

Impact of type and timeliness of control measures on COVID-19 epidemic growth: Organization for Economic Co-operation and Development countries, March – July 2020.

*Francisco Pozo Martin (ZIG2), Heide Weishaar (ZIG2),
Florin Cristea (ZIG2), Johanna Hanefeld (ZIG),
Lars Schaade (Inst.Leit.), Charbel El Bcheraoui (ZIG2)*



COVID-19 challenge

- World: 30.3 million cases / ~1 million deaths
- OECD: 11.5 million cases / ~0.5 million deaths
- Ongoing pandemic with no vaccine available
- Possible 2nd, 3rd... waves
 - No vaccine yet available and uncertain end dates
 - Stringent non-pharmaceutical interventions
 - Lockdowns
 - How long can the public adhere to restrictions?



If we had to choose, what measures work best?

- Aim
 - Provide policymakers with the much needed evidence about which measures to relax or suspend and which measures to tighten and rely on in case of a second wave or resurging numbers of cases
- Objectives
 - Measure the effect of the various policy interventions that were implemented in response to COVID-19 on the epidemiological trend of the pandemic in OECD member states*.

*Australia, Austria, Belgium, Canada, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States of America.



Longitudinal panel study using data from publicly available databases.

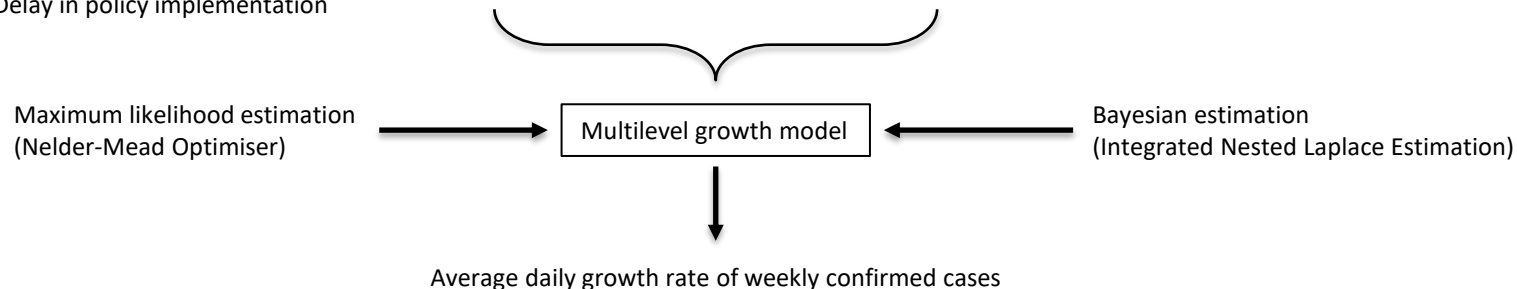
Study period is the period spanning 13 weeks after the first policy is implemented in each country

Policy regressors = intensity of...

1. School closing requirements
 2. Workplace closing requirements
 3. Cancelling of public events
 4. Restrictions on gatherings
 5. Public transport restrictions
 6. Stay at home requirements
 7. Internal travel restrictions
 8. Public information campaigns
 9. Mask wearing requirements
 10. Testing policy
 11. Contact tracing policy
- +
Delay in policy implementation

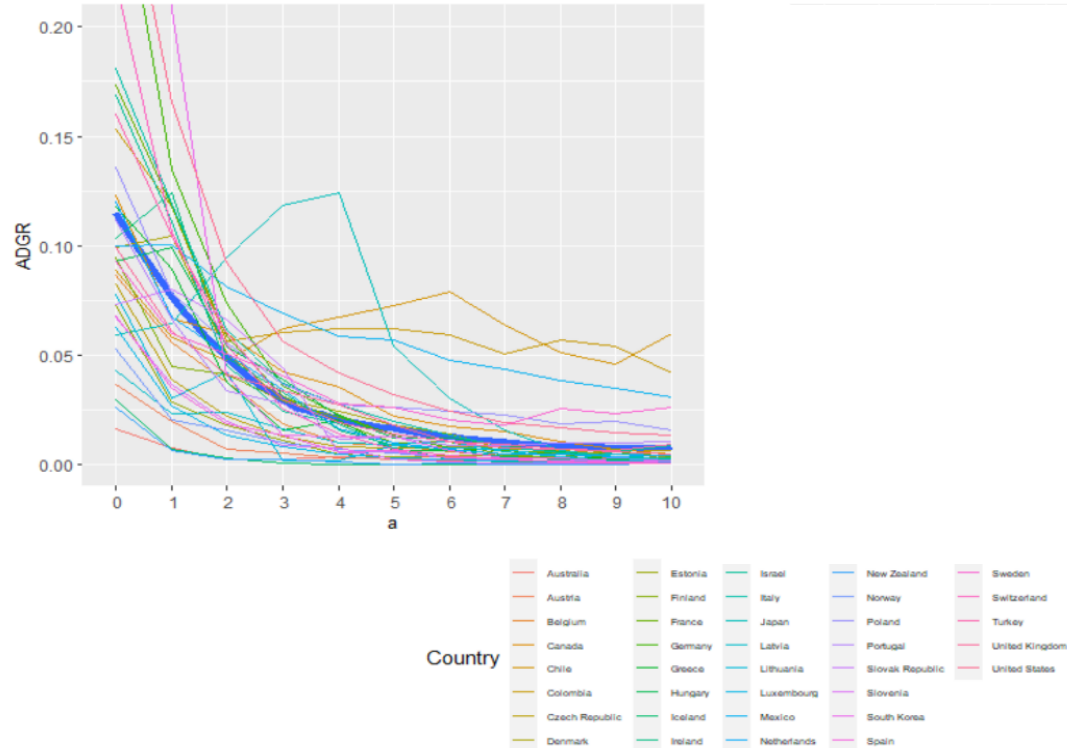
Control variables:

1. Sociodemographic Index
2. GDP per capita (PPP)
3. % of population living in urban areas
4. % of total GDP spent in health
5. Average size of household
6. Palma ratio (measure of inequality)



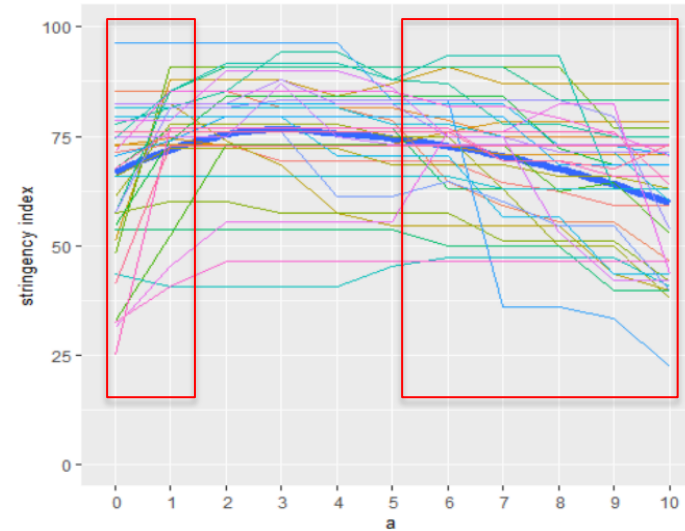
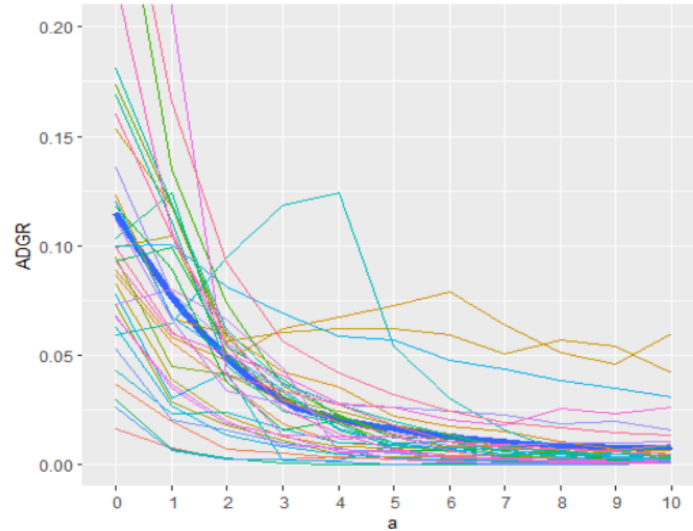


Epidemic growth / intensity of policies over time



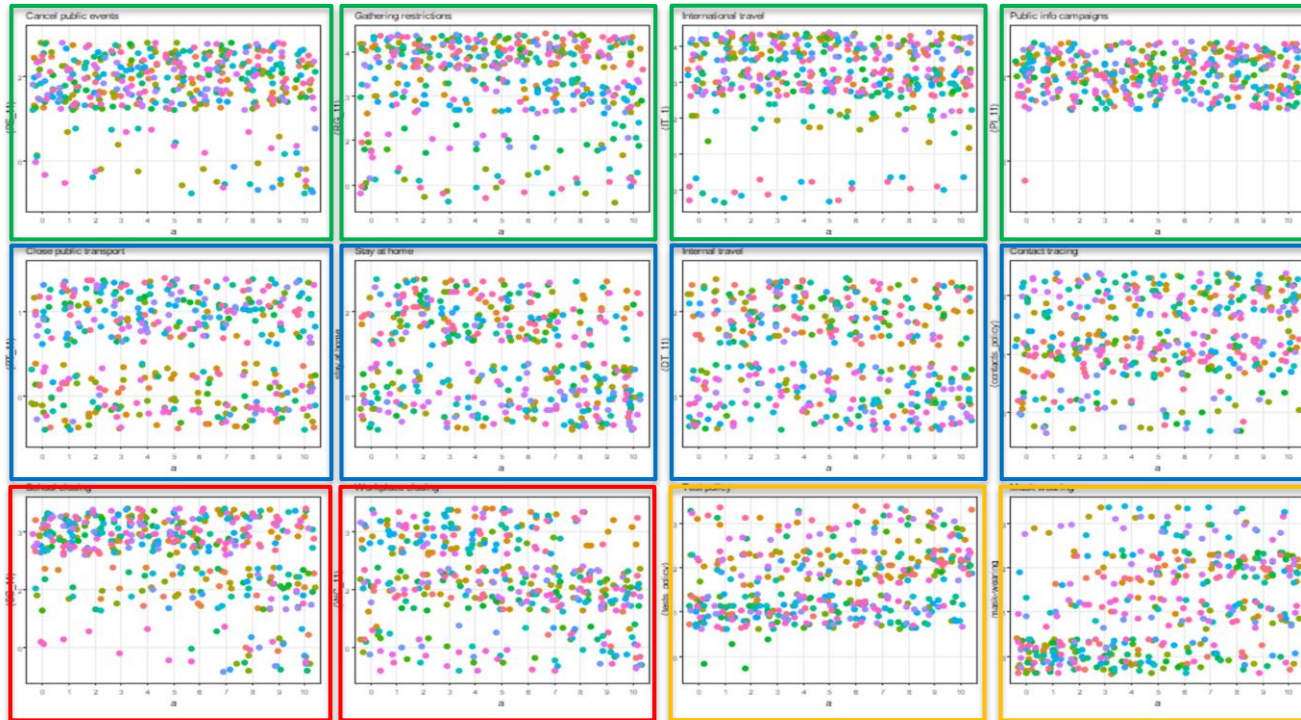


Epidemic growth / intensity of policies over time





Stringency of policy implementation over time





Final model results

Maximum likelihood estimation		Bayesian estimation
Regressors	Coefficients (SE) ^{SIG}	Mean parameter
Intercept	-0.595 (0.134) ***	-0.550
Time	-0.133 (0.009) ***	-0.134
Restrictions on gatherings: gatherings of more than 100 people not permitted	-0.370 (0.088) ***	-0.407
Restrictions on gatherings: gatherings of between 11 and 100 people not permitted	-0.531 (0.086) ***	-0.558
Restrictions on gatherings: gatherings of fewer than 10 people not permitted	-0.494 (0.083) ***	-0.536
Mask-wearing: recommended	-0.050 (0.052)	-0.043
Mask-wearing: required in some public places or in some geographical areas	-0.090 (0.044) *	-0.103
Mask-wearing: required in all public places in all geographical areas	-0.285 (0.060) ***	-0.314
School closing: require closing of only some levels or categories, e.g. just high school, or just public schools	-0.167 (0.064) ***	-0.189
School closing: require closing of all levels	-0.270 (0.073) ***	-0.293
Workplace closing: require closing (or work from home) for some sectors or categories of workers	-0.146 (0.044) ***	-0.141
Workplace closing: require closing (or work from home) of all-but-essential workplaces (e.g. grocery stores, doctors)	-0.201 (0.049) ***	-0.209
Total number of tests performed per thousand population	-0.004 (0.002) **	-0.004



Our study indicates that

- Restrictions on gatherings
- Mask wearing requirements
- School closing requirements
- Work closing requirements
- The total number of tests performed



Average daily growth rate of
weekly confirmed SARS-CoV-2 cases

Policies analyzed



School closing requirements	<p>0 - No measures or recommend closing</p> <p>2 - Require closing (only some levels or categories, e.g. just high school, or just public schools)</p> <p>3 - Require closing all levels</p>
Workplace closing requirements	<p>0 - No measures or recommend closing (or work from home)</p> <p>2 - require closing (or work from home) for some sectors or categories of workers</p> <p>3 - require closing (or work from home) all-but-essential workplaces (e.g. grocery stores, doctors)</p>
Public events cancelling requirements	<p>0 – No measures or recommend cancelling</p> <p>2 – Require cancelling</p>
Restrictions on gatherings	<p>0 - No restrictions</p> <p>1 - Restrictions on gatherings of more than 100 people</p> <p>2 - Restrictions on gatherings of between 11 and 100 people</p> <p>3 – Restrictions on gatherings of 10 people or less</p>
Public transport restrictions	<p>0 – No measures</p> <p>1 – Recommend closing (or significantly reduce volume/ route/ means of transport available) or require closing (or prohibit most citizens from using it)</p>

Stay at home requirements	<p>0 – No measures or recommend not leaving house</p> <p>1 - require not leaving house with exceptions for daily exercise, grocery shopping, and ‘essential’ trips or require not leaving house with minimal exceptions (e.g. allowed to leave only once a week, or only one person can leave at a time, etc.)</p>
Restrictions on internal movement	<p>0 – No measures or recommend not to travel between regions/ cities</p> <p>2 – internal movement restrictions in place</p>
International travel controls	<p>0 - No measures</p> <p>1 - Screening</p> <p>2 - Quarantine arrivals from high-risk regions</p> <p>3 - Ban on arrivals from some regions</p> <p>4 - Ban on all regions or total border closure</p>
Public health information campaigns	<p>0 -No COVID-19 public information Campaign</p> <p>1 - public officials urging caution about COVID-19</p> <p>2 - coordinated public information campaign (e.g. across traditional and social media)</p>
Mask policies	<p>0 - No mask-wearing requirements</p> <p>1 – Mask wearing in public recommended</p> <p>2 – Mask wearing in public required in some public places/ geographical areas</p> <p>3 – Mask wearing in public required in all public places/ geographical areas</p>