the country level, where we remove underlying growth and the contribution of the sectoral composition. We introduce fiscal policy variables with a lag to minimize reverse causality, and we use data starting from the second quarter of 2020, when the pandemic hit most European countries. To capture the evolution of policies over time, and identify quarterly fiscal support, we continue to rely on data on the magnitude and composition of fiscal support packages reported by the IMF COVID-19 Policy Survey. As in the previous section, the fiscal policy measures are classified into three categories: above-the-line measures; liquidity measures; and other measures and normalized by the pre-pandemic GDP level. Because of concerns similar to those mentioned in the decomposition analysis, such as reverse causality and anticipation effects, our estimates might potentially suffer from a downward bias and can thus be interpreted as lower bounds.

Different to the previous sections, we now include country fixed effects to control for characteristics of countries that remain constant over time. This is because we are no longer focusing on the relative importance of time-invariant characteristics in explaining the recession, but rather on understanding whether a number of these characteristics had an impact on the effectiveness of policy support measures.

A. The role of the composition and types of fiscal policies

As discussed previously, advanced economies introduced relatively large fiscal packages to attenuate the crisis compared to emerging countries. This applies to all three types of policy support. While above-the-line measures accounted, on average, for 0.7 percent of pre-crisis GDP in advanced economies, this figure is 0.4 percent for emerging countries. The numbers are 0.2 percent against 0.03 percent for liquidity measures, and 2.5 percent against 0.5 percent for other fiscal measures.

Countries mostly relied on above-the-line measures, which accounted, on average, for 56.9 percent of all fiscal measures. Other fiscal measures were also implemented (34.4 percent), and liquidity measures were sparely used (8.7 percent). However, these proportions are not identical across the two groups of countries. Emerging countries relied more on above-the-

line measures than advanced countries (69 percent of all fiscal measures against 50 percent). In contrast, they relied less on other measures (27 percent of all fiscal measures against 38.5 percent) and liquidity measures than advanced economies (3.8 percent of all fiscal measures against 11.8 percent). As a result, the different amounts and types of fiscal policies between advanced economies and emerging countries have led to differentiated contributions of fiscal policies.

Our results are reported in Table 1. While the first column includes a linear coefficient for fiscal support, in the second column we introduce quadratic terms to explore the non-linearities of the effectiveness of fiscal support. One could argue that the first units of currency spent on each type of fiscal support would have a larger multiplier than those after a substantial amount is disbursed. This could be because a certain portion of households are liquidity constrained. Government transfers to such households would first relax their liquidity constraints, allowing them to increase their consumption to a certain extent. However, with increased fiscal support, and especially given the restrictions on mobility and contact-intensive economic activities, an increasing proportion of government transfers to households would be directed towards savings, hence dampening the fiscal multiplier. Similar arguments for diminishing returns could be made for fiscal support to liquidity constrained firms, or when it comes to government spending that prioritizes high impact projects.

Our results reveal that fiscal multipliers are non-linear in the size of the fiscal package. Indeed, the quadratic terms are significant and negative, indicating that there are diminishing returns to fiscal support in alleviating economic losses due to the pandemic. As a result, lower amounts of fiscal support announced in emerging economies would partially explain larger estimated fiscal multipliers in these countries.

Table 1. Multipliers for the Different Types of Fiscal Measures

	(1)	(2)	(3)	(4)
Total fiscal package	0.404***	0.948***		
	(0.000)	(0.000)		
Quadratic term: Total fiscal package		-0.021***		
		(0.000)		
ATL measures			1.032***	2.413***
			(0.000)	(0.000)
Liquidity measures			0.182	0.899
			(0.570)	(0.160)
Other fiscal measures			0.218**	0.493***
			(0.042)	(0.000)
Quadratic term: ATL measures				-0.202***
				(0.001)
Quadratic term: Liquidity measures				-0.212**
				(0.027)
Quadratic term: Other fiscal measures				-0.013***
				(0.001)
Observations	123	123	123	123
R-squared	0.784	0.842	0.819	0.865
Country FE	YES	YES	YES	YES
Time FE	NO	NO	NO	NO

Note: Each column presents the relevant coefficients for each panel regression, where the dependent variable is GDP growth during 2020 at the country level, where we remove underlying growth and the contribution of the sectoral composition. The regressions include country fixed effects and control for Stringency index, de facto mobility, Central Bank policy rate and central bank balance sheet expansion. Robust pval in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Table A4 in the Appendix for details on the specification.

Next, we focus on fiscal multipliers for each type of fiscal support. Column 3 reports the multipliers for each of the fiscal measures when only linear terms are included, and column 4 includes quadratic terms for each of the types of measures. We find that above-the-line measures have the highest multiplier, above one, indicating that each dollar spent on above-the-line measures led to an increase of real GDP by more than one dollar. Fiscal multipliers for other fiscal measures are also statistically significant, but around five times lower in magnitude compared to fiscal multipliers for above-the-line measures. The coefficient for liquidity measures is not statistically significant. As a result, countries that deployed more above-the-line measures benefited from larger fiscal multipliers, partly explaining the

differences between advanced and emerging economies. This indicates that the composition of the fiscal packages matters for the effectiveness of fiscal support.

Moreover, the non-linearities of fiscal multipliers are more pronounced for above-the-line and liquidity measures compared to other fiscal measures as indicated by the size of the quadratic term, as shown in column 4. Failing to introduce the quadratic terms would lead to a downward bias in the coefficient for the countries whose fiscal packages were relatively small (e.g., emerging countries) and an upward bias for the rest.

B. The role of inequality and informality

In this section, we explore the role of inequality and informality in shaping the effectiveness of fiscal support measures. We do so by interacting our measures of inequality and informality with all fiscal support measures.

First, inequality in emerging countries is on average slightly higher than in advanced economies. Average Gini coefficient over 2016–19 is 32.2 for emerging countries, against 31.3 for advanced economies. It also varies between countries, ranging from 24.8 in Slovenia to 42 in Turkey. The interplay between fiscal policy effectiveness and inequality is ambiguous from a theoretical perspective. On the one hand, inequality can be associated with a higher proportion of liquidity-constrained households with a high marginal propensity to consume. This is argued by Brinca et al. (2016) who observe that wealth inequality and fiscal multipliers show positive correlation in the data and, theoretically, that fiscal multiplier is highly sensitive to the fraction of the population who face binding credit constraints. On the other hand, however, more inequality at the top might cause a higher proportion of the government transfers to increase savings, pushing down the fiscal multiplier.

Second, we find that average informality, measured as the average contribution to GDP of the shadow economy over the period 2015–17, is higher in emerging countries (29.3 percent of GDP) than in advanced economies (14.8 percent). Higher informality can affect the efficacy of fiscal policy in different ways. On the one hand, it can decrease the effectiveness of government programs, as informal sector workers may not be able to access furlough, unemployment benefits or other fiscal support measures, thereby reducing fiscal multipliers. On the other hand, it can also limit the enforcement of containment measures, which tend to curtail spending, thereby raising fiscal multipliers.

The results are displayed in Table 2. Panel A explores the role of inequality while Panel B focuses on informality. For reference, columns 1 and 2 of Panel A show the model with total fiscal packages and with its quadratic terms, respectively. In columns 3 to 8, we use different measures of inequality and informality, added additionally as an interaction with the total fiscal packages variable. In columns 3 and 9, respectively, we include levels of inequality and informality; then, we insert the quartile in which a given country would be found regarding these variables (columns 4 and 10), and finally a dummy measure indicating whether a given country is above the median for the variable across out sample (columns 5 and 11). Columns 6, 7, and 8 in Panel A and 12, 13, 14 in Panel B add quadratic terms for the total fiscal measures.

The results from Panel A suggest that higher levels of inequality are associated with a higher fiscal multiplier when non-linearities are accounted for. These results are consistent with Brinca et al. (2016) and with the hypothesis that economies with higher proportion of liquidity-constrained households had larger fiscal multipliers during the pandemic. In Panel B, the interactive term between informality and fiscal policy support are positive, but significant only in some specifications. They suggest that a higher level of informality is weakly associated with a higher efficacy of fiscal policy. These findings point towards a relatively higher impact of fiscal policies in emerging countries.[15]

[15] Our analysis is not intended to be a comprehensive assessment of the economic impact of informality and inequality. As fiscal support is phased out, higher levels of informality and inequality could increase the risk of medium-term output scarring, and an increase of informal jobs may result in workers being at higher risk of lower incomes and more limited access to social safety nets (see e.g., a recent G-20 Background Note on Minimizing Scarring from the Pandemic).

Table 2. Regression Results on Fiscal Multipliers given by Inequality and Informality

Panel A. Fiscal multiplier and inequality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total fiscal package	0.404***	0.948***	0.404***	0.402***	0.428***	0.985***	0.922***	0.767***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fiscal package * Inequality (level)			0.032			0.090*		
			(0.567)			(0.051)		
Fiscal package * Inequality (quartiles)				0.0031			0.325***	
				(0.981)			(0.002)	
Fiscal package * Inequality (dummy)					-0.009			0.107**
					(0.852)			(0.015)
Total fiscal package, quadratic term		-0.021***				-0.023***	-0.028***	-0.025***
		(0.000)				(0.000)	(0.000)	(0.000)
Observations	123	123	123	123	123	123	123	123
R-squared	0.784	0.842	0.784	0.784	0.784	0.849	0.863	0.853
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO	NO	NO

Panel B. Fiscal multiplier and informality

	(9)	(10)	(11)	(12)	(13)	(14)
Total fiscal package	0.491***	0.352***	0.194	0.964***	0.897***	0.790***
	(0.000)	(0.000)	(0.144)	(0.000)	(0.000)	(0.000)
Fiscal package * Informality (level)	0.180*			0.107*		
	-0.063			-0.077		
Fiscal package * Informality (quartile)		0.144			0.114	
		(0.294)			(0.104)	
Fiscal package * Informality (dummy)			0.110*			0.0645
			-0.093			(0.109)
Total fiscal package, quadratic term				-0.020***	-0.021***	-0.020***
				(0.000)	(0.000)	(0.000)
Observations	123	123	123	123	123	123
R-squared	0.798	0.789	0.798	0.847	0.846	0.847
Country FE	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO

Note: Each column presents the relevant coefficients for each panel regression, where the dependent variable is GDP growth during 2020 at the country level, where we remove underlying growth and the contribution of the sectoral composition. Level refers to the relative level of the variable of interest in a given country; quartile refers to the quartile in which a given country is regarding that variable; and dummy is a variable equal to 1 if a given country is above the median for the given variable.The regressions include country fixed effects and control for Stringency index, de facto mobility, Central Bank policy rate and central bank balance sheet expansion. Robust pval in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Table A5 in the Appendix for details on the specification.

C. The role of IMF-supported programs

After the onset of the pandemic, countries around the world requested the assistance of the IMF through a number of IMF-supported programs with the aim of alleviating the economic damage from the pandemic. In Europe, Albania, Moldova, Ukraine, Bosnia and Herzegovina and Kosovo received IMF funding in 2020 through IMF-supported programs. In addition to

IMF funding, these programs typically included enhanced policy recommendations and technical assistance from IMF staff, and in the case of Ukraine and Moldova, conditionalities.

There are several channels through which IMF programs may have led to higher fiscal multipliers. First, the financing provided by the IMF may have relaxed fiscal space constraints, helping countries enact stimulus packages without crowding out private investment and/or raising sovereign yields. Second, IMF programs may have catalyzed capital inflows from private and other official creditors by acting as a signal of sound macroeconomic policies. Third, the enhanced policy recommendations and technical assistance (and in the case of Ukraine and Moldova, conditionalities) accompanying IMF-supported programs may have increased the effectiveness of fiscal policies (e.g., by targeting stimulus spending towards higher multiplier elements).

We test this hypothesis by interacting fiscal policy support with a dummy variable for countries with an IMF-supported program in 2020. The results of this exercise are presented in Table 3. Columns 1 and 2, for comparison, are as in Table 1. In columns 3 and 4, we add the interaction term between fiscal packages and the presence of an IMF-supported program. In both specifications we obtain a significant coefficient for the interaction, indicating that the fiscal multiplier is higher in countries with IMF programs.

However, an important caveat to our findings is that our regression might be capturing selection effects. First, countries with the tightest fiscal space constraints would have the strongest incentive to request an IMF-supported program. If these countries also have the highest return to a marginal increase in fiscal impulse, then the positive coefficient for the interaction term may be driven by selection effects. Second, countries which requested an IMF-supported program may have also received disbursements from other official creditors (beyond the aforementioned catalytic effects of IMF programs), in which case a positive coefficient would capture the impact of broader international support rather than IMF-supported programs on their own.

Table 3. Regression Results on Fiscal Multipliers and IMF-supported programs

	(1)	(2)	(3)	(4)
Total fiscal package	0.404***	0.948***	0.407***	0.947***
	(0.000)	(0.000)	(0.000)	(0.000)
Total fiscal package, quadratic term		-0.021***		-0.021***
		(0.000)		(0.000)
Fiscal package * IMF			1.624**	1.584**
			(0.027)	(0.020)
Observations	123	123	123	123
R-squared	0.784	0.842	0.800	0.858
Country FE	YES	YES	YES	YES
Time FE	NO	NO	NO	NO

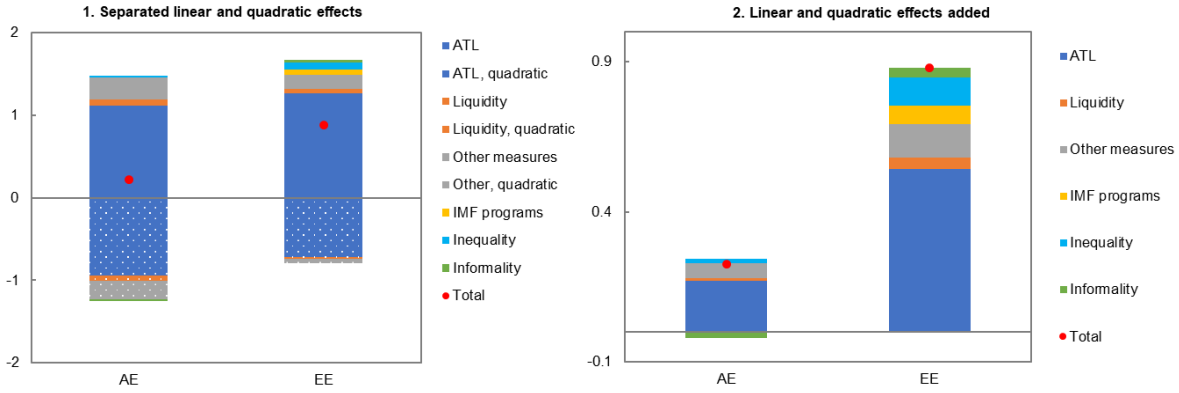
Note: Each column presents the relevant coefficients for each panel regression, where the dependent variable is GDP growth during 2020 at the country level, where we remove underlying growth and the contribution of the sectoral composition. The regressions include country fixed effects and control for Stringency index, de facto mobility, Central Bank policy rate and central bank balance sheet expansion. Robust pval in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Table A6 in the Appendix for details on the specification.

D. Differences in marginal fiscal multipliers

In Figure 8, we compare the fiscal multiplier that we would observe if an additional unit of fiscal support was considered, on average, in advanced and in emerging countries. To do this, we use the coefficients obtained in the previous exercises and compute a country-by-country marginal fiscal multiplier, using the country specific data on inequality, informality, IMF-supported programs, fiscal policy magnitudes and compositions.[16] In Panel 1 of Figure 2, we present the findings separately for linear and quadratic effects. In Panel 2 of Figure 2, the findings are reported for combined linear and quadratic effects.

[16] Using the composition and magnitude of the announced fiscal policies in each country, together with the coefficients obtained in the previous regressions, and the interaction terms, we estimate a fiscal multiplier at the margin (i. e. the expected impact of an additional unit of currency spent, if it was spent using the average country composition of the different fiscal policies). The effect is set to 0 if the quadratic term is larger than the linear term.

Figure 8. Average Marginal Fiscal Multipliers



Source: IMF staff calculations
Note: PPP-weighted averages are shown.

The figures show larger multipliers for additional fiscal support in emerging countries compared to advanced countries. This, as depicted in the previous sections, is explained by a number of reasons. We showed previously that fiscal multipliers are larger where above-the-line measures account for a higher proportion of the fiscal package, fiscal packages are smaller, inequality is higher and the shadow economy is larger, as well as in countries with an IMF-supported program in place during the pandemic. All these support marginal fiscal multipliers being on average substantially larger in emerging countries compared to advanced economies.

While fiscal multipliers are estimated to be lower in advanced economies than emerging countries, our decomposition analysis reveals that the role of policies in advanced economies was, however, much more important in mitigating the crisis than in emerging countries. This is due to the considerably larger size of announced policies in advanced economies.

VI. Conclusion

The substantial variation in the growth outcomes of European countries during the pandemic can be explained by differentials in underlying growth, decline in mobility, pre-pandemic country fundamentals pertaining to health and macroeconomic factors, and policy support measures, while differences in sectoral composition have had a limited impact. We find that the decline of mobility in 2020 contributes the most to output losses in all countries, while differences in sectoral composition played a more limited role. We also find that the shallower recessions experienced in emerging countries are due to higher underlying growth and

younger populations which are less at-risk from COVID-19 infections, and despite more substantial policy support in advanced economies. We complement the decomposition analysis with a calibration exercise, allowing for heterogeneity in policy contributions based on the composition of policy support, to provide an estimate of the contribution of economic policies in alleviating the costs of the pandemic. This analysis suggests a more substantial impact from policy measures in mitigating output losses, raising the potential contribution of policies by over 70 percent in advanced economies and more than doubling it in emerging economies.

Our analysis of the effectiveness of fiscal policy support suggests that fiscal multipliers are on average higher in countries where above-the-line measures account for a higher proportion of the fiscal package, total fiscal packages are smaller, inequality is higher and the shadow economy is larger, as well as in countries with an IMF-supported program in place during the pandemic. These factors help explain relatively large fiscal multipliers in emerging countries compared to advanced economies.

Overall, our analysis sheds light on the causes of growth differentials during the pandemic, and on the role and effectiveness of fiscal and monetary policies in mitigating output losses. With many countries yet to fully recover from pandemic-related economic scarring, continued risks of new COVID-19 variants that may cause a resurgence of the pandemic, and a volatile global growth outlook, we hope that the analysis presented in this paper may provide useful insights for macroeconomic forecasting and policy design.

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Appendix

Table A1. Data Sources and Construction

	Variable	Note	Source
Initial conditions	Trade openness	Defined as sum of imports and exports divided by GDP	IMF WEO
	Current account balance		IMF WEO
	Gini inequality index		WB WDI
	Size of shadow economy	As a share of official GDP in 2017	Medina & Schneider (2018)
	Median age		UN Population Division, World Population Prospects, 2017 Revision
	Hospital beds per 1000 people		OECD, Eurostat, WB WDI, National Authorities
	Share of smokers in population	Average of male and female smokers ratios	WB WDI
	Population density	People per sq. km of land	WB WDI
Policy	Fiscal support measures	Announced measures as percent of 2019 GDP. Time variation reflects different vintages of the survey	IMF COVID-19 Policy Survey
	Real interest rates	Ex-post real interest rates calculated as key policy rates less CPI inflation, in quarterly averages.	Haver Analytics, Eurostat, European Central Bank, National Authorities, IMF staff calculations
	Central bank assets	As percent of 2019 GDP	Haver Analytics, European Central Bank, National Authorities
Mobility	Stringency of containment measures	Quarterly average of higher frequency data	Blavatnik School of Government at the University of Oxford
	De facto mobility	Quarterly average of residuals from a weekly panel regression with google mobility (defined as average of mobility indicators for retail and recreation, and workplaces) as dependent variable and stringency of containment measures and country-quarter fixed effects as independent variables.	Google Mobility Reports, IMF staff calculations

Table A2. Results for the Sectoral Panel Regressions

VARIABLES	(1) 2020 Real GDP growth net of underlying growth & sectoral composition effects	(2) Agriculture	(3) Industry exc. Cons.	(4) Construction	(5) Wholesale & retail	(6) ICT	(7) Finance & insurance	(8) Real estate	(9) Prof., scientific & tech	(10) Pub. adm., educ. & social work	(11) Arts & other
Fiscal support measures	0.274***	0.126*	0.360***	0.214**	0.406***	0.105**	0.0653	0.0239	0.230***	0.126***	0.319**
	(0.0518)	(0.0696)	(0.104)	(0.0893)	(0.0690)	(0.0445)	(0.0657)	(0.0310)	(0.0707)	(0.0447)	(0.120)
Real interest rate	0.120	-0.343	0.351	0.389	-0.0764	0.343	-0.913	0.157	0.0157	0.0158	0.0888
	(0.213)	(0.463)	(0.422)	(0.378)	(0.387)	(0.392)	(0.794)	(0.243)	(0.351)	(0.262)	(1.145)
Change in central bank assets	-0.0294	0.0563	-0.157*	-0.0531	-0.0699	-0.00965	-0.0401	0.0629**	-0.0988	0.0360	0.0561
	(0.0273)	(0.0605)	(0.0788)	(0.0870)	(0.0641)	(0.0705)	(0.0602)	(0.0246)	(0.102)	(0.0257)	(0.216)
Stringency of containment	-0.178***	-0.0825***	-0.140***	-0.168***	-0.338***	-0.102***	-0.0448**	-0.0470***	-0.258***	-0.0720***	-0.485***
	(0.0133)	(0.0243)	(0.0305)	(0.0331)	(0.0255)	(0.0165)	(0.0219)	(0.0118)	(0.0261)	(0.0141)	(0.0670)
De facto mobility	0.144**	0.0660	0.163	0.225	0.148	0.0943	0.0481	0.0779**	0.0866	0.105	0.166*
	(0.0672)	(0.0869)	(0.121)	(0.160)	(0.119)	(0.0682)	(0.103)	(0.0355)	(0.0780)	(0.0668)	(0.0977)
Median age	-0.337***	-0.290	-0.732***	0.491	-0.723***	-0.261	-0.148	-0.0550	-0.325**	0.0467	-0.645
	(0.0905)	(0.240)	(0.213)	(0.374)	(0.213)	(0.219)	(0.328)	(0.143)	(0.144)	(0.102)	(0.467)
Hospital beds per 1000 people	0.200	-0.0789	-0.380	-0.406	1.245**	0.433	-0.0928	-0.0549	0.353	-0.202	-0.431
	(0.185)	(0.581)	(0.441)	(0.695)	(0.509)	(0.405)	(0.486)	(0.223)	(0.491)	(0.195)	(1.007)
Trade openness	-0.994*	-2.002	-0.563	0.346	-0.520	2.665***	-1.407	-1.488	-0.569	0.586	1.552
	(0.560)	(1.281)	(1.496)	(1.169)	(0.892)	(0.980)	(1.227)	(0.979)	(1.016)	(0.746)	(3.103)
Size of shadow economy	-0.0204	-0.0597	0.0139	0.280*	-0.130	0.0272	0.397**	-0.0436	-0.104	0.0211	0.0599
	(0.0573)	(0.120)	(0.112)	(0.150)	(0.136)	(0.120)	(0.176)	(0.0751)	(0.107)	(0.0797)	(0.226)
Share of smokers in population	-0.0478	0.265	0.0481	0.0520	-0.282	-0.226	-0.261*	-0.0711	0.111	0.194***	0.108
	(0.0620)	(0.184)	(0.147)	(0.238)	(0.170)	(0.152)	(0.140)	(0.0590)	(0.139)	(0.0519)	(0.345)
Gini inequality index	-0.0134	-0.122	-0.175	0.125	0.0139	0.561***	0.0536	-0.0243	0.127	0.0552	0.427
	(0.0939)	(0.270)	(0.229)	(0.260)	(0.251)	(0.183)	(0.196)	(0.128)	(0.153)	(0.0871)	(0.404)
Population density	-0.00441***	-0.00129	-0.00156	-0.000464	-0.0145***	-0.000937	-0.00131	-0.00288*	0.000982	-0.00192	0.0183**
	(0.00122)	(0.00313)	(0.00352)	(0.00250)	(0.00366)	(0.00202)	(0.00205)	(0.00164)	(0.00219)	(0.00127)	(0.00745)
Current account balance	0.155*	0.317*	0.395	0.0175	-0.111	0.129	0.515***	-0.00962	-0.140	0.0431	-0.759
	(0.0875)	(0.177)	(0.286)	(0.237)	(0.225)	(0.186)	(0.167)	(0.0965)	(0.177)	(0.0919)	(0.546)
Constant	-1.767***	-0.523	-0.892	2.925**	1.690	4.880***	-0.215	-0.843*	3.369***	-0.0230	5.277***
	(0.524)	(1.160)	(0.842)	(1.357)	(1.070)	(1.063)	(1.136)	(0.459)	(0.987)	(0.564)	(1.942)
Observations	164	164	164	164	164	164	164	164	164	164	164
R-squared	0.616	0.123	0.321	0.225	0.594	0.316	0.176	0.234	0.502	0.265	0.460

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column (1) is for demonstration only while columns (2)-(11) reflect sectoral regressions used in growth decomposition.

Table A3. Calibration of Monetary Policy Multipliers

Country	Impact of 1 p.p. cut in policy rate	Literature reference	Impact of increase in central bank assets by 1% of 2019 GDP	Literature reference
Albania	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Austria	0.42	Jarociński (2010)	0.11	Burriel & Galesi (2018)
Belarus	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Belgium	0.42	Jarociński (2010)	0.06	Burriel & Galesi (2018)
Bosnia and Herzegovina	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Bulgaria	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Croatia	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Cyprus	0.42	Jarociński (2010)	0.05	Burriel & Galesi (2018)
Czech Republic	0.42	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Denmark	0.42	Jarociński (2010), Mountford (2005)	0.08	Burriel & Galesi (2018)
Estonia	0.42	Jarociński (2010)	0.33	Burriel & Galesi (2018)
Finland	0.42	Jarociński (2010)	0.12	Burriel & Galesi (2018)
France	0.42	Jarociński (2010)	0.08	Burriel & Galesi (2018)
Germany	0.42	Jarociński (2010)	0.14	Burriel & Galesi (2018)
Greece	0.42	Jarociński (2010)	0.03	Burriel & Galesi (2018)
Hungary	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Iceland	0.42	Jarociński (2010), Mountford (2005)	0.06	Burriel & Galesi (2018)
Ireland	0.42	Jarociński (2010)	0.13	Burriel & Galesi (2018)
Israel	0.42	Jarociński (2010), Mountford (2005)	0.04	Gambacorta, Hofmann & Peersman (2014)
Italy	0.42	Jarociński (2010)	0.07	Burriel & Galesi (2018)
Kosovo	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Latvia	0.42	Jarociński (2010)	0.18	Burriel & Galesi (2018)
Lithuania	0.42	Jarociński (2010)	0.33	Burriel & Galesi (2018)
Luxembourg	0.42	Jarociński (2010)	0.15	Burriel & Galesi (2018)
North Macedonia	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Malta	0.42	Jarociński (2010)	0.03	Burriel & Galesi (2018)
Moldova	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Montenegro, Rep. of	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Netherlands	0.42	Jarociński (2010)	0.04	Burriel & Galesi (2018)
Norway	0.42	Jarociński (2010), Mountford (2005)	0.10	Gambacorta, Hofmann & Peersman (2014)
Poland	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Portugal	0.42	Jarociński (2010)	0.04	Burriel & Galesi (2018)
Romania	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Russia	0.14	Vymyatnina (2005)	0.24	Burriel & Galesi (2018)
Serbia	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
Slovak Republic	0.42	Jarociński (2010)	0.11	Burriel & Galesi (2018)
Slovenia	0.42	Jarociński (2010)	0.06	Burriel & Galesi (2018)
Spain	0.42	Jarociński (2010)	0.02	Burriel & Galesi (2018)
Sweden	0.42	Jarociński (2010), Mountford (2005)	0.10	Gambacorta, Hofmann & Peersman (2014)
Switzerland	0.42	Jarociński (2010), Mountford (2005)	0.01	Gambacorta, Hofmann & Peersman (2014)
Turkey	0.75	Büyükbaşaran, Can & Küçük (2019)	0.24	Burriel & Galesi (2018)
Ukraine	0.33	Jarociński (2010)	0.24	Burriel & Galesi (2018)
United Kingdom	0.43	Mountford (2005)	0.25	Weale & Wieladek (2016)

Note: The calibrated multipliers for an increase in central bank assets in Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Kosovo, North Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Turkey, Ukraine are extrapolated from the average of the multipliers estimated by Burriel & Galesi (2018) for Estonia, Latvia, Lithuania and the Slovak Republic.

Table A4. Regression Results on Fiscal Composition

VARIABLES	(1)	(2)	(3)	(4)
ATL			1.032***	2.413***
			(2.92e-08)	(5.92e-07)
Liquidity			0.182	0.899
			(0.570)	(0.160)
Other			0.218**	0.493***
			(0.0423)	(8.67e-05)
ATL, quadratic				-0.202***
				(0.00148)
Liquidity, quadratic				-0.212**
				(0.0273)
Other, quadratic				-0.0132***
				(0.00143)
Policy rate	0.0980	-0.280	-0.0630	-0.322
	(0.831)	(0.453)	(0.857)	(0.293)
CB Balance Sheet	-0.118	-0.0610	-0.0946	-0.0697
	(0.127)	(0.368)	(0.149)	(0.184)
Stringency Index	-0.165***	-0.104***	-0.123***	-0.0578*
	(3.57e-06)	(0.000693)	(0.000778)	(0.0854)
De facto mobility	0.151*	0.159**	0.181**	0.148**
	(0.0526)	(0.0207)	(0.0174)	(0.0431)
Fiscal measures	0.404***	0.948***		
	(6.49e-06)	(0)		
Fiscal measures, quadratic		-0.0211***		
		(3.81e-08)		
Constant	-3.035	-8.277***	-6.757***	-11.67***
	(0.160)	(8.08e-05)	(0.00586)	(7.02e-06)
Observations	123	123	123	123
R-squared	0.784	0.842	0.819	0.865
Country FE	YES	YES	YES	YES
Time FE	NO	NO	NO	NO

Robust pval in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A5. Regression Results on Fiscal Multipliers given by Inequality and Informality

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Fiscal measures	0.404***	0.404***	0.402***	0.428***	0.491***	0.352***	0.194	0.948***	0.985***	0.922***	0.767***	0.964***	0.897***	0.790***
	(6.49e-06)	(8.52e-06)	(3.19e-05)	(0.00323)	(4.86e-07)	(0.000247)	(0.144)	(0)	(0)	(0)	(1.80e-07)	(0)	(8.63e-11)	(4.10e-06)
Fiscal* Ineq (level)		0.0320							0.0901*					
		(0.567)							(0.0514)					
Policy rate	0.0980	0.0607	0.0968	0.108	0.121	0.0589	0.0253	-0.280	-0.412	-0.535	-0.474	-0.242	-0.305	-0.298
	(0.831)	(0.900)	(0.837)	(0.820)	(0.771)	(0.895)	(0.953)	(0.453)	(0.279)	(0.151)	(0.212)	(0.509)	(0.405)	(0.413)
CB Balance Sheet	-0.118	-0.119	-0.118	-0.117	-0.138	-0.130	-0.137	-0.0610	-0.0607	-0.0526	-0.0606	-0.0770	-0.0713	-0.0758
	(0.127)	(0.122)	(0.125)	(0.132)	(0.111)	(0.110)	(0.101)	(0.368)	(0.353)	(0.325)	(0.344)	(0.301)	(0.312)	(0.297)
Stringency Index	-0.165***	-0.165***	-0.165***	-0.164***	-0.151***	-0.162***	-0.160***	-0.104***	-0.100***	-0.0949***	-0.0982***	-0.1000***	-0.103***	-0.105***
	(3.57e-06)	(4.05e-06)	(4.28e-06)	(5.58e-06)	(9.59e-06)	(2.73e-06)	(2.59e-06)	(0.000693)	(0.000765)	(0.000656)	(0.000682)	(0.000793)	(0.000606)	(0.000645)
De facto mobility	0.151*	0.140*	0.150*	0.154*	0.142*	0.142*	0.142*	0.159**	0.129*	0.107	0.118*	0.154**	0.153**	0.153**
	(0.0526)	(0.0786)	(0.0758)	(0.0656)	(0.0670)	(0.0663)	(0.0681)	(0.0207)	(0.0680)	(0.119)	(0.0988)	(0.0275)	(0.0274)	(0.0278)
Fiscal * Ineq (quartile)			0.00311							0.325***				
			(0.981)							(0.00236)				
Fiscal * Ineq (dummy)				-0.00874							0.107**			
				(0.852)							(0.0147)			
Fiscal* Inf (level)					0.180*							0.107*		
					(0.0627)							(0.0772)		
Fiscal * Inf (quartile)						0.144							0.114	
						(0.294)							(0.104)	
Fiscal * Inf (dummy)							0.110*							0.0645
							(0.0926)							(0.109)
Fiscal, quadratic								-0.0211***	-0.0226***	-0.0283***	-0.0254***	-0.0197***	-0.0207***	-0.0197***
								(3.81e-08)	(4.95e-09)	(5.27e-09)	(1.81e-08)	(1.21e-06)	(1.70e-07)	(1.22e-06)
Constant	-3.035	-3.040	-3.028	-3.073	-3.952*	-3.253	-3.473*	-8.277***	-8.664***	-9.251***	-8.892***	-8.482***	-8.361***	-8.198***
	(0.160)	(0.163)	(0.158)	(0.160)	(0.0620)	(0.119)	(0.0920)	(8.08e-05)	(2.10e-05)	(2.99e-06)	(8.71e-06)	(3.78e-05)	(4.41e-05)	(0.000103)
Observations	123	123	123	123	123	123	123	123	123	123	123	123	123	123
R-squared	0.784	0.784	0.784	0.784	0.798	0.789	0.798	0.842	0.849	0.863	0.853	0.847	0.846	0.847
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Robust pval in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A6. Regression Results on Fiscal Multipliers and IMF-supported programs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Fiscal measures	0.404***	0.407***	0.947***	0.410***	0.418***	0.443***	0.486***	0.989***	0.927***	0.777***	0.973***
	(6.49e-06)	(5.80e-06)	(0)	(8.03e-06)	(8.94e-06)	(0.00163)	(5.79e-07)	(0)	(0)	(7.06e-08)	(0)
Fiscal measures, quadr			-0.0209***					-0.0225***	-0.0277***	-0.0251***	-0.0202***
			(2.18e-08)					(2.31e-09)	(1.71e-09)	(6.32e-09)	(3.33e-07)
Fiscal * IMF		1.624**	1.584**	1.891**	1.174***	-0.337	2.457	1.876***	1.032	-0.178	2.817*
		(0.0272)	(0.0201)	(0.0173)	(0.00392)	(0.719)	(0.175)	(0.00421)	(0.113)	(0.860)	(0.0730)
Policy Rate	0.0980	0.239	-0.140	0.0908	0.169	0.121	0.0793	-0.391	-0.462	-0.444	-0.321
	(0.831)	(0.560)	(0.706)	(0.853)	(0.718)	(0.799)	(0.875)	(0.358)	(0.261)	(0.280)	(0.482)
CB Balance Sheet	-0.118	-0.100	-0.0445	-0.0988	-0.0981	-0.0956	-0.117	-0.0406	-0.0359	-0.0407	-0.0514
	(0.127)	(0.233)	(0.552)	(0.251)	(0.255)	(0.271)	(0.222)	(0.585)	(0.558)	(0.575)	(0.535)
Stringency Index	-0.165***	-0.135***	-0.0755***	-0.140***	-0.137***	-0.141***	-0.133***	-0.0759***	-0.0713***	-0.0758***	-0.0791***
	(3.57e-06)	(3.79e-06)	(0.00182)	(8.57e-06)	(5.75e-06)	(8.18e-06)	(1.49e-05)	(0.00322)	(0.00237)	(0.00239)	(0.00255)
De facto mobility	0.151*	0.161**	0.169***	0.152**	0.164**	0.170**	0.153**	0.141**	0.121**	0.133**	0.165***
	(0.0526)	(0.0292)	(0.00870)	(0.0372)	(0.0372)	(0.0263)	(0.0361)	(0.0246)	(0.0467)	(0.0327)	(0.00972)
Fiscal * IMF * Inequality				0.710				0.759			
				(0.255)				(0.200)			
Fiscal * Inequality (level)				0.0311				0.0888**			
				(0.566)				(0.0411)			
Fiscal*IMF*Ineq (quartile)					0.745				0.715		
					(0.552)				(0.538)		
Fiscal * Ineq (quartile)					-0.0139				0.303***		
					(0.915)				(0.00151)		
Fiscal*IMF*Ineq (dummy)						0.975**				0.878**	
						(0.0147)				(0.0307)	
Fiscal * Ineq (dummy)						-0.0125				0.102**	
						(0.783)				(0.0101)	
Fiscal * IMF * Informality							-0.724				-0.894
							(0.381)				(0.215)
Fiscal * Informality							0.153				0.0776
							(0.128)				(0.178)
Constant	-3.035	-5.095**	-10.25***	-4.902**	-5.017**	-4.782**	-5.380***	-10.45***	-10.92***	-10.52***	-10.12***
	(0.160)	(0.0119)	(1.64e-07)	(0.0193)	(0.0109)	(0.0220)	(0.00796)	(1.11e-07)	(5.92e-09)	(5.28e-08)	(4.98e-07)
Observations	123	123	123	123	123	123	123	123	123	123	123
R-squared	0.784	0.800	0.858	0.803	0.800	0.805	0.811	0.867	0.876	0.872	0.862
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Robust pval in parentheses
*** p<0.01, ** p<0.05, * p<0.1

PUBLICATIONS

Output Losses in Europe during COVID-19: What Role for Policies?

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