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EXPLAINING THE CROSS-COUNTRY DIFFERENCES IN THE ECONOMIC FALLOUT DURING THE COVID-19 PANDEMIC CRISIS

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ABSTRACT

This paper investigates the main drivers of the differences in the economic fallout in advanced economies during the COVID-19 crisis. In addition to containment measures, the analysis places emphasis on pre-crisis factors that may have bolstered economic resilience during the health crisis and mitigated the output loss. Also, it assesses the role of discretionary fiscal policy in 2020 in explaining the cross-country variation in the economic fallout by explicitly controlling for the simultaneity of the policy measures and the size of the GDP shock. We find that factors such as social distancing measures and the structure of the economy, which are directly related to the COVID-19 crisis, explain a large part of the asymmetry in output loss in 2020 across countries. Pre-crisis structural and institutional factors also seem to contribute to economic resilience during the current crisis, while stronger discretionary fiscal support in 2020 is associated with lower output loss.

Keywords: economic resilience; COVID-19 pandemic; cross-sectional analysis

JEL classification: C21; F43; H50

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ΕΡΜΗΝΕΥΟΝΤΑΣ ΤΙΣ ΔΙΑΦΟΡΕΣ ΜΕΤΑΞΥ ΤΩΝ ΧΩΡΩΝ ΩΣ ΠΡΟΣ ΤΙΣ ΟΙΚΟΝΟΜΙΚΕΣ ΕΠΙΠΤΩΣΕΙΣ ΑΠΟ ΤΗΝ ΚΡΙΣΗ ΤΗΣ ΠΑΝΔΗΜΙΑΣ COVID-19

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ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τους βασικούς προσδιοριστικούς παράγοντες των διαφορών στην οικονομική επίπτωση κατά την κρίση της πανδημίας COVID-19 μεταξύ των προηγμένων οικονομιών. Η ανάλυση επικεντρώνεται στην επίδραση των μέτρων κοινωνικής αποστασιοποίησης, καθώς επίσης και παραγόντων που προϋπήρχαν της κρίσης και οι οποίοι ενδεχομένως ενίσχυσαν την οικονομική ανθεκτικότητα απέναντι στην πανδημική κρίση περιορίζοντας την πτώση του παραγόμενου προϊόντος. Επιπλέον, η μελέτη εξετάζει το ρόλο των δημοσιονομικών μέτρων στήριξης που ελήφθησαν το 2020 στην εξήγηση των διακυμάνσεων της οικονομικής επίπτωσης μεταξύ των χωρών, λαμβάνοντας υπόψη το συγχρονισμό των μέτρων και του μεγέθους της πτώσης του ΑΕΠ. Διαπιστώνουμε ότι παράγοντες όπως η κοινωνική αποστασιοποίηση και η διάρθρωση της οικονομίας, που συνδέονται άμεσα με την κρίση της πανδημίας COVID-19, εξηγούν μεγάλο μέρος της ασυμμετρίας μεταξύ των χωρών στην απώλεια προϊόντος το 2020. Επιπλέον, στην οικονομική ανθεκτικότητα φαίνεται να συμβάλλουν διαρθρωτικοί και θεσμικοί παράγοντες που προϋπήρχαν της κρίσης, ενώ μεγαλύτερη δημοσιονομική στήριξη το 2020 συνδέεται με χαμηλότερη απώλεια προϊόντος.

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I INTRODUCTION

The COVID-19 pandemic crisis has had a severe negative impact on the global economy. Pandemics typically produce economic losses both directly, due to mortalities, and indirectly, due to disruptions in activity (Anyfantaki et al. 2020). Indeed, the COVID-19 crisis has led to a fall of 4.7% in GDP in advanced economies as a whole in 2020, compared with an increase of 1.6% in 2019.

Moreover, the economic fallout from the pandemic appears to be unevenly distributed across countries, with some economies registering considerably higher losses. This cross-country variation can be partly attributed to differences in containment measures across countries, as there is a negative relation between containment measures and economic resilience (see Chart 1). However, other factors are also at play, since countries with similar degrees of stringency in containment measures, such as Greece and Germany, have experienced a varying economic fallout. Consequently, countries have displayed different levels of economic resilience to the pandemic crisis, which could be associated with asymmetries in pre-existing macroeconomic, institutional and structural factors as well as in the policy measures to support economic activity during the crisis.

The aim of this paper is to investigate the main drivers of the differences in the economic fallout across advanced economies during the COVID-19 pandemic crisis. The empirical setup explores the effect of factors directly linked to the current health crisis as well as the effect of individual economies' pre-crisis features that may have bolstered economic resilience and mitigated the output loss during the COVID-19 outbreak. In addition, we assess the role of the discretionary fiscal policy response in 2020 in explaining the cross-country variation in the economic fallout by explicitly controlling for the simultaneity of the policy measures and the size of the GDP shock. To the best of our knowledge, this is the first study to explicitly consider the role of structural and institutional factors as well as discretionary fiscal policy measures in explaining differences in the economic consequences of the COVID-19 crisis.

The paper draws on the literature on economic resilience, which examines variations in economic performance across national and regional economies following a common shock. The concept of economic resilience is broad and is often explained in terms of three components: the exposure or vulnerability to a shock; the capacity to absorb a shock; and, finally, the ability to recover and return quickly to pre-crisis or medium-term rates of growth. Economic resilience was used widely after the global financial crisis to explain cross-country variations (particularly among EU countries) in both the economic losses triggered by the global fallout in financial markets and the speed of the subsequent recovery. It was also used in order to analyse the degree of preparedness of countries in case a similar crisis occurred in the future and placed increased emphasis on the reduction of financial sector vulnerabilities.

Empirical findings support the role of macroeconomic imbalances as well as the role of various structural and institutional factors

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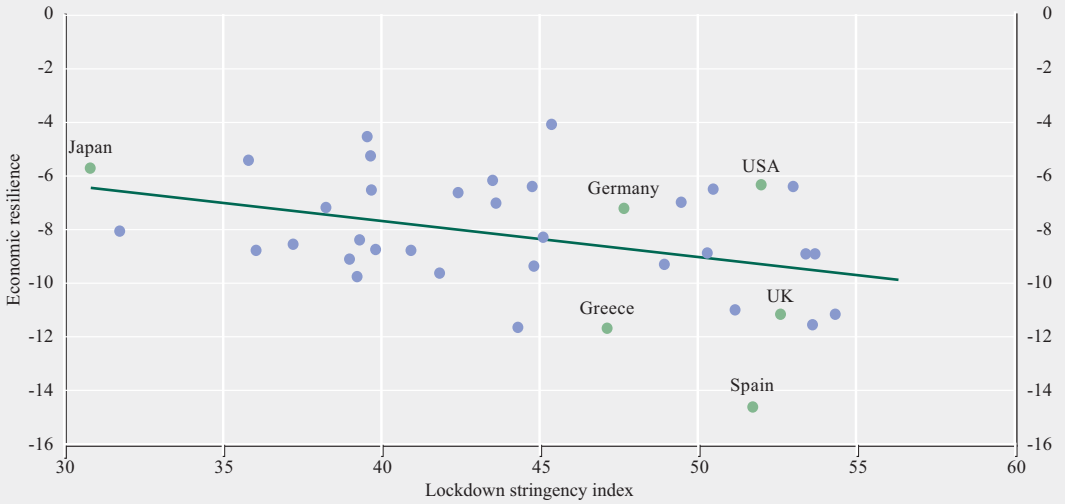
Chart 1 Economic resilience[1] and lockdown stringency index[2]



Sources: IMF and Oxford COVID-19 Government Response Tracker (OxCGRT) Database , authors' own calculations.
Note: Each dot in the chart represents one of the 39 countries in the sample (see Section 3.1).
1 The difference in the GDP growth forecast for 2020 between IMF *World Economic Outlook* October 2020 and October 2019 (in percentage points). More negative values signify lower resilience.
2 OxCGRT Stringency Index, 0 to 100 (from lowest to highest stringency).

in forging economic resilience. Public debt sustainability, a current account surplus and a positive net international investment position seem to shield economies against an abrupt unwinding of excessive negative imbalances, which can exacerbate external shocks. Moreover, they increase the fiscal and monetary policy space for mitigating the effects of the shock (Alessi et al. 2018; Hermansen and Röhn 2015). Additionally, the role of labour and product market institutions is ambiguous and depends on the definition of resilience. A higher degree of regulation is likely to contain output losses in the short term (higher resilience) but impede the reallocation of resources in the recovery (lower resilience) (Groot et al. 2011; Gianmoena and Rios 2018; Hundt and Holtermann 2020). On the other hand, evidence from advanced economies suggests that properly calibrated reforms that include lower regulation in labour and product markets can increase overall resilience by aiding the reallocation of workers and capital to the more productive jobs and firms, while protecting employment in the short term (Bluedorn et al. 2019). Also, a favourable business environment as well as strong and efficient institutions (judicial, political and financial) have been shown to play an important role in raising countries' economic resilience (Sondermann 2016; Jolles et al. 2018; Alessi et al. 2018; Bluedorn et al. 2019). These factors increase the ability of the economy to make adjustments that cushion the impact of a shock or facilitate the necessary reallocation of resources for a rapid recovery.

In light of the COVID-19 crisis still unfolding, only a handful of papers have so far assessed the factors that may explain the cross-country variation of its economic effects. A number of these studies examine resilience from a regional perspective. Gong et al. (2020) and Hennebry (2020) look at the resilience of Chinese and Irish regions, respectively, to the COVID-19 crisis. Using the regional GDP growth rate for the first quarter of 2020 as an indicator of economic resilience and its correlation with pre-existing factors, Gong et al. (2020) find that the characteristics of the pan-

demic crisis, institutional experience in tackling past epidemic crises, government measures to support the economy and the economic structure of regions, including reliance on contact-sensitive industries and foreign trade, affect the resilience of Chinese regions. Hennebry (2020) employs a similar method using unemployment data and finds that resilience to the financial crisis is not correlated with resilience to the current COVID-19 crisis, highlighting the importance of the crisis characteristics for economic outcomes.

Other studies construct composite indices to analyse the variability in output loss among countries. In Diop et al. (2020), countries are ranked on the basis of vulnerability and resilience indices, which are constructed using a principal component analysis. The vulnerability index is based on indicators on the structure of the economies (such as international tourism receipts, oil and natural resources rents and personal remittances). The resilience index is constructed using a combination of institutional factors (including regulatory quality and government effectiveness) and other factors that can facilitate the absorption of shocks, such as fiscal space, external debt position and unemployment. On the basis of this analysis, advanced economies rank overall lower in vulnerability and higher in resilience compared with emerging market economies, with notable variation also within country groups.

Similar conclusions on the resilience of groups of countries are drawn in Noy et al. (2020). The authors measure the hazard, exposure, vulnerability and resilience of economies in order to compute a disaster risk index for each country. Tourism and ageing population are associated with higher vulnerability, while lower government debt as a percentage of GDP and a higher share of government expenditure in GDP are related to more resilience. In a study for Latin American countries, Montenegro et al. (2020) use principal component analysis to identify differences in pre-existing patterns of resilience of Latin American countries across four components: socioeconomic infrastructure; macroeconomic conjuncture; financial and banking structure; and productive and environmental capacity. Countries with greater resilience exhibit advanced macroeconomic and financial development, while social, institutional and cultural tensions, and low productive capacity in high technology sectors are associated with lower resilience. In a somewhat different study, Pierri and Timmer (2020) examine the effects from the decline in mobility and from information technology (IT) adoption across US states during the COVID-19 crisis using a linear probability model. They find that IT adoption mitigates the economic fallout from reduced mobility during the pandemic, which they measure in terms of unemployment increases rather than output losses.

Similar to our study, Sapir (2020) uses the revision of the GDP forecast for 2020 to measure resilience and assesses the drivers of the GDP shock during the COVID-19 pandemic in EU countries by estimating a simple OLS cross-sectional regression. The analysis finds that the stringency of social distancing measures, the share of tourism in GDP and the quality of governance in each country can explain the differences in economic losses across EU countries. By contrast, public indebtedness does not play a role in economic resilience.

The present paper contributes to the literature on economic resilience to the COVID-19 shock by formally examining the disparities in economic outcomes across advanced economies based on macroeconomic and institutional variables identified in the literature on economic resilience to macroeconomic shocks. It draws on the analysis by Sapir (2020) and extends it by looking at pre-existing structural and institutional factors beyond tourism and governance. Our paper also extends the analysis to a large dataset for 39 advanced economies and provides robustness checks on model uncertainty in cross-sectional regressions using Bayesian model averaging techniques.

We find that factors which are directly associated with the COVID-19 crisis explain a large

part of the cross-country variation in the output loss in 2020. In particular, the contribution of contact-sensitive sectors, such as tourism, to the economy, lockdown measures and participation in global value chains (GVCs) seem to be robust to alternative model specifications as well as to Bayesian model averaging techniques. The pre-crisis fiscal space seems to matter in shaping the resilience of EU countries. Moreover, a better quality of governance and more stringent regulation in product and labour markets are related to increased economic resilience during the current crisis. Finally, stronger discretionary fiscal support in 2020 is also associated with lower output loss.

The rest of the paper is structured as follows: Section 2 outlines the baseline empirical specification and Section 3 presents the main results. Section 4 performs a battery of robustness checks and Section 5 assesses the role of discretionary fiscal policy in 2020 in explaining cross-country differences in the size of the GDP shock. Section 6 concludes.

2 EMPIRICAL SPECIFICATION

2.1 BASELINE MODEL

We examine the factors that explain the differences in the depth of the COVID-19 crisis across advanced economies by employing a simple cross-country regression of the form:

$$GDPr_i = \alpha_0 + X_i\alpha_1 + \varepsilon_i, \qquad \varepsilon \sim N(0, \sigma^2 I) \qquad (1)$$

The dependent variable, $GDPr_i$, is the difference in the GDP growth forecast for 2020 between the IMF *World Economic Outlook* (WEO) October 2020 and the IMF WEO October 2019, in line with the definition used in Sapir (2020).[1] The greater the downward revision of economic growth for 2020 in an economy, the higher the economic fallout from the COVID-19 pandemic and, therefore, the lower the economic resilience to the current crisis. The merit of this definition is that it accounts both for the unprecedented decline in real GDP in 2020 as a result of the pandemic and for the expected path of the economy in 2020 prior to the crisis. In other words, the dependent variable also captures differences in the business cycle across economies before the pandemic.

Matrix, X_i, includes a set of independent variables that are related to the characteristics of the COVID-19 crisis, as well as factors that are key, according to the relevant literature, to explaining the resilience of an economy in the face of a large economic shock. Specifically, during the COVID-19 pandemic, social distancing measures introduced by governments to contain the spread of the virus have taken a heavy toll on economies, notably during the first half of 2020. Also, the contribution to GDP of sectors exposed to social distancing controls and travel restrictions can determine to a large extent the exposure and vulnerability of an economy to the current crisis. As a result, equation (1) includes as independent variables an index for lockdown measures, namely the Oxford COVID-19 Government Response Stringency Index, the direct contribution of tourism to GDP in 2019, and participation in GVCs as a proxy of trade openness (see Table 1 for data definitions). We expect that more open economies would face a sharper output loss during the COVID-19 outbreak due to disruptions in global value chains and international trade.

Moreover, differences in economic resilience across countries may depend on pre-crisis macroeconomic imbalances, as well as on structural and institutional factors that are closely related to preparedness and the pursuit of effective economic policies during a crisis. To this end, the general government structural budget balance in 2019 (as a percentage of potential GDP) is included in the analysis

1 The cut-off date of the analysis is early March 2021. Due to lack of realised values for real GDP growth in 2020 for all countries in the sample, we employ its estimate drawn from the IMF WEO October 2020 database. However, Section 4 presents a set of robustness checks by employing alternative definitions of the dependent variable, including the available realised GDP figures for 2020.

Table 1 Source and methodology for the main variables

Variable	Source	Year	Methodology
GDP growth revision	IMF WEO Database	2020	Difference in the GDP growth forecast for 2020 between the IMF World Economic Outlook (WEO) October 2020 and the IMF WEO October 2019
Lockdown measures	Oxford COVID-19 Government Response Tracker (OxCGRT) Database	2020	Stringency Index: composite index which is a simple additive score of several indicators of government response around the world (such as school and business closures and travel restrictions) rescaled to vary from 0 (lowest stringency) to 100 (highest stringency). Data up until 28 September 2020 (in line with the cut-off date of the IMF WEO October 2020)
Tourism	World Travel and Tourism Office	2019	Direct contribution of tourism to GDP
Participation in global value chains (GVCs)	UNCTAD	2019	Foreign value added as a percentage of exports of goods (Koopman et al. 2011)
Structural budget balance	IMF WEO Database	2019	Structural primary budget balance (as a percentage of potential output)
Governance	World Bank Governance Indicators	2018	Governance is the sum of six indicators: control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law, voice and accountability
Financial development	IMF Financial Development Database	2019	Index summarising the depth, access and efficiency of financial institutions and financial markets
Regulation in labour and product markets	OECD	2019 (or latest available)	Synthetic indicator constructed on the basis of the following OECD indicators: EPL (for 2019), PMR (for 2018), trade union density (for 2018), collective bargaining coverage (average 2010-2017)

Note: Due to large differences across countries in the latest available year for the OECD indicator on collective bargaining coverage, the average value after the global financial crisis is computed as in Duval et al. (2007).

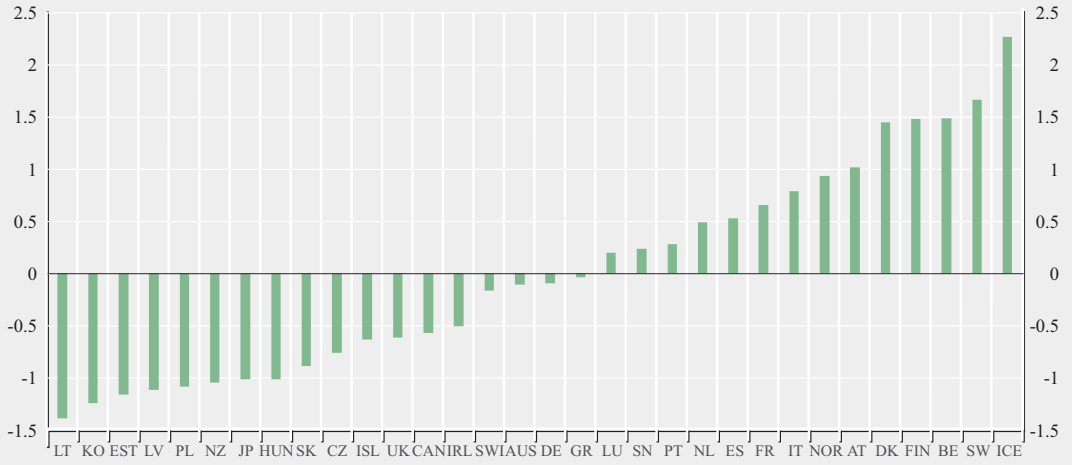
as a measure of the available fiscal space prior to the crisis. We expect that a higher fiscal space would be associated with a lower economic fallout during the COVID-19 crisis.[2] Furthermore, the quality of governance and the degree of financial development could impact the ability of an economy to weather the negative effects of the economic shock. Strong institutions and a better quality of governance are generally associated with better economic outcomes, as the ability of the policy framework to cushion the impact of the crisis in the short term is key to economic resilience (see among others Acemoglu and Robinson 2012; Caldera-Sánchez and Röhn 2016). Besides, a higher degree of financial development, namely deep, accessible and effective financial markets and institutions, implies a more efficient allocation of financial capital, improved liquidity and a better functioning of capital markets, which can contribute to lower output losses during adverse tail risk events (Caldera-Sánchez and Gori 2016; Caldera-Sánchez et al. 2016).

Finally, according to the relevant literature, structural factors, such as regulation in labour and product markets, seem to play an important role in dampening the initial impact of an economic shock. Empirical studies corroborate that a more stringent regulation in labour and product markets is not only associated with a milder recession in the short term, but also with increased persistence of the negative shock and a slower economic recovery due to an inefficient allocation of resources (Duval et al. 2007; Gianmoena and Rios 2018; Bluedorn

2 The pre-crisis structural budget balance is widely used in academic and policy analyses as a measure of the available fiscal space. However, for EU countries, fiscal space is usually defined as the difference between the general government structural balance and the medium-term objective (MTO). In terms of magnitude, the difference between the two definitions is small for EU countries.

Chart 2 Synthetic indicator of regulation in labour and product markets in 2019

(number of standard deviations from the 2019 OECD average)



Source: OECD, authors' own calculations.
Note: The OECD average is the simple arithmetic average of the individual country scores.

et al. 2019).[3] In the present analysis, the role of regulation in labour and product markets in explaining the cross-country variation in the GDP shock is examined using a synthetic indicator based on relevant OECD structural reform indices.

2.2 A SYNTHETIC INDICATOR OF LABOUR AND PRODUCT MARKET REGULATION

We construct a synthetic indicator to examine the effects of labour and product market regulation on economic resilience during the COVID-19 crisis. The indicator can be viewed as a simple summary measure of the stringency of regulation in labour and product markets. Hence, it only partly reflects the implementation of past structural reforms, which are captured by the level of the indicator and can affect the resilience of economies in the event of crises.[4] In our empirical set-up, the use of individual indicators of regulation in product and labour markets is subject to several caveats. These include lower degrees of freedom in the estimation due to sample size restrictions. The use of a synthetic indicator is also justified by the fact that countries tend to follow broadly similar attitudes across policy areas, leading to a high correlation of reforms in labour and product markets. Often, such correlation is also evident between broader institutional frameworks (e.g. quality of governance) and structural reforms in product and labour markets, giving rise to multicollinearity issues in empirical analyses.

Following Duval et al. (2007) and Nicoletti and Scarpetta (2005), the synthetic indicator is derived from a principal component analysis. In particular, the index is the first principal component of the following OECD policy indicators for 2019 (or the latest available year): (a) trade union density; (b) the strin-

3 In line with a standard New Keynesian model, wage and price stickiness is associated with a more flat Phillips curve and, thus, with a higher trade-off between output and inflation. Under optimal monetary policy and price stability, the central bank will react less to shocks, as a more aggressive reaction would lead to greater output loss with limited benefits to price stability. In effect, policies that increase wage and price stickiness (e.g. higher product market regulation, more employment protection regulation, etc.) are expected to lead to a smaller (though more persistent) output fall after a shock.

4 It should be noted, however, that the synthetic indicator does not allow inference on the effects of changes in regulation over time, since it is constructed using the level of the OECD structural reform indicators for the latest available year. In countries that have stepped up reform efforts in recent years, a higher pace of reforms can result in lower business cycle volatility and potentially stronger recovery after the current crisis, which, notwithstanding, is not examined in the present analysis.

Table 2 Data summary

	Obs	Mean	Std. Dev.	Min	Max
GDPr	39	-8.3	2.3	-14.7	-4.1
Lockdown measures	39	44.6	6.4	30.8	54.3
Tourism	39	9.8	4.9	4.2	25
Participation in GVCs	39	78.6	29.1	29.9	161.7
Structural budget balance in 2019	39	-1.3	2.4	-8.1	3.5
Governance	39	6.9	2.8	1.4	10.7
Financial development	39	0.6	0.2	0.2	0.9
Regulation in product & labour markets	32	54.7	30.9	11.9	124.4

gency of employment protection legislation for regular workers (EPL); (c) the stringency of product market regulation (PMR); and (d) the collective bargaining coverage, namely the share of workers covered by a collective agreement.[5] The weight of each policy indicator in the synthetic index is obtained from the scoring coefficients of the first principal component.

As an illustration of the cross-country values of the synthetic indicator, Chart 2 shows the number of standard deviations around the 2019 OECD average for a set of advanced economies. A negative (positive) deviation from the OECD average indicates a lower (higher) value of the synthetic indicator and, therefore, higher (lower) flexibility in product and labour markets relative to the OECD average. Countries such as Korea, Lithuania, Estonia and New Zealand note less stringent regulation in labour and product markets compared with the OECD average, while in Iceland, Sweden and Belgium more stringent regulations apply.[6] High reform efforts during recent years in euro area countries under an economic adjustment programme, such as Greece and Portugal, are reflected in a value of the synthetic index near the OECD mean.

Table 1 presents the source and methodology for each of the main variables used in the analysis and Table 2 summarises their statistical properties.

3 EMPIRICAL RESULTS

3.1 BASELINE ESTIMATES

We employ a cross-sectional dataset for 39 advanced economies, which comprises all EU countries (excluding Malta) and economies classified as advanced according to the IMF "Economy Groupings" of the IMF *Fiscal Monitor* October 2020. These economies are the United States, the United Kingdom, Switzerland, Japan, Korea, Iceland, Israel, New Zealand, Norway, Singapore, Hong Kong, Australia, and Canada.

Table 3 presents the baseline results on the factors that explain the disparity in countries' resilience to the current crisis. Variables associated with the distinct characteristics of the crisis, such as the stringency of social distancing measures and the economy's reliance on tourism, are statistically significant under all

5 For more information on the timing of the OECD indicators, see Table 1. These indicators are infrequently revised due to data validations and methodological changes. Therefore, the latest data can often overestimate the stringency of regulation in labour and product markets, notably in countries that have recently increased their reform efforts. However, this should not affect the estimations, since the pace of reforms in most countries is commonly slow and potential data revisions should only marginally affect aggregate indicators.

6 The relative ordering of the countries in Chart 2 depends on the weight (i.e. the scoring coefficients) of the individual OECD structural reforms indicators in the synthetic index. For instance, a lower weight applies to regulation in product markets compared with regulation in the labour market. Hence, countries, such as Sweden, with less regulated product markets do not score high when flexibility in labour markets is also taken on board.

Table 3 Factors explaining the economic fallout during the COVID-19 crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lockdown measures	-0.11** (0.04)	-0.12*** (0.03)	-0.12*** (0.03)	-0.12*** (0.03)	-0.19*** (0.04)	-0.17*** (0.04)	-0.16*** (0.04)
Tourism	-0.27*** (0.05)	-0.27*** (0.05)	-0.27*** (0.05)	-0.29*** (0.05)	-0.27*** (0.05)	-0.39*** (0.07)	-0.43*** (0.07)
Participation in GVCs		-0.034*** (0.008)	-0.034*** (0.008)	-0.029*** (0.008)	-0.028*** (0.009)	-0.042*** (0.013)	-0.038*** (0.012)
Structural budget balance in 2019			0.02 (0.09)	-0.10 (0.11)			-0.17 (0.14)
Structural budget balance* EU dummy				0.41* (0.21)			0.74*** (0.23)
Structural and institutional factors							
Governance	0.22** (0.09)	0.34*** (0.09)	0.34*** (0.09)	0.25** (0.09)			
Financial development					3.31** (1.41)		
Regulation in product & labour markets						0.032** (0.012)	0.031*** (0.011)
Constant term	-2.64 (2.22)	0.10 (2.00)	0.10 (2.03)	0.77 (1.97)	2.94 (2.13)	4.74* (2.33)	4.32** (2.05)
Adjusted R^2	0.458	0.615	0.604	0.635	0.522	0.554	0.663
No. of countries	39	39	39	39	39	32	32

Source: Authors' own estimations.
Notes: The dependent variable is the difference in the GDP growth forecast for 2020 between IMF WEO October 2020 and October 2019. All independent variables refer to 2019 or latest available year, except lockdown measures which refer to 2020 (see Table 1). Standard errors are reported in brackets. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively.

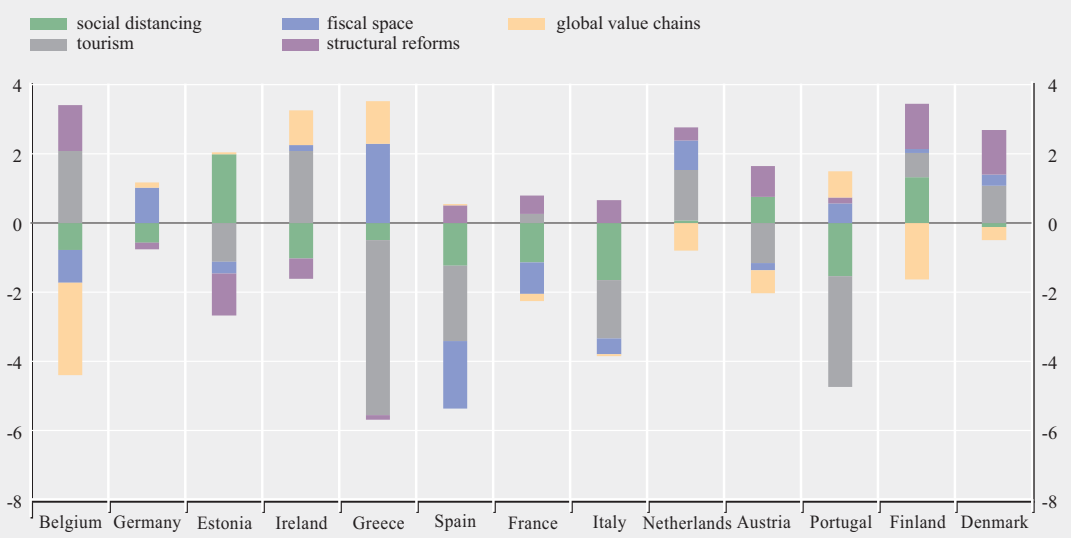
model specifications. In particular, a 1 percentage point (pp) increase in the direct contribution of tourism to GDP is associated with about 0.3 pp downward revision in GDP growth for 2020. Moreover, social distancing measures and tourism taken together explain around 45% of the GDP growth revision for 2020. In addition, higher integration into GVCs leads to a higher downward GDP revision (Column (2)), reflecting the supply disruptions that took place mainly during the first half of 2020 as well as the restrictions on supply chains and international trade. The inclusion of participation in GVCs in the estimations substantially increases the model's explanatory power.

Column (3) in Table 3 adds the structural general government budget balance for 2019, which is not statistically significant, suggesting that the pre-crisis fiscal space does not matter for the disparities in economic outcomes across advanced economies. However, this finding may reflect the extensive quantitative easing measures taken by central banks, which reduced restrictions on fiscal policy in large economies. Moreover, fiscal space may be more important in EU-27 countries, given the common fiscal rules and the budgetary assessment process inherent in the European Semester. The positive and statistically significant coefficient of the interaction term of the structural budget balance with a dummy capturing a country's membership in the EU (see Table 3, Column (4)) reveals that pre-pandemic fiscal space in EU countries is associated with a smaller recession in 2020.[7]

Moreover, the empirical results highlight the importance of institutional factors for absorbing the COVID-19 shock. Countries with bet-

7 Based on an F statistic, the hypothesis that the coefficients of the budget balance and the interaction term are equal cannot be accepted at the 10% significance level.

Chart 3 Model-based GDP decomposition relative to the shock observed in the EU-26 on average



Source: Authors' own calculations.
Notes: The chart shows the contribution of factors (in percentage points) based on the estimates in Table 3, Column (7). For all factors, except social distancing measures, 2019 values are used. A positive (negative) value indicates the contribution of the factor in containing (deepening) the downward GDP growth revision for 2020 relative to the EU average.

ter quality in governance and higher financial development show greater economic resilience, or otherwise, lower GDP growth revisions for 2020 (see Table 3, Columns (2) and (5), respectively). At the same time, Columns (6) and (7) suggest that less flexible product and labour markets are related to higher resilience in the short term, by promoting job retention and supporting incomes during the crisis. However, previous empirical studies show that structural reforms in product and labour markets contribute to a speedier recovery in the economy following an economic shock.[8]

For illustrative purposes, we perform a model-based decomposition of the GDP shock during the COVID-19 crisis based on the estimates presented in Table 3 (Column (7)). Chart 3 shows the decomposition relative to the shock observed in the EU on average (EU-26).[9] A positive value indicates that the factor in question contributed to the containment of the downward revision of GDP growth for 2020 relative to the EU average. Similarly, a negative value denotes that the factor contributed to a further deepening of the shock relative to the EU average.

The chart shows that the stringency of social distancing measures had a relatively greater recessionary effect on certain economies, such as Italy, Spain and France. By contrast, more relaxed social distancing measures in other countries, such as Estonia and Finland, relative to the EU as a whole, have contained to a certain extent the downward GDP growth revision. Tourism had a relatively larger contribution to the decline in economic activity in Southern European countries (Greece, Spain, Italy and Portugal). Also, the short-term effect of GVC integration has been negative for the more open economies, like Belgium, the Netherlands and Finland, as a result of the distinct characteristics of the current crisis and

8 When both the depth of the recession and the speed of the recovery after a crisis are taken into account, lower flexibility in product and labour markets is linked to a stronger economic impact (Bluedorn et al. 2019).
9 The EU average is computed as the simple average of the respective indicators over the 26 Member States included in the sample.

the disruptions in international trade. Moreover, higher pre-crisis structural budget surpluses appear to have contained the recession in 2020 in Greece, Germany and the Netherlands. Finally, increased product and labour market flexibility, relative to the EU average, in countries like Estonia, Ireland and, to a lesser extent, Germany appears to be linked to a higher contraction of GDP in the short term.

4 ROBUSTNESS CHECKS

This section provides a set of robustness checks of the baseline empirical findings. In particular, we account for model selection uncertainty in the cross-sectional regressions by employing a Bayesian model averaging technique. We also perform estimations for alternative definitions of the dependent variable on the size of the GDP shock, as well as of social distancing measures and tourism.

4.1 MODEL SELECTION: A BAYESIAN MODEL AVERAGING MODEL

The relatively small cross-sectional sample underpinning the present analysis (39 observations) could lead to biased estimates. Moreover, testing the significance of individual regressors increases the risk of omitted variable bias. Given the model uncertainty over the best approximation to the "true model" and the restrictions on the size of the dataset, we perform a robustness check of the baseline findings by employing a Bayesian Model Averaging (BMA) empirical framework. BMA is a model averaging technique which allows fitting multivariate linear regression models with uncertainty about the choice of the explanatory variables.

In principle, BMA assigns a prior probability to each model, takes into account the dataset to update these priors and computes a weighted average of the conditional estimates across all models since each model provides some information over the regression parameters. Assuming the model form as described by equation (1), the model weights stem from the posterior model probabilities (PMP) which are determined by:

$$p(M_i|GDPr,X) \propto p(GDPr|M_i,X)p(M_i)$$

where the first term of the product denotes the marginal likelihood function of the model, which is the probability of the data given model M_i, and the second term is the prior probability of model M_i. In turn, the marginal likelihood function is calculated by:

$$p(GDPr|M_i,X) = \int_{\alpha} p(GDPr|a_i,X,M_i)p(a_i|M_i,X)da_i$$

In effect, the posterior distribution of any coefficient, α_i, is given by:

$$p(a|GDPr,X) = \sum_{a=1}^{2^k} p(a|M_i,GDPr,X)p(M_i|X,GDPr)$$

where the sum denotes the posterior density of α_i weighted by the PMP of each model M_i. The posterior inclusion probability (PIP) of a variable is then the sum of the posterior model probabilities of all models that include the particular variable.[10] Based on this context, BMA provides a coherent inference approach on the regression parameters of interest by taking explicitly into account the uncertainty due to both the estimation and the model selection.

In the present analysis, for each model M_i, we assume a normal error structure. As regards the priors of the model parameters, we assume full prior uncertainty over the constant term and the error variance.[11] For the remaining parameters, α_i, we assume a conservative mean value of zero, which reflects the fact that less is known with certainty about the coefficients, while their variance is defined based on the Zellner's g prior (i.e. the variance-covariance structure is close to that of the data).[12] We follow a standard approach in the BMA framework and set a unit information prior (UIP) for the hyperparameter, g, i.e. $g = N$ for all mod-

10 In large sample sizes, the posterior probability of the best model (i.e. the one closest to the "true model") converges to 1.
11 In other words, we set $p(\alpha_0) \propto 1$ and $p(\sigma) \propto \sigma^{-1}$.
12 Otherwise stated, we set for the coefficients: $\alpha_i|g \sim N(0, \sigma^2 (\frac{1}{g} X_i' X_i)^{-1})$.

Table 4 Model selection based on Bayesian model averaging

	(1) - Governance		(2) - Regulation	
	Posterior mean	PIP	Posterior mean	PIP
Lockdown measures	-0.11	0.87**b**	-0.15	0.93**b**
Tourism	-0.26	0.99**d**	-0.31	0.98**c**
Participation in GVCs	-0.03	0.96**c**	-0.03	0.74**a**
Governance	0.29	0.91**b**		
Structural budget balance ratio	0.018	0.187	0.018	0.187
Regulation in labour and product markets			0.014	0.52**a**
Financial development	-0.001	0.27	0.519	0.27
Current account balance ratio	0.02	0.26	0.011	0.208
Net international investment position ratio	0.001	0.26	0.002	0.34
Nominal long-term interest rate	0.06	0.23	0.06	0.21
Model space	515		515	

Source: Authors' own estimations.
Notes: The dependent variable is the difference in the GDP growth forecast for 2020 between IMF WEO October 2020 and October 2019. All independent variables refer to 2019 or latest available year, except lockdown measures which refer to 2020 (see Table 1). PIP denotes posterior inclusion probability. a, b, c, d denote weak, positive, strong, very strong impact on the GDP shock, respectively.

els, where N is the sample size. Finally, on defining the model prior, we assume a hyperparameter, $\theta = 0.5$, which implies a uniform model prior and therefore an equal probability for all models.

With regard to the factors included in the BMA analysis, we take on board a wide set of independent variables based on the literature on economic resilience, our baseline regressions about the economic fallout during the COVID-19 pandemic and the pairwise correlations with the GDP shock. In particular, we employ the lockdown measures, tourism, participation in GVCs, the quality of governance, regulation in labour and product markets, the nominal long-term interest rate, the degree of financial development, the structural budget balance, the current account balance and the net international investment position. The number of independent variables results in a model space of 2^9 (over 500) alternative models. We derive the posterior model distribution by employing a Markov Chain Monte Carlo (MCMC) sampler algorithm with 100,000 iterations and 50,000 burn-ins.

Table 4 shows the BMA estimates. Column (1) shows the posterior mean and the posterior inclusion probability when the quality of governance is included in the model, while Column (2) shows the respective estimates when regulation in labour and product markets is included in the model variables. We opt to perform separate estimations for the two variables, since the small sample properties of BMA under the presence of potential multicollinearity are still under theoretical validation in the relevant literature.[13] Following Kass and Raftery (1995), we assume that the importance of an independent variable for explaining the GDP shock is weak, positive, strong and very strong if the PIP is between 0.5-0.75, 0.75-0.95, 0.95-0.99 and 0.99-1, respectively. The BMA estimates shown in Table 4 coincide with the baseline findings that the lockdown measures, tourism, participation in GVCs, the quality of governance and regulation in product and labour markets are the most robust deter-

13 The pairwise correlation of the quality of governance and the synthetic indicator of regulation in labour and product markets is 0.41 in our sample.

minants of the GDP shock during the COVID-19 pandemic.[14]

4.2 ALTERNATIVE DEFINITIONS OF DEPENDENT AND INDEPENDENT VARIABLES

We assess the robustness of the baseline results presented in Table 3 (Column (2)) accounting for two alternative definitions of the dependent variable. The dependent variable proxies for the size of the GDP shock in 2020 and, so far, it was defined as the difference in real GDP growth for 2020 between two IMF forecast rounds, before and during the pandemic (see Table 1). However, this definition may exacerbate the magnitude of the output loss as it accounts for both the expected economic path for 2020 before COVID-19 and the expected GDP decline in 2020. The first alternative definition assumes only the expected output loss in 2020, namely the change in real GDP in 2020 compared with the previous year. The second definition uses the baseline definition for the GDP shock but replaces the IMF WEO October 2020 estimates for GDP growth in 2020 with the available releases of provisional annual national accounts data. Failing to account for the realised GDP values could, to some extent, induce a measurement error of the dependent variable. For several advanced economies, the provisional GDP growth figures for 2020 were more upbeat relative to the IMF WEO October 2020 projections. Columns (1) and (2) in Table 5 present the results for the two alternative definitions of the size of the GDP shock, respectively. These are in line with the baseline findings.

Furthermore, we assess the validity of the Oxford Stringency Index as a proxy for social distancing measures. The introduction of lockdown measures differs across countries. This is captured by the index with the inclusion of zero values from 1 January 2020 until the date of initiation of social distancing measures in each country. Chart 4 shows that Greece opted for an earlier adoption of social distancing measures compared with Sweden. In other words, the index combines an intensity and a timing effect of the lockdown measures. For instance, when the daily values of the stringency index are averaged over the first half of 2020, this results in lower values of the index during the first wave of the pandemic compared with the second half of the year, when the strict lockdown measures were relaxed (though not completely lifted). From a cross-country perspective, countries that initiated lockdown measures earlier than others will have higher values of the index in the first half of the year, though the intensity of the measures may be low.

In Table 5, Column (3) separates the two effects embedded in the lockdown proxy. We control for the timing of the lockdown measures by constructing an ordinal variable, taking a value of 1 when the country introduced social distancing measures within January 2020, a value of 2 when the measures were introduced within February and a value of 3 when the measures were introduced thereafter. The intensity effect is captured by the average of the lockdown index, starting from the initiation of social distancing measures in each country until late September 2020. Estimates suggest that countries that initiated social distancing measures earlier in 2020 faced a more pronounced GDP shock. Also, the intensity of the lockdown still matters for explaining the cross-country variation in output, though the size of the coefficient is now somewhat lower compared with the baseline estimates.

An additional robustness check concerns the potential endogeneity of lockdown measures. It could be the case that lockdown measures are only weakly exogenous to the economic fallout, reflecting policymakers' concerns about the size of the output loss due to the restrictions. To some extent, such concerns may have affected the decision to relax lockdown measures after the first wave of the pandemic. To address this issue, Column (4) in

14 A BMA analysis, in which both the quality of governance and regulation in labour and product markets are included in the estimations, results in a weaker PIP for labour and product market regulation.

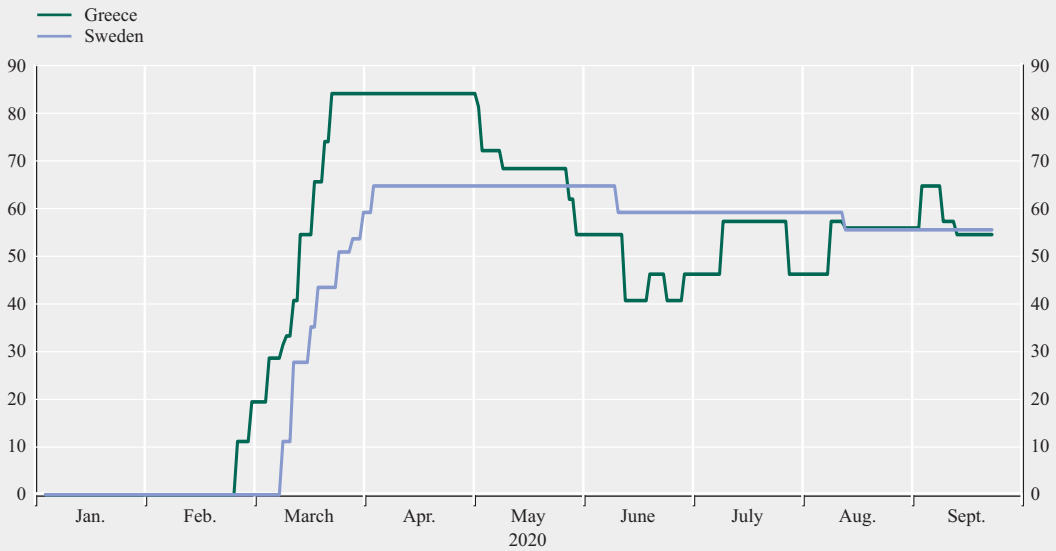
Table 5 Robustness checks on dependent and independent variables

	Alternative dependent variable		Alternative regressors		
	2020 GDP growth	GDP shock with realised values	Lockdown - timing effect	Lockdown in 2020H1	Tourism receipts
	(1)	(2)	(3)	(4)	(5)
Lockdown measures	-0.15*** (0.04)	-0.10** (0.04)			-0.13*** (0.04)
Intensity effect			-0.10*** (0.03)		
Timing effect			0.69** (0.33)		
Lockdown measures (2020H1)				-0.13*** (0.05)	
Tourism (contribution to GDP)	-0.30*** (0.05)	-0.31*** (0.06)	-0.27*** (0.05)	-0.27*** (0.05)	
Tourism receipts					-0.27*** (0.07)
Participation in GVCs	-0.04*** (0.01)	-0.02** (0.01)	-0.03*** (0.009)	-0.03*** (0.009)	-0.03*** (0.01)
Governance	0.21** (0.10)	0.37*** (0.11)	0.33*** (0.09)	0.29*** (0.10)	0.30*** (0.10)
Constant term	5.38** (2.23)	0.08 (2.44)	-1.32 (2.02)	0.71 (2.44)	-0.49 (2.30)
Adjusted R^2	0.587	0.547	0.595	0.588	0.495
No. of countries	39	39	39	39	39

Source: Authors' own estimations.
Notes: The intensity effect is captured by the average of the lockdown stringency index starting from the initiation of social distancing measures until 28 September 2020. The timing effect is an ordinal variable taking a value of 1 if lockdown measures were introduced in January, a value of 2 if introduced in February and a value of 3 thereafter. Standard errors are reported in brackets. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively.

Chart 4 Oxford COVID-19 Government Response Stringency Index, Sweden – Greece

(daily values, 1 January 2020-28 September 2020)



Source: Hale, T., S. Webster, A. Petherick, T. Phillips and B. Kira (2020), Oxford COVID-19 Government Response Tracker (OxCGRT), Blavatnik School of Government.

Table 5 includes as a proxy for lockdown measures the average of the Oxford Stringency Index over the first half of 2020, which should better reflect governments' aim to mitigate the human cost of the health crisis, abstracting from economic considerations. The point estimate of the coefficient of lockdown measures is close to that in the baseline findings.

Finally, we employ an alternative measure of tourism, since the direct contribution of tourism to GDP used in the baseline findings can be subject to measurement error and can bias the estimates. In that regard, we use the share of tourism receipts in GDP as a proxy for an economy's reliance on tourism. Results presented in Column (5) in Table 5 are consistent with the baseline estimates.

5 ASSESSING THE IMPACT OF DISCRETIONARY FISCAL POLICY DURING COVID-19

Fiscal policy in advanced economies has responded to the pandemic via increased discretionary spending to support the incomes of businesses and households and to cushion the economic loss of the health crisis. According to the IMF *Fiscal Monitor Update* (January 2021), fiscal measures (expenditures or foregone revenue) in advanced economies amount to about 12.7% of GDP, while measures to support liquidity through government guarantees, loans or subsidies amount to about 11% of GDP.

However, the overall size of the fiscal support varies across economies, mainly reflecting differences in fiscal space and the evolution of the health crisis in each country. According to the IMF, the size of the fiscal support packages affecting the general government budget balance (on-budget measures) is negatively related to a country's initial borrowing costs, while fiscal measures that are not included in the budget balance (off-budget measures), such as the provision of liquidity and guarantees, are positively related to the initial debt-to-GDP ratio.

Given the observed differences across advanced economies in the size of fiscal support in 2020, the question arises as to whether expansionary fiscal policy contributed to the cross-country disparity in economic outcomes during the crisis. In order to examine the role of discretionary fiscal policy, we re-estimate equation (1) by including the change in the cyclically adjusted primary balance (Δcapb) in 2020 (as a percentage of potential output) as a proxy for the discretionary fiscal stance in advanced economies. At the same time, we explicitly account for the potential simultaneity bias of fiscal policy measures and the size of the GDP shock by employing an instrumental variable regression. Given the difficulty of finding a valid instrument, we employ the cyclically adjusted primary balance in 2019, the nominal long-term interest rate in 2019 and the public debt-to-GDP ratio in 2019. The selected instruments should be correlated with the fiscal stance in 2020, yet they should be more orthogonal to the GDP shock. The estimated equation is of the following form:

$$GDPr_i=\alpha_0+\Delta capb_i\alpha_1+X_i\alpha_2+\varepsilon_i, \quad \varepsilon\sim N(0,\sigma^2 I) \tag{2}$$

where *GDPr* is the difference in the real GDP growth rate for 2020 between the IMF WEO October 2020 and the IMF WEO October 2019, $\Delta capb$ is the change in the (cyclically adjusted) primary balance (as a percentage of potential GDP) for 2020, and X_i is the matrix that includes the lockdown measures, the contribution of tourism to GDP, the quality of governance and the output gap in 2019.[15]

Table 6 presents the estimates. Columns (1) and (2) show the OLS estimates of equation (2), which do not account for the simultaneity bias. To address the potential interplay of the fiscal stance with social distancing measures, Column (2) includes the lockdown measures, averaged only over the first half of

15 The output gap aims to control for any remaining effects from the cyclical variation (see Golinelli and Momigliano 2009).

Table 6 The role of discretionary fiscal policy during the COVID-19 crisis

	(1)	(2)	(3)	(4)	(5)
	(OLS)	(OLS)	(IV)	(IV)	(IV)
Lockdown measures	-0.13*** (0.04)		-0.13*** (0.05)	-0.12** (0.05)	
Lockdown measures (2020H1)		-0.16** (0.06)			-0.14** (0.06)
Δcapb (2020)	-0.29** (0.13)	-0.26* (0.13)	-0.64** (0.28)	-0.49*** (0.19)	-0.47** (0.19)
Tourism	-0.29*** (0.07)	-0.31*** (0.07)	-0.27*** (0.07)	-0.28*** (0.07)	-0.29*** (0.07)
Governance	0.22* (0.12)	0.17 (0.13)	0.17 (0.13)	0.20 (0.13)	0.18 (0.13)
Output gap	-0.18 (0.17)	-0.15 (0.17)	-0.12 (0.18)	-0.15 (0.18)	-0.14 (0.18)
Constant term	-2.37 (2.66)	-0.75 (3.37)	-3.72 (3.05)	-3.54 (2.81)	-2.78 (3.51)
Adjusted R^2	0.568	0.553			
Sanderson-Windmeijer F statistic (p-value)			7.58	7.18	7.28
Anderson canon. corr. LM test (p-value)			0.00	0.00	0.00
Sargan test (p-value)			-	0.577	0.589
Durbin-Wu-Hausman chi-sq test (p-value)			0.1	0.05	0.03
Number of instruments			1	3	3
No. of countries	32	32	31	29	29

Source: Authors' own estimations.
Notes: The dependent variable is the difference in the GDP growth forecast for 2020 between IMF WEO October 2020 and October 2019. Δcapb is the change in the cyclically adjusted primary budget balance in 2020 (as % of potential GDP). Remaining independent variables refer to 2019 or latest available year, except lockdown measures which refer to 2020 (see Table 1). Standard errors are reported in brackets. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively. The Sanderson-Windmeijer F statistic assesses the hypothesis of weak instruments, the Anderson canonical correlation LM test examines the underidentification of the model, the Sargan test assesses the overidentification and the Durbin-Wu-Hausman chi-squared test examines the null hypothesis that the instrumented variable is exogenous.

2020.[16] Columns (3)-(5) present the respective IV regressions. Column (3) includes only the initial cyclically adjusted primary balance as an instrument for the fiscal stance, while Column (4) incorporates in addition the nominal long-term interest rate and the public debt-to-GDP ratio as valid instruments. Column (5) repeats the estimates shown in Column (4), including an exogenous proxy of the lockdown measures.

A battery of statistical tests for the IV regressions is outlined at the bottom of Table 6. These examine the identification of the IV model, inference amid potentially weak instruments, as well as the endogeneity of the fiscal stance that would support the use of an IV estimator. In particular, the Anderson canonical correlation LM statistic tests for model underidentification, i.e. under the null hypothesis, the set of instruments is not correlated with the endogenous regressors. Also, the Sanderson-Windemeijer statistic assesses the presence of weak instruments in the first-stage regression and the Sargan test assumes, under the null hypothesis, that the orthogonality condition is met, namely that the instruments are uncorrelated with the error term. Finally, the Durbin-Wu-Hausman chi-squared statistic formally tests for the exogeneity of the fiscal stance. Overall, the tests confirm that the instruments used are relevant, the estimated IV models are not underidentified and the use of an IV estimator is

16 It could be the case that less stringent lockdown measures in 2020 are associated with lower fiscal support in the same year. At the same time, higher fiscal support can lead to more stringent lockdown measures to tackle the health crisis. Notwithstanding, social distancing measures during the first half of 2020 should be more exogenous to the fiscal stance as they were to a large extent associated with the policy aim to mitigate the human cost of the pandemic and were therefore less related to the economic losses or to policy accommodation.

justified, i.e. the fiscal stance is endogenous to the GDP shock.

Our estimates suggest that the fiscal stance in 2020 in advanced economies is statistically significant and associated with a smaller economic fallout during the COVID-19 crisis; the more expansionary the fiscal stance, the lower the output loss. When accounting for the potential endogeneity of fiscal policy measures with the GDP shock in 2020, the impact of the fiscal stance strengthens. All in all, cross-country differences in the size of expansionary fiscal policy in 2020 seem to explain the asymmetric economic losses in advanced economies during the pandemic.

6 CONCLUSIONS AND POLICY RECOMMENDATIONS

The concept of economic resilience provides a useful tool for the discussion about the prevention and containment of crises. Given the high degree of global interconnectedness of countries, it is impossible to accurately predict and avert economic shocks. However, enhancing the resilience of countries increases their ability to absorb economic effects and facilitates a speedier and more robust recovery through a reallocation of resources and structural transformation.

Our empirical results confirm the significance of factors associated with the features of the COVID-19 crisis for explaining the uneven output loss across economies. Namely, the effects of social distancing measures, which have been implemented in the interest of public health, and the relative stronger impact of the pandemic on specific sectors such as tourism, due to the restrictions in international travel and contact-intensive services, and on global value chains, due to supply and international trade disruptions. Moreover, our analysis points to the significance of institutional factors, extending the existing literature by not only looking at the quality of governance, but also examining the level of financial development as well as product and labour market flexibility. Our results indicate that the pre-crisis characteristics of the economies can indeed determine their resilience in the face of a pandemic shock. Moreover, pre-crisis fiscal space is a key factor of economic resilience for EU Member States, supporting the view that containing macroeconomic imbalances can shield economies from excessive destabilising effects during crises. Finally, our analysis on discretionary fiscal policies during the pandemic crisis has underscored the importance of government support to containing the short-term effects of the shock.

Eradicating the pandemic and supporting the most vulnerable should remain a priority as long as contagion and death rates remain high. However, when the world will begin to move out of the pandemic and countries start thinking about rebuilding their economies in the new reality, important policy implications will emerge. Increasing economic resilience through horizontal reforms that raise potential output, facilitate an efficient reallocation of resources, improve the business environment and promote investment is key to addressing the effects of economic shocks, irrespective of their origin.

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