

How effective has the Spanish lockdown been to battle COVID-19? A spatial analysis of the coronavirus propagation across provinces



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OBJETIVOS / OBJETIVES

- This paper examines the propagation of COVID-19 across the Spanish provinces, using spatial econometric techniques.
- This feature enables us to test whether the lockdown has been effective in both preventing the propagation of the coronavirus between provinces and in attenuating the propagation of the virus within each province.
- We also carry out several counterfactual exercises to simulate what would have happened in two different hypothetical scenarios.

METODOLOGÍA / METHODOLOGY

The model that is finally estimated is linear, so it can be estimated using the standard Fixed-Effect (FE) estimator:

$$\ln(\ln Y_{it} - \ln Y_{it-1}) = \alpha_i + \gamma Z_{it} + \lambda W_i X_t + v_{it}$$

Where Z include two sets of variables. First, epidemic time (K) and transformations of this variable (K^2, K^3). Second, a dummy variable $M14$ that takes the value 1 from the 14th of March and one- and two-week lags of this dummy variable (i.e. $M21$ and $M28$). W represents the mobility and X includes K and $M14$.

RESULTADOS/ RESULTS

- The rates of growth of COVID-19 cases in one province depends on the development of the epidemic in other provinces. This result corroborates the findings by [Giuliani et al. \(2020\)](#) in Italy.
- We find a negative and statistically significant effect of $M14_t$ on the rates of growth of coronavirus cases, even though the lockdown require time to have an effect due to the gap in time between a person getting infected and subsequently infecting another person. Whereas larger effects were not found one week after the implementation of the lockdown due to the coefficient of $M21_t$ is not statistically significant, the negative and statistically significant coefficient of $M28_t$ indicates that the Spanish lockdown increased its effectiveness two weeks after its implementation.
- The counterfactuals indicate that lockdown implemented on March 14th has reduced the number of potential COVID-19 cases by 79.5%. Similar numbers are found by [Nussbaumer-Streit et al. \(2020\)](#). Taken together both counterfactual analyses, the lockdown implemented on March 7th has reduced the number of potential COVID-19 cases by 92.3%.

GRÁFICOS Y TABLAS / GRAPHS TEXT

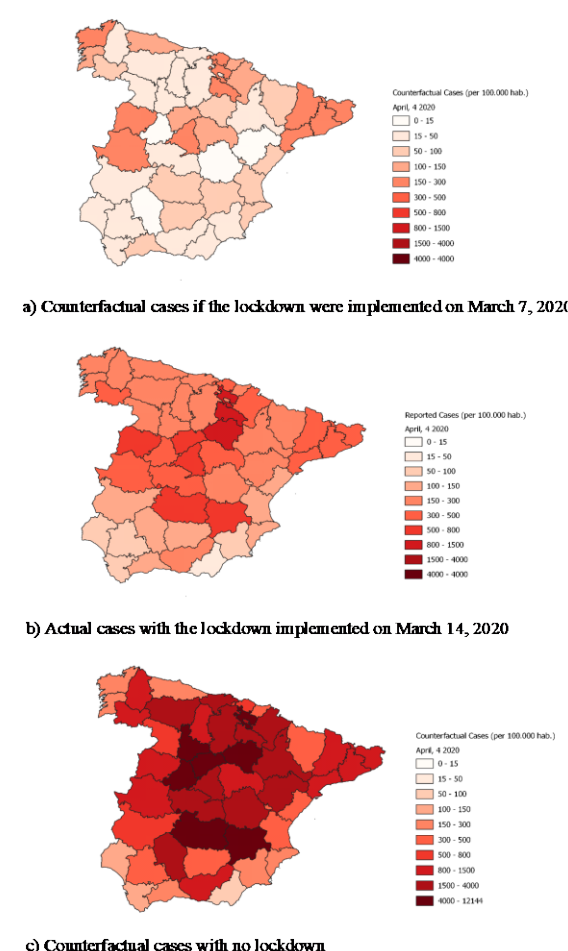


Figure 1. Geographical distribution of actual and simulated cases on April 4, 2020

CONCLUSIONES/ CONCLUSIONS

The rate of growth of COVID-19 cases in one province depends on the development of the epidemic in other provinces

The lockdown has been effective to both attenuate the propagation of the virus in the absence of both pharmaceutical measures (e.g. vaccines) and other non-pharmaceutical interventions (e.g. massive testing, face-masks available for the whole population, etc.). However, it should be implemented at the very early stages of the epidemics

REFERENCIAS/ REFERENCES

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