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The Geography of the Effectiveness and Consequences of Covid-19 Measures: Global Evidence [1]

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Research Department

The Geography of the Effectiveness and Consequences of Covid-19 Measures: Global Evidence

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Abstract

This study has: (i) analysed the economic impact of the Covid-19 pandemic, (ii) evaluated the effectiveness and relevance of different measures against the pandemic and (iii) examined nexuses between the corresponding measures and economic outcomes. The study uses a sample of 186 countries divided into four main regions, notably: Asia-Pacific and the Middle East, Europe, Africa and America. 34 preventing and mitigating measures against the Covid-19 pandemic are classified into five main categories: lockdown, movement restrictions, governance and economic, social distancing, and public health measures. The empirical evidence is based on comparative difference in means tests and correlation analyses. The findings show how the effectiveness and consequences of the Covid-19 measures are different across regions. In adopting the relevant policies to fight the ongoing pandemic, the comparative insights from the findings in the study are worthwhile. *Inter alia*: (i) from a holistic perspective, only European countries have favourably benefited from the Covid-19 measures; (ii) lockdown measures at the global level have not been significant in reducing the pandemic; (iii) the restriction of movement measure has been relevant in curbing the spread in the American continent; (iv) social distancing has been productive in Europe and counter-productive in Africa; (v) governance and economic measures have exclusively been relevant in Europe and (vi) overall public health measures have not had the desired outcomes in flattening the infection curve probably because most of the underlying measures are awareness decisions or oriented toward people already infected.

JEL Codes: E10, E12, E20, E23, I10, I18

Key Words: Novel Coronavirus, Social Distance, Macroeconomics effects

1. Introduction

At the time of writing this paper, there is an apparent disagreement between the World Health Organisation (WHO) authorities and governments. While Covid-19 continues to spread at an alarming rate of contamination, governments are easing restrictions and gradually lifting lockdowns in many countries. At the beginning of the evolution of the pandemic, most countries in the world adopted some measures in response to the Covid-19 pandemic. After a few months of implementation, the global economy began to suffer and the government authorities decided to relax the restricting measures in order to revitalise corresponding economies. For example, some Heads of States such as Donald Trump or Jair Bolsonaro have had some disagreements with their administrations or a large part of citizens in their countries. They are criticized for putting the economy ahead of people's lives. The leaders are therefore faced to a veritable equation: limiting the pandemic under the constraint of boosting economic activity.

The extant literature has: (i) attempted to find relationships between government measures against the Covid-19 pandemic and their effectiveness and (ii) searched for a link between the scale of these measures and the corresponding economic impact (Ozili, 2020; Agbe, 2020; Bisong et al., 2020; Farayabi & Asongu, 2020). A common shortcoming in the underlying literature is that it has failed to assess the geography on the effectiveness and consequences of Covid-19 measures with particular emphasis on various regions of the world. In order to address the attendant gap in the literature, the objective of this paper is threefold; firstly, we analyse the economic impact of the pandemic. Secondly, we evaluate the effectiveness and relevance of different Covid-19 measures across regions. Finally, we look at the correlation between these measures and the economic outcomes.

The positioning of the study departs from the recent strand of Coronavirus-centric literature that has focused on, *inter alia*: the socio-economic effects of the novel virus (Nicola et al., 2020); policy and scholarly insights into the economic consequences of the Covid-19 pandemic (Ataguba, 2020); opportunities, socio-economic incidences and policy measures linked to the novel virus; (Ozili, 2020); the impact of the pandemic on remittances flows (Bisong et al., 2020); the effect of the pandemic on childhood poverty in North Africa and the Middle East (Agbe, 2020); mathematical modelling of infectious viral diseases (Adekola et al., 2020); nexuses between the Covid-19 pandemic, inequality and social stratification

(Obeng-Odoom, 2020) and assessing laboratory responses to the coronavirus (Odeyemi et al., 2020). While the extant studies have examined the effect of the Covid-19 pandemic, the attendant literature is sparse on a comprehensive study that provides a comparative assessment of the consequences and effectiveness of Covid-19 measures at the global level. The purpose of this study is therefore to fill the gap in the light of the objectives discussed above.

The rest of the study is structured as follows. The data and research methods are covered in Section 2. Section 3 presents the results and corresponding discussion while Section 4 concludes with policy implications and future research directions.

2. Data presentation and methods

In this paper, three types of data are used. The first are government measures applied in response to the Covid-19 pandemic. The second are health data on the evolution of positive new cases. Finally, the third are macroeconomic projections and updates on gross domestic product (GDP) growth due to the coronavirus. Data of different measures are from the Assessment Capacities Project (ACAPS) Government Measures Dataset. This dataset is part of the Covid-19 pandemic and puts together all the measures implemented by governments worldwide in response to the underlying pandemic. It includes secondary data review collected by ACAPS analysts and volunteers from the University of Copenhagen and the University of Lund. The data are divided into five categories (social distancing, movement restrictions, public health measures, governance and socio-economic measures and lockdowns). Each category is broken down into several types of measures as shown in Table 1. The dataset is updated once a week and our data are as of 18 June 2020. To capture only the decision aimed to break the chain of transmission of the virus, we use only the measures being introduced or expanded.

Regarding the evolution of the health situation, we use the data on the geographic distribution of Covid-19 confirmed new cases worldwide as of 26 June 2020 available at the European Union Open Data Portal.[2] The dataset also provides numbers of daily deaths due to Covid-19 over time. To assess the situation of the pandemic in the country, we refer to the existence of

[2] Access URL : https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-geographic-disbtribution-worldwide.xlsx

a possible peak. Our approach is as follows. Firstly, we plot the evolution curve of new cases, which is a daily frequency time series. Secondly, we evaluate the trend of the curve. If it is on a downward trend or seems to have peaked, we judge that the situation is improving. Otherwise, we assume that the situation is deteriorating further in that country.

Concerning the economic information, we employ the pre-"Covid-19" macroeconomic projections of October 2019 and revised macroeconomic projections of April 2020. Following Diop and Asongu (2020), we estimate the macroeconomic impact by the difference between these two projections. The result will be an economic contraction caused by the Coronavirus everything else remaining equal. It should be noted however that, the downward revisions have also been the consequences of idiosyncratic factors (such as structural constraints in South Africa), policy adjustments in Ethiopia and natural shocks and other climate incidences (such as the locust invasion in Eastern Africa) (International Monetary Fund, 2020). Once we have all information about health evolution, government measures in response to the Covid-19 pandemic and projected macroeconomic outcomes, we can now evaluate their relationships. As for the methodology, we employ a statistical toolbox such as descriptive statistics to analyse the macroeconomic impact and peaks. Indeed, we use the comparison of means (t-test) to determine whether the means of the group of countries that reached a peak in the evolution of the pandemic and the group of countries where the situation has not improved, are equal with respect to the different government measures. Lastly, we analyse the correlation between the economic outcomes and government measures in response to Covid-19 by displaying scatterplots.

3. Results and discussion

In this section, we present different results obtained. Table 2 reports the summary statistics of the macroeconomic impact of Covid-19 by regions consisting of 186 countries. The impact estimated corresponds to an economic contraction expressed in percentage points of low GDP. The pandemic has had a severe impact on global growth based on the World Economic Outlook (WEO) forecast. Overall, the global growth would leave 2020 GDP some 7.12 percentage points lower than in the pre-Coronavirus projections. Libya is expected to be the country most affected by this shock (impact of 58.70 percentage points) while Equatorial Guinea earns the lowest impact (0.5 percentage points). When we compare the impact by region, it is worthwhile to note that the Asia-Pacific and Middle East bloc exhibits the lowest economic impact (5.97 percentage points). It is followed by Africa (6.32 percentage points).

We can note that of Libya is very extreme. Apart from Libya, the most impacted country is Seychelles with a contraction of 14.1 percentage points of GDP growth. Europe and the Americas are the most affected regions by the Covid-19 pandemic (8.69 percentage points and 8.27 percentage points, respectively).

Table 3 reports the number of countries that have reached the peak of the pandemic. Overall, as of the 26th of June 2020, of 170 countries, only 62 had reached the peak of the pandemic, corresponding to 36.59%. This result confirms the pessimism of the WHO authorities on the Covid-19 pandemic. According to the WHO authorities, 60% of the world's 10 million Covid-19 confirmed cases since December 2019 were registered in the month of June. This situation indicates that the pandemic is getting worse and not slowing down. This concern is much more pronounced in African countries and the American continent. For example, in Africa, only 7 countries out of 54 have reached the peak of the pandemic (i.e.12.96%). Recently, the WHO alerted the international community on the situation of the Covid-19 pandemic in Africa. In effect, it is spreading at an alarming rate in Africa especially in rural areas. It should be noted that so far, Africa has been one of the safest continents. However, the confirmed new cases and deaths in these current weeks show that there is cause for concern. The positive result emerging from this table is the case of Europe. In this region, 32 countries out of 43 (i.e. 74.42%) have reached the peak, implying that the situation of the pandemic is improving overall. The countries that were most affected by the pandemic such as Italy, Spain and France have already reached the peak even if the fear of a second wave of contamination is still present in Portugal and Germany.

In Table 4, we present the government efficiency measures in response to the Covid-19 pandemic. As detailed in the previous section, we estimate the improvement of the health situation by the observation of the peak. To this end, we use a binary codification (1 if the peak is reached and 0, otherwise). Here we use comparison of means test (t-test). The null and alternative hypotheses are stated as follows:

$$H_0: \text{diff} = 0$$

$$H_1: \text{diff} \neq 0$$

Diff represents the difference between the two means of government measures (mean in countries with peak (code 1) and countries without peak (code 0)).

Many patterns emerge from this table. When we consider the total government measures in response to the pandemic in the world as a whole, the p-value is lower than 0.05, supporting the alternative hypothesis that the difference in means is not equal to 0; thus further indicating that there is a statistical difference between the two means. More specifically, the result confirms the position that the number of measures adopted by countries, in which the Covid-19 pandemic already peaked, is statistically different from the number of measures adopted by the other group of countries. Since the difference is negative, the number of total measures in countries which have reached the peak is lower than those in countries which have not reached a peak yet. This difference in the number of measures and corresponding peak levels could be interpreted in the perspective that, at a global level, government measures have had a positive impact on the evolution of the pandemic. Contrarily, if we observe the result by region, it is apparent that only European countries have favourably benefited from these measures. If we take only the measures relating to lockdown in consideration, we fail to reject the null hypothesis, implying that the difference of means is not significantly different from 0. Thus the lockdown imposed have not had a significant impact in reducing the spread of the pandemic. Regarding the restriction of movement, the null hypothesis is rejected in America contrarily to other regions. Hence, this restriction has only had an impact in America. Africa and Europe have contradictory outcomes for the social distancing measure. The measure has an expected outcome in Europe. Accordingly, the number of restrictions on social distancing is higher in countries with the peak than in the others and this difference is significant. However, in Africa, the situation is reversed. This surprising result implies that in Africa the social distancing measure is counter-productive. For the governance and economic measures, the difference in the two means is only significant in Europe and when we consider the situation at the global level. In effect, the mean in the group of countries which reached the peak is twice as high as in the other group. Finally, the difference of the two means for the number of public health measures is not significant. On the face of it, this result seems to be surprising. However, it should be noted that most of the restrictions are awareness decisions or oriented toward people already infected.

Finally, to depict the correlation between economic impact and government measures, we prefer the scatterplots with statistics of adjustment. The results are drawn on the Figures 1-4. Figure 1 provides a picture of the correlation between the economic impact of the Covid-19 pandemic and the scale of the government measures applied to respond to the pandemic in Europe. No clear correlation patterns appear and the coefficient of determination is less than

10% for any of the measures. Indeed, a higher heterogeneity is noted and most of the countries display an important economic impact. Figure 2 shows the cross-country correlations for Africa. What we observed in this graph is a higher concentration of the countries. The only outlier for all the measures is Libya. This country is severely affected economically by the Covid-19 pandemic. Nigeria is also an outlier for lockdown measures. Contrarily to European countries in Figure 1, a higher homogeneity is observed. The same tendency of homogeneity is apparent in Figure 3 for the countries in American continent. Guyana is the main outlier given that the outlier of the USA is obvious by a high number of public health and governance and socio-economic decisions. The coefficient of determination for the nexuses in Figure 3 is also low. Finally, in Figure 4 no clear correlation patterns are noted for the Asia-Pacific and MiddleEast bloc. For a wide range of countries, the economic impact is important while the number of government measures are fairly low.

4. Concluding implications and future research directions

This study has: (i) analysed the economic impact of the Covid-19 pandemic, (ii) evaluated the effectiveness and relevance of different measures against the pandemic and (iii) examined nexuses between the corresponding measures and economic impacts. The study uses a sample of 186 countries divided into four main regions, notably: Asia-Pacific and the Middle East, Europe, Africa and America. 34 preventives and mitigating measures against the Covid-19 pandemic are classified into five main categories: lockdown, movement restrictions, governance and economic, social distancing, and public health measures. The empirical evidence is based on comparative difference in means tests and correlation analyses. The findings show how the effectiveness and consequences of the Covid-19 measures are different across regions.

The comparative findings which are self-evident from the tables and figures have also been discussed in the light of best-performing and worse-performing countries. The main obvious policy implication in worse-performing regions and countries is for them to leverage on the experience and success stories from their best-performing counterparts at country and regional levels. Moreover, the findings in terms of regional tendencies are also relevant to policy makers with respect to orientations in aid-allocation decisions, such that more foreign aid and investment in an effort to fight the pandemic should be oriented towards regions that have not yet reached an infection peak.

In adopting the relevant policies to fight the ongoing pandemic, the comparative insights from the findings in the study are worthwhile. *Inter alia*: (i) from a holistic

perspective, only European countries have favourably benefited from the Covid-19 measures; (ii) lockdown measures at the global level have not been significant in reducing the pandemic; (iii) the restriction of movement measure has been relevant in curbing the spread in the American continent; (iv) social distancing has been productive in Europe and counter-productive in Africa; (v) governance and economic measures have exclusively been relevant in Europe and (vi) overall public health measures have not had the desired outcomes in flattening the infection curve probably because most of the underlying measures are awareness decisions or oriented toward people already infected.

Future studies can leverage on data with more time series properties as time unfolds to assess how the established findings in the study are robust to further empirical scrutiny. Accordingly, it is only as time unfolds that the relevant data would be available from which corresponding empirical techniques can enable studies to establish causality instead of correlations as apparent in this study. In the meantime, based on the findings provided in this study, a less time-contingent future research direction could be to assess why some regions and countries are failing to adopt effective measures and from the corresponding findings, provide/propose appropriate measures designed to reverse the tendencies in the worse – performing countries and regions.

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Table1: Measures' descriptions

Measures	Descriptions
Movement restrictions	
Additional health or other document requirements upon arrival	Authorities upon arrival to a country may request a health declaration format or doctor's certifications to allow entry.
Border checks	Authorities may travel and identification document checks in land and sea entry points in a country.
Border closure	A country may close the land or sea border with the neighbouring countries. Only nationals and residents are allowed through.
Complete border closure	A country has completely closed the borders for all - including nationals.
Checkpoints within the country	Authorities may have installed check points within the country on regional borders or main road to a) conduct health checks and b) stop the internal movement of people.
International Flights suspension	International and/or internal flights may be suspended by government authorities.
Domestic travel restrictions	Authorities are limiting the movement of people within a country.
Visa restrictions	Authorities are limiting specific nationalities from entering the country or they are adding visa restrictions that did not exist before.
Curfews	Introducing curfews in some regions or in the whole country.
Surveillance and monitoring	Authorities may conduct electronic surveillance via mobile phones or other ways to do case tracing or to monitor the movement of

	people.
Public health measures	
Awareness campaigns	Authorities are conducting awareness campaigns on media, social media, public spaces, or elsewhere around hygiene methods, social distancing, of other measures.
Introduction of isolation and quarantine policies	1. People have to self-quarantine or to be put in isolation units upon arrival to a country. 2. People with symptoms have to self-quarantine or to be put in isolation units. 3. People who have been in touch with confirmed Covid-19 cases have to self- quarantine.
General recommendations	The government has made general recommendations to people to be careful or given some general hygiene guidelines. This usually implies a weak response where other measures are not really taken.
Health screenings in airports and border crossings	Health screening and body temperature controls are conducted by authorities in airports and border crossings.
Obligatory medical tests not related to Covid-19	There are reports of governments having forced people to take health checks for conditions not related to Covid-19 (such as HIV).
Psychological assistance and medical social work	Authorities have implemented measures for the psychological assistance of the patients, their families, as well as people in quarantine or lockdown.
Mass population testing	Authorities are screening all the population of a country or of a region within a country.
Strengthening the public health system	Authorities put in place measures to strengthen the health system. These could be: 1. hiring more doctors or other medical personnel. 2. building new hospitals and medical centres or

	expanding current ones. 3. Other
Testing policy	Conducting tests to identify infected people.
Requirement to wear protective gear in public	Masks/gloves etc. when required by law.
Other public health measures enforced	I.E. sanitation of transports, additional health regulations not falling under other categories
Amendments to funeral and burial regulations	Changes in burial regulation for example in order to limit the number of people who can attend or change the way the burial is conducted.
Governance and socio-economic measures	
Economic measures	Authorities have taken economic measures in order to mitigate the impact of the other restrictions to the economy and the society.
Emergency administrative structures activated or established	Authorities have put in place emergency administrative structures such as Emergency Response committees etc. in order to coordinate the response and/or decide on measures and/or monitor the implementation.
Limit product imports/exports	Authorities are limiting the import or export of either food or health items.
State of emergency declared	Authorities have declared a state of emergency. Usually this measure is used to be able to implement other measures that are not allowed by constitutions in a regular situation. This may also include state of necessity, exceptional state, state of public health emergency.
Military deployment	The military has been deployed to support the medical operations

	and ensure compliance with the measures.
Limit public gatherings	Cancelation of public events. Limit to the number of people that can meet in public and private spaces.
Closures of businesses and public services	Businesses, public services and facilities are closing access to the public. In some countries, services are available online.
Changes in prison policies	Change in policies around prisons to mitigate the spread of the disease. This may include early release but also suspension of day-release programs, suspension of visits etc.
Schools closure	Authorities have closed schools.
Lockdown	
Partial Lockdown	Partial lockdown includes: 1. The population cannot leave their houses apart for specific reasons that they have to communicate to the authorities. 2. All stores that are not related to food supplyor pharmacies are not open.
Full lockdown	Full lockdown includes: 1. The population cannot leave their houses apart for specific reasons that they have to communicate to the authorities. 2. All non-essential services closed and production stops.
Lockdown of refugee/IDP camps or other minorities	Limitations to the population living in camps and/or camp like conditions.

Sources: ACAPS

Table 2: Macroeconomic impact of Covid-19 by region

Region	Obs	Mean	Std. Dev	Min	max
Europe	43	8.69	1.54	6.30	12.90
Africa	54	6.32	7.65	0.50	58.70
Americas	34	8.27	4.94	4.40	32.80
Asia-Pacific and MiddleEast	55	5.97	2.69	1.20	14.10
World	186	7.12	5.02	0.50	58.70

Sources: authors

Table 3: Peaks of Covid-19 by region

Region	Obs	Freq.	Percent
Europe	43	32	74.42
Africa	54	7	12.96
Americas	32	8	25
Asia-Pacific and MiddleEast	41	15	36.59
World	170	62	36.47

Sources: authors

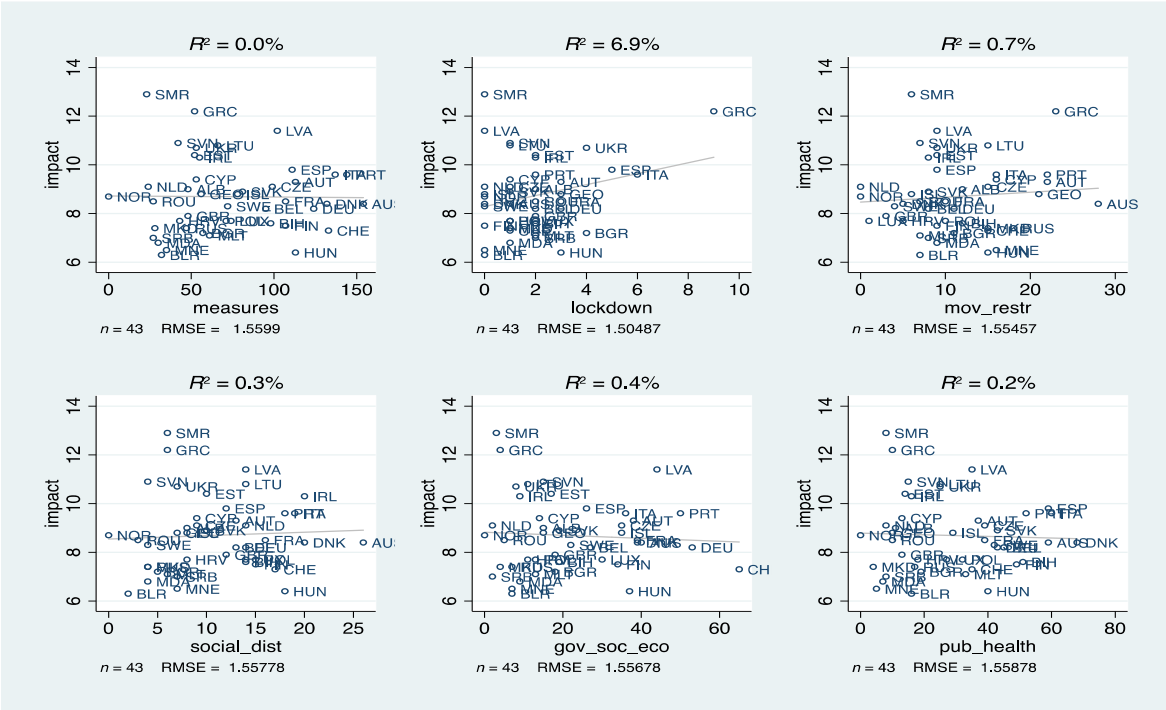
Table4: Government measures efficiency of Covid-19 by region

Region	Mean (0)	Mean (1)	Diff	T-stat	P-value
Total measures					
Europe	51.09	79.43	-28.35	**-2.18**	**0.03**
Africa	43.27	35.57	7.70	0.77	0.44
Americas	55.62	61	-5.37	-0.32	0.75
Asia-Pacific and Middle East	63.54	67.53	-3.99	-0.21	0.83
World	51.69	69.22	-17.53	**-2.67**	**0.01**
Lockdown					
Europe	1.64	1.84	-0.21	-0.32	0.75
Africa	2.38	1.71	0.67	0.49	0.62
Americas	3.37	3.25	0.12	0.10	0.92
Asia-Pacific and MiddleEast	4.34	3.07	1.28	0.92	0.36
World	3.00	2.31	0.69	1.31	0.19
Movement restrictions					
Europe	10.00	11.16	-1.16	-0.52	0.61
Africa	10.11	8.43	1.68	0.68	0.49
Americas	12.67	7.37	5.29	2.26	**0.03**
Asia-Pacific and Middle East	19.54	17.93	1.60	0.33	0.74
World	12.93	12.00	0.93	0.61	0.54
Social distancing					
Europe	7.18	11.78	-4.60	-2.38	**0.02**

Africa	8.85	4.85	4.00	2.02	**0.04**
Americas	7.00	6.75	0.25	0.11	0.91
Asia-Pacific and Middle East	7.77	8.27	-0.50	-0.20	0.84
World	8.01	9.50	-1.49	-1.55	0.12
Governance and economic					
Europe	11.91	24.50	-12.59	-2.38	**0.02**
Africa	8.85	4.85	4.00	1.26	0.21
Americas	13.79	14.12	-0.33	-0.06	0.95
Asia-Pacific and Middle East	13.35	10.20	3.15	0.54	0.59
World	11.34	17.48	-6.14	-2.71	**0.01**
Public health					
Europe	20.35	30.15	-9.79	-1.57	0.12
Africa	13.08	15.71	-2.63	-0.55	0.58
Americas	18.79	29.5	-10.71	-0.90	0.37
Asia-Pacific and Middle East	18.54	28.07	-9.53	-1.28	0.21
World	16.41	27.93	-11.52	-3.59	**0.00**

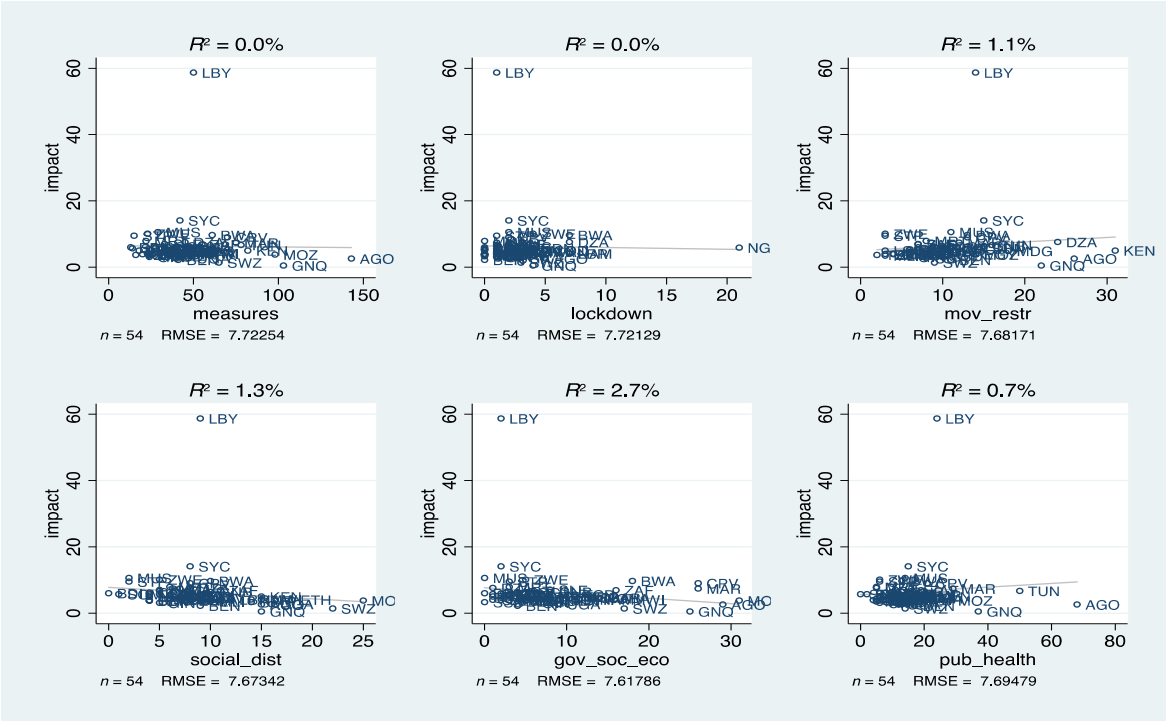
Sources: authors

Figure 1: Correlation between economic impact and measures (Europe)



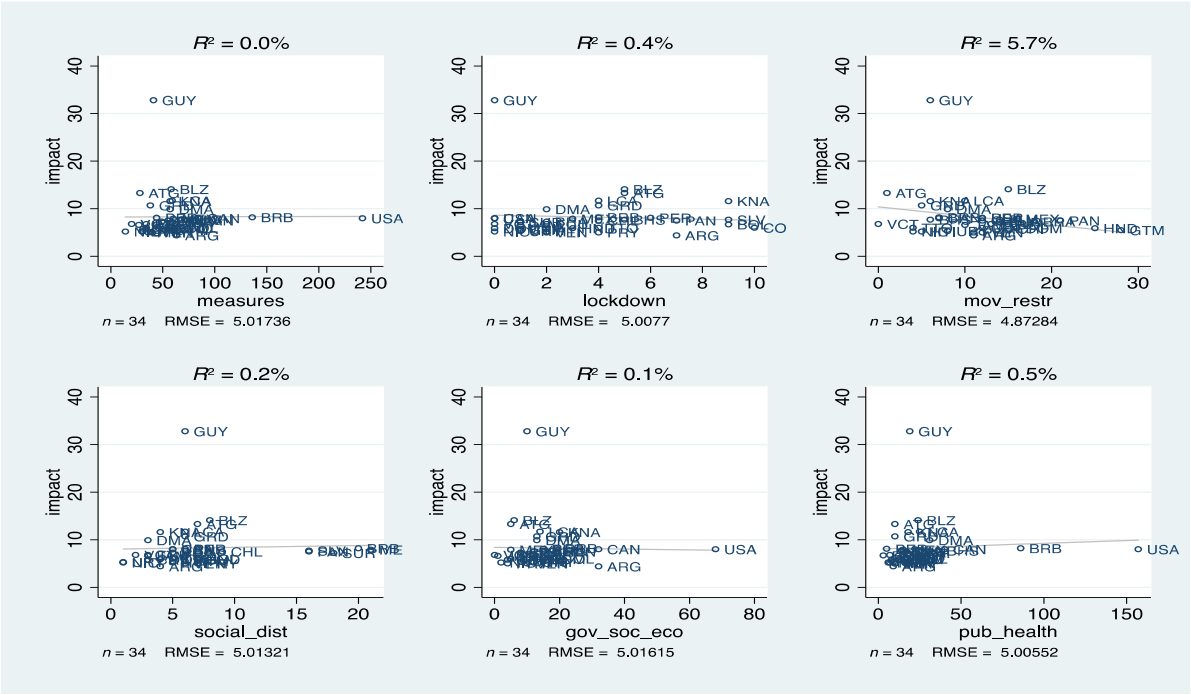
Sources: authors

Figure 2: Correlation between economic impact and measures (Africa)



Sources: authors

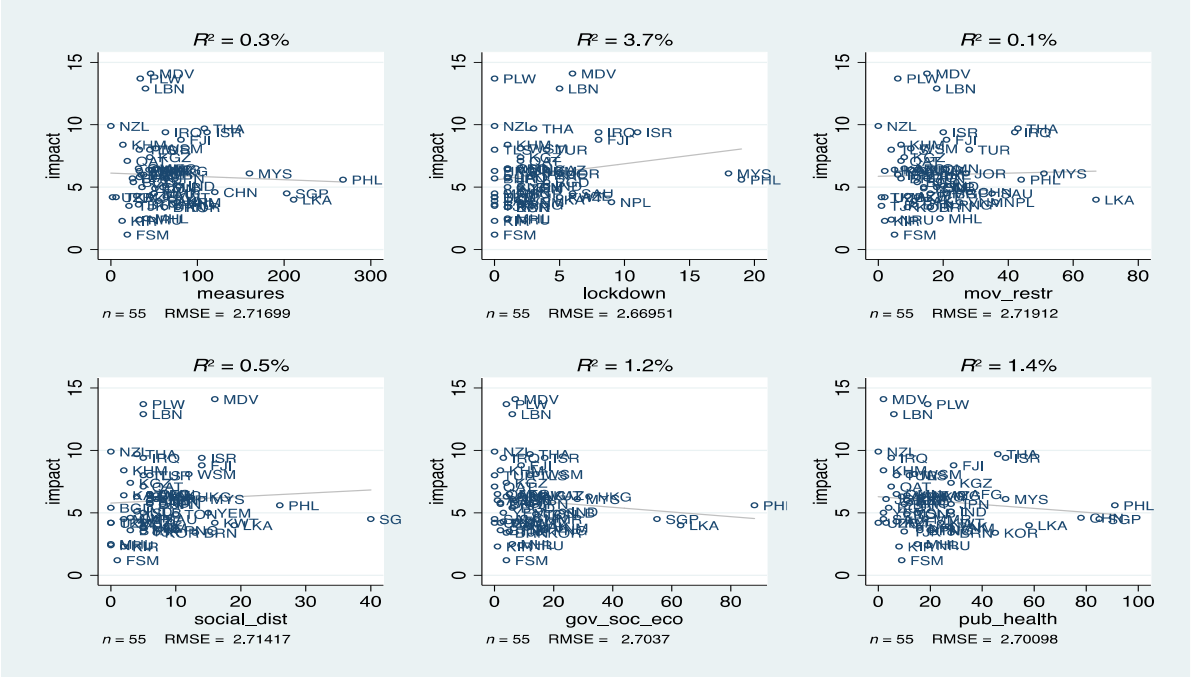
Figure 3: Correlation between economic impact and measures (America)



Sources: authors

Figure 4: Correlation between economic impact and measures

(Asia-Pacific and MiddleEast)



Sources: authors