ECONOMICS DISCUSSION

Does Testing for Coronavirus reduce Deaths*?

W A Razzak

School of Economics and Finance, Massey University, PN, New Zealand

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Abstract

We examine the effect of testing for Coronavirus on deaths in eight countries over the month of March 2020 by estimating a fixed-effect regression model using the Generalized Method of Moments (GMM). On average, the data reject the hypothesis that "testing" for the virus does not affect death. By country, however, we reject the hypothesis in two countries at the 5 percent level, in three countries at the 10 percent level, and could not reject it in three other countries.

JEL Classifications: I10, C23, C26
Keywords: Pandemic, Testing and Deaths, Panel Data, Fixed Effect Model, GMM

* All correspondence to W A Razzak, Honorary Research Fellow at the School of Economics and Finance, Massey University, PN, New Zealand at razzakw@gmail.com or w.razzak@massey.ac.nz.

1. Introduction

The World Health Organization (WHO) emphasizes that testing for Coronavirus is an essential pillar in the strategy for fighting against the virus. Testing determines with some

We estimate semi-elasticity across the panel and reject the null hypothesis on average. Then we allow the country slope to vary, and we are able to reject the null hypothesis on different statistical levels. The hypothesis is strongly rejected in the cases of Italy and the U.S. i.e., tests significantly reduce deaths. We can reject the hypothesis in the cases of Belgium and the U.K., and possibly in Japan but not in Austria, Iceland, and South Korea.

Next we describe the data first because the data determined our estimation methodology then we present the model, estimation, and results. Section 3 is a conclusion.

2. Hypothesis, data, methodology, and results

2.1 Hypothesis

We are unaware of any empirical examination of the efficacy of “testing for Coronavirus”. Does it reduce death seems like a reasonable question to ask, and by how much? Therefore, the objective of this paper is to test the hypothesis that testing for the Coronaviris has no effect on deaths.

2.2 Data

We begin by describing the data because the data determine our methodology. We have data e. Then

Another set of data by Oxford University, which report the cumulative number of tests for Coronavirus per millions of people by country is much smaller than the above data set. The data do not report the results of the tests so we do not know if some people tested positive or negative. There is no information about the methods, the institutions, etc. This data set is much smaller than the earlier one because fewer countries have tested systematically, and some countries tested much later in time, e.g., end of March or early April. We identified only eight countries only that have reported complete time series data for the cumulative number of tests from March 1 to March 31, 2020. Thus, we choose these countries in order to have a balanced panel. These countries are Austria, Belgium, Iceland, Italy, Japan, South Korea, U.K., and the U.S.

Figure (1) is a scatter plot of the percentage change in the number tests and deaths. All the correlations are negative, except for South Korea where there is no correlation. The cumulative number of tests per million people increased in all countries in March 2020. The challenge is to confirm these visually observed correlations (and perhaps causations) in regressions. We also want to measure the magnitude of the change in deaths due to testing.

2.3 Methodology

We fit a linear State-Dependence first-order dynamic model with an unobserved heterogeneity:

(1)

The dependent variable

The OLS coefficient estimates of equation (1), whether a fixed-effect model or a first-differenced transformation are biased and inconsistent, Therefore, we estimate equation (1) using the GMM to estimate a fixed-effect model with White cross-section instrument weighting matrix; and White cross-section standard errors and covariance. (see for example, Wooldridge (2002), Matyas and Sevestre (1996), Hyslop (1999), Gary (1984), Baltagi (1995), Arellano and Bover (1995), and Anderson and Hsiao (1982)[2]).

The instruments include a constant term, Δ [illegible], Δ [illegible], and infections and lagged infections[3]. Infections could lead to death, thus they could be used as instruments. Figure (2) is a scatter plot of infections and death. The correlation is positive in all cases except in the case of South Korea, where the correlation is weakly negative. Not all infected people die of

Table (2) allows the slope coefficient to vary across countries. The estimated semi-elasticity is significant in Italy, and the U.S. The semi-elasticity indicates that a one percent increase in testing for the virus reduces deaths by 68.5 and 12.3 a day in these two countries respectively. However, at the 10 percent level, the Belgium and U.K. data suggest that testing has a significant negative effect on deaths, more so in the case of Belgium. The estimated semi-elasticity is -1.65 and -31.8 thus a one percent increase in daily testing reduces deaths by 1.65 and 31.8 a day in Belgium and the U.K. respectively. The estimated semi-elasticity in Japan could be considered significant at a higher than 10 percent level, albeit much less significant than in Belgium and the U.K. It implies that a one percent increase in daily tests reduces deaths by 25. The results for Austria, Iceland, and South Korea are statistically insignificant.

3. Conclusions

We examined the effect of “testing” for Coronavirus on deaths in eight countries (Austria, Belgium, Iceland, Italy, Japan, South Korea, U.K., and the U.S.). We chose this panel only because a balanced panel exist for the period from March 1, 2020 to March 31, 2020. We estimated a State Dependence – a linear first-order dynamic model – using GMM, where by deaths depends on lagged deaths, and tests for the Coronavirus. Our instruments included infections, lagged infections, and appropriate (distanced) lags of deaths and tests. On average and across the panel, a one percent increase in tests reduces death by about 4 a day. When we allowed the effect of tests on deaths to vary across countries, we found that tests reduce deaths in Italy and the U.S. at the 5% significance level, in Belgium and the U.K. at the 10% level, and at a lower significance level in Japan. The hypothesis that tests do not reduce deaths is rejected in the case of Austria, Iceland, and South Korea. We conclude that testing for the Coronavirus could be a useful pillar in the strategy to deal with the pandemic.

References

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Tables and Figures

Table (1)

Dependent Variable: ضس (DEATH)
Method: Panel GMM EGLS (Cross-section weights)
Periods included: 27
Cross-sections included: 8
Total panel (balanced) observations: 216
White cross-section instrument weighting matrix
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Erro	t-Statistic	Prob.
C	70.84714	22.43690	3.157617	0.001*
پ ژ ضس	0.962212	0.081554	11.79849	0.000*
ضس	-4.567294	1.619102	-2.820882	0.005*

Weighted Statistics

Root MSE	64.69200	R-squared	0.710428
Mean dependent variable	58.03890	Adjusted R-squared	0.697777
S.D. dependent variable	109.1907	S.E. of regression	66.24359
Sum squared residuals	903971.8	Durbin-Watson sta	1.658484
J-statistic	5.275447	Instrument rank	13
Prob(J-statistic)	0.152704		

Unweighted Statistics

R-squared	0.893153	Mean dependent va	78.16667
Sum squared residuals	782367.6	Durbin-Watson sta	2.174279

The instruments are ڀ ژ ضس , infections, lags 1, 3, and 4 of infections. Asterisk denotes significant At the 5% level. The J statistics P values indicates that we cannot reject the validity of the over-identifying restrictions.

Table (2)

Dependent Variable: ضلس (DEATH)
Method: Panel GMM EGLS (Cross-section weights)
Sample (adjusted): Mar 5, 2020 – Mar 31, 2020
Periods included: 27
Cross-sections included: 8
Total panel (balanced) observations: 216
White cross-section instrument weighting matrix
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Erro	t-Statistic	Prob.
C	223.9346	111.0194	2.017076	0.0450*
پ ژ ضلس ضلس	0.497655	0.319181	1.559163	0.1205#
Austria	-0.203774	0.328276	-0.620740	0.5355
Belgium	-1.657207	0.988440	-1.676588	0.0952#
Iceland	-0.003510	0.004648	-0.755221	0.4510
Italy	-68.49904	35.64869	-1.921502	0.0561*
Japan	-0.252101	0.218778	-1.152315	0.2506#
South Korea	0.064096	0.290564	0.220592	0.8256
U.K.	-31.80554	23.56964	-1.349428	0.1787#
U.S.	-12.63421	5.056308	-2.498701	0.0133*

Weighted Statistics

Root MSE	123.8680	R-squared	0.457505
Mean dependent variable	110.0778	Adjusted R-squared	0.413887
S.D. dependent variable	130.9937	S.E. of regression	129.0504
Sum squared residuals	3314147.	Durbin-Watson sta	2.495593
J-statistic	21.88009	Instrument rank	34
Prob(J-statistic)	0.189374		

Unweighted Statistics

R-squared	0.689874	Mean dependent va	78.16667
Sum squared residuals	2270842.	Durbin-Watson sta	1.996665

The instruments include ضلس ژ ي for each cross-section; infections and lags of infections 1, 3 and 4. Asterisk denotes statistically significant at the 5% level; #denotes statistically Significant at the 10% level. The J statistics P values indicates that we cannot reject the Validity of the over-identifying restrictions.

Figure (1)

Data Appendix

The source is https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-geographic-disbtribution-worldwide.xlsx

The source for the tests is the University of Oxford https://www.oxfordmartin.ox.ac.uk/global-development, and the 8 countries are Austria, Belgium, Iceland, Italy, Japan, South Korea, The U.K., and the U.S.