Carrot and stick. The effects on GDP of economic support and stringency policies in response to COVID-19.

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Government responses have largely been different across countries, depending on institutional factors, fiscal space, and income level (Filho and Nieto, 2020; Loayza and Pennings, 2020; Deb et al., 2020; Pepinsky, 2020).

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Government responses have largely been different across countries,
depending on institutional factors, fiscal space, and income level
(Filho and Nieto, 2020; Loayza and Pennings, 2020; Deb et al.,
2020; Pepinsky, 2020).
This study aims to extend the analysis of this heterogeneity of
policies by investigating the effects of both containment and
economic measures on economic growth in a set of 48 countries.

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Using data on economic growth extracted by the World Bank and
data on stringency policies from Ox-CGRT, the aim of the paper is
to address the following two research questions:

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Using data on economic growth extracted by the World Bank and data on stringency policies from Ox-CGRT, the aim of the paper is to address the following two research questions:
RQ1: Do containment policies have an impact on economic growth?

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Using data on economic growth extracted by the World Bank and data on stringency policies from Ox-CGRT, the aim of the paper is to address the following two research questions:

RQ1: Do containment policies have an impact on economic growth?

RQ2: To what extent are economic support measures able to mitigate the negative impact of containment policies?

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The effects of containment policies and economic support measures on economic growth in the short run seems to be of the uttermost importance in the current framework.

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The effects of containment policies and economic support
measures on economic growth in the short run seems to be of the
uttermost importance in the current framework.
Their interaction could lead to undesired effect and waste of public
resources.

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In order to address the dramatic economic loss linked to the COVID-19 pandemic, countries have implemented,

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In order to address the dramatic economic loss linked to the COVID-19 pandemic, countries have implemented, together with policies aimed at stopping the spread of the virus,

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In order to address the dramatic economic loss linked to the COVID-19 pandemic, countries have implemented, together with policies aimed at stopping the spread of the virus, a mixture of discretionary fiscal and monetary measures.

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In order to address the dramatic economic loss linked to the
COVID-19 pandemic, countries have implemented, together with
policies aimed at stopping the spread of the virus, a mixture of
discretionary fiscal and monetary measures.
What is the impact of these policies on GDP growth?

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We should consider studying the impact of stringency and
economic support policies because:

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We should consider studying the impact of stringency and economic support policies because:

1. the pandemic is still a major threat, and estimating this impact helps policy-makers to design better policy and to better estimate the impact of such policies;

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1. the pandemic is still a major threat, and estimating this impact helps policy-makers to design better policy and to better estimate the impact of such policies;

2. epidemics and global pandemics have been predicted to be a more and more relevant threat in the next years (Adamson et al., 2020; Simpson et al., 2020; Hotez, 2021);

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Literature review

This study contributes to the recently developed research on the impact of stringency and economic support policies on economic growth.

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▶ Even with limited data due to temporal constraints, few studies have attempted to analyse the efficacy of economic measures (Chetty et al., 2020; Granja et al., 2020);

▶ the literature offers several case studies: Nikolajenko et al. (2021), on Lithuania; Berardi et al. (2020) on Italy; Granja et al. (2020) on the US; and Kozeniauskas et al. (2020) on Portugal.

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- ▶ the literature offers several case studies: Nikolajenko et al. (2021), on Lithuania; Berardi et al. (2020) on Italy; Granja et al. (2020) on the US; and Kozeniauskas et al. (2020) on Portugal.
- ▶ In spite of the different approaches, the literature agrees on the idea that government responses have largely been different (Filho and Nieto, 2020; Loayza and Pennings, 2020; Deb et al., 2020; Pepinsky, 2020).

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To the best of our knowledge none of these studies addresses the issue in a cross-country perspective examining the interaction between economic support and stringency measure.

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Estimation strategy

The strategy

It is widely recognized that fix effects models have an advantage over random-effects models when analyzing panel data,

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It is widely recognized that fix effects models have an advantage over random-effects models when analyzing panel data, because they control for all level 2 characteristics, both measured or unmeasured (Allison, 2009; Halaby, 2004; Wooldridge, 2010).

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It is widely recognized that fix effects models have an advantage over random-effects models when analyzing panel data, because they control for all level 2 characteristics, both measured or unmeasured (Allison, 2009; Halaby, 2004; Wooldridge, 2010). This is important while modelling a new phenomenon, in which time-invariant characteristics (such as demographic composition, different work ethics, population density, and more generally all the characteristics that do not change over the timespan analyzed) are likely to play a role.

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The equation we are going to estimate is:

$$GDP_{ct} = \alpha + \beta_1 Cases_{ct} + \beta_2 Str_{ct} + \beta_3 Eco_{ct} + \epsilon$$

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Where: GDP_{ct} is gross domestic product growth in country c at time t,

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Where: GDP_{ct} is gross domestic product growth in country c at time t, and is modelled as a function of the Cases $Cases_{ct}$,

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Where: GDP_{ct} is gross domestic product growth in country c at time t, and is modelled as a function of the Cases $Cases_{ct}$, the stringency measure Str_{ct} and

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Where: GDP_{ct} is gross domestic product growth in country c at time t, and is modelled as a function of the Cases $Cases_{ct}$, the stringency measure Str_{ct} and the economic support Eco_{ct}.

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In this way we aim to estimate in β_2 and β_3 the average impact on GDP growth of stringency and economic measures.

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Data are gathered from:

▶ Organization for Economic Cooperation and Development
OECD (*GDP quarterly growth, expenditure approach,
seasonally adjusted data*);

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▶ Oxford COVID-19 Government Response Tracker;

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We calculate $GDP_p c$ in two ways:

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We calculate GDP_pc in two ways: as growth with respect to the previous quarter ($GDPGrpq$),

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We calculate $GDP_p c$ in two ways: as growth with respect to the previous quarter ($GDPGrpq$), and with respect to the same quarter of the previous year ($GDPGrpy$).

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We calculate $GDP_p c$ in two ways: as growth with respect to the previous quarter ($GDPGrpq$), and with respect to the same quarter of the previous year ($GDPGrpy$).

We expect to be able in this way to capture both the relative and absolute effects of the policies,

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We calculate GDP_pc in two ways: as growth with respect to the previous quarter ($GDPGrpq$), and with respect to the same quarter of the previous year ($GDPGrpy$).

We expect to be able in this way to capture both the relative and absolute effects of the policies, i.e., with respect to the current GDP trend, and in comparison with a pre-COVID-19 scenario.

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Cases is operationalized as the average number of COVID-19 cases per country c in each quarter of 2020 t.

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Cases is operationalized as the average number of COVID-19 cases
per country c in each quarter of 2020 t.
To operationalize the stringency of NPIs measures on a quarterly
basis, *Str*, we used Oxford Stringency Index.

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To operationalize the stringency of NPIs measures on a quarterly basis, *Str*, we used Oxford Stringency Index. It is the sum of several different sub-indexes, rescaled in a single variable on a 0-100 base.

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Indepedent variables - COVID

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To operationalize the stringency of NPIs measures on a quarterly basis, *Str*, we used Oxford Stringency Index. It is the sum of several different sub-indexes, rescaled in a single variable on a 0-100 base. From the same source, we computed *Eco*, the sum of four different sub indexes, rescaled in a single variable on a 0-100 base.

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This lead to the creation of a panel dataset composed by 48 different countries

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This lead to the creation of a panel dataset composed by 48 different countries (all the ones for which there are OECD data)

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This lead to the creation of a panel dataset composed by 48 different countries (all the ones for which there are OECD data) observed per the 4 quarters of 2020, for a total of 192 observations.

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GDPGrpq and GDPGrpy

Table: Average Cases

	GDPGrpy	GDPGrpq
Av.Cases pc	249.6***	256.9***
Stringency	-0.221***	-0.286***
Economic	0.0297**	0.171***
Constant	3.717***	3.520***
Observations	192	192

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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GDPGrpq and GDPGrpy
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Max Cases

Table: Max Cases

	GDPGrpy	GDPGrpq
Av.Cases pc	144.4***	145***
Stringency	-0.225***	-0.289***
Economic	0.0351***	0.177***
Constant	3.697***	3.490***
Observations	192	192

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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It is worthed to test the combined effect of these two policies. The severity of stringency may influence consumption in the presence of economic support policies as well.

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There are therefore reasons to believe that the effects of the former and the latter on GDP are (also) intertwined.

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There are therefore reasons to believe that the effects of the former and the latter on GDP are (also) intertwined. To test the relationship between the two, we slightly amend the model, including an interaction term between the two proxies of the policies.

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There are therefore reasons to believe that the effects of the former and the latter on GDP are (also) intertwined. To test the relationship between the two, we slightly amend the model, including an interaction term between the two proxies of the policies.

$$GDP_{ct} = \alpha + \beta_1 Cases_{ct} + \beta_2 Str_{ct} + \beta_3 Eco_{ct} + \beta_4 Str_{ct} * Eco_{ct} + \epsilon$$

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Interaction model

Table: Interaction model - Marginal Effects

	GDPGrpy	GDPGrpq
Av.Cases pc	248.9***	248.8***
Stringency	-0.225***	-0.325***
Economic	0.0265*	0.136***
Observations	192	192

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Average Marginal Effects of Eco with 90% confidence intervals
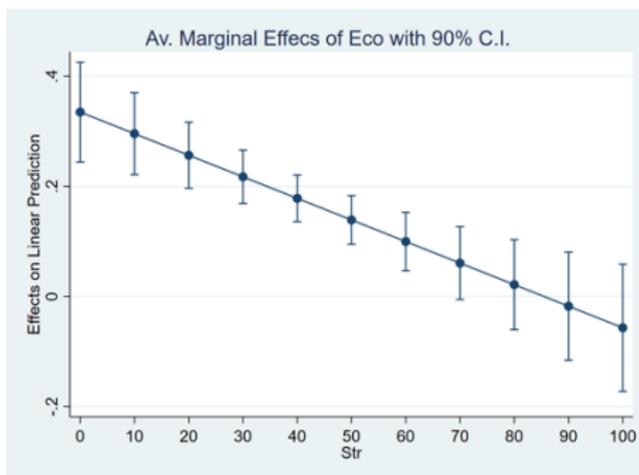
Figure: Impacts on GDPGroq of Eco for different levels of Str. 90% confidence intervals.

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The emergency triggered by the COVID-19 pandemic has pushed
national governments to implement containment policies aimed at
reducing the spread of the virus.

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Conclusions

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Adopting a cross country approach, our results confirm that containment policies are negatively correlated with economic growth in the short run.

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The emergency triggered by the COVID-19 pandemic has pushed national governments to implement containment policies aimed at reducing the spread of the virus.

Adopting a cross country approach, our results confirm that containment policies are negatively correlated with economic growth in the short run. At the same time, economic support measures seem to be effective at mitigating the economic cost of lockdown measures.

Conclusions

The emergency triggered by the COVID-19 pandemic has pushed national governments to implement containment policies aimed at reducing the spread of the virus.

Adopting a cross country approach, our results confirm that containment policies are negatively correlated with economic growth in the short run. At the same time, economic support measures seem to be effective at mitigating the economic cost of lockdown measures. Nonetheless, on average, when stringency measures become more severe, economic support measures do not fully restore the economic costs of lockdown.

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Thank you for the attention!
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Countries included in the analysis

Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Saudi Arabia, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.