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# Outcome-Based Evaluation of Leadership during the COVID-19 Pandemic: An Empirical Study

# Final Report

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## I. Introduction

The effect of catastrophes on leaders' political successes is a key area of political economy. Studies have researched the impact of various events on the performance of relevant political leaders, ranging from hurricanes (Abney & Hill, 1966) to shark attacks (Achen & Bartels, 2013) and everything in-between. Most have found that leaders are, to some extent, punished at the polls for disasters largely beyond their control.

Few events have created international disturbances on the same scale as the COVID-19 pandemic. Bar a short list of island nations (along with Turkmenistan and North Korea), every country has recorded positive tests. Several nations responded sharply; New Zealand, under Prime Minister Jacinda Ardern, is generally referred to as a leading example of a strict-yet-effective response, having recorded just a total of 26 deaths. For perspective, Ireland has a similar population and a cumulative 5,074 deaths (WHO *Global Situation Reports*, 2021). Others have shied away from applying strict restrictions, to varying degrees of success.

This study intends to investigate how voters at a national level evaluated their leader's response to the pandemic. More specifically, we will apply statistical methods to election data and find correlation with specific COVID-19 data such as death, infection and vaccination rates, government response indexes, lockdown durations, and similar measurements.

This will be researched through the statistically powerful tool of linear regressions. We will begin with simple linear regressions to identify certain variables having greater impact than others. Next, multivariate regressions will be introduced with the assumption that electorates respond to different areas of a leader's COVID-19 response simultaneously and differently.

## II. Literature

Studies on the impact of disasters and catastrophes (natural or otherwise) have long existed in political economy. Achen's & Bartel's paper 'Blind Retrospection: Why Shark Attacks Are Bad For Democracy,' (2013) and its application of the linear regression to election data, was a particular inspiration for this project.

The largest contributions to methodology came from Baccini, Broudeur and Weymouth's 'The COVID-19 pandemic and the 2020 US presidential election' (2021), which applied multivariate regressions to county-level election data from the United States to identify the effect of the pandemic on Donald Trump's election success. I intended to apply similar methodology, albeit with fewer control variables and a much smaller sample size. Gasper and Reeve's 'Make It Rain? Retrospection and the Attentive Electorate in the Context of Natural Disasters' (2011) similarly contributed to the use and form of the linear regressions applied in this study.

This study will differ from the aforementioned literature by researching at an international level. This reduces our statistical power (a limited number of elections have taken place during the pandemic *and* we are forced to deal with differing election systems), but allows us to observe global trends.

## III. Regression Methodology

The aim of this study was to identify correlation between certain COVID-19 variables and differences in the electoral performance of national leaders between a pre-pandemic election and a subsequent election that has taken place *during* the pandemic (considered to be during or after March 2020). Standard linear regressions (or 'lines of best fit') are applied for this purpose.

The electoral performance of each leader is measured as the total number of votes cast for them as a percentage of total votes. In the case of multi-stage elections, we consider only the final stage of voting.

The dependent variable for the regression is the percentage of votes cast for each leader during their 'pandemic election' subtract the same statistic in their 'pre-pandemic election.' This will hereon be referred to as the 'difference in vote share,' and is assumed to represent the electorate's view of their time in office; a positive difference is assumed to suggest they performed well, and a negative difference suggests they performed poorly.

This would then be regressed against various combinations of independent variables. The most significant of these variables are:

1. Cumulative deaths, lagged one week behind the election date to account for electorate response time (hereon referred to as 'lagged')
2. Cumulative reported cases, lagged
3. Total number of vaccines distributed, lagged
4. Total number of days spent in national or near-national lockdown prior to the date of election
5. Four of the University of Oxford's 'Government Response Tracker' Indexes, lagged:
    a. Containment and health index
    b. Stringency index
    c. Economic support index
    d. Overall government response index

These variables would be applied in numerous combinations and controlled in various ways for factors such as elapsed time (as cumulative variables will grow continuously throughout the pandemic) and population sizes.

## IV. Data Collection

To investigate the described electoral changes during the pandemic, we first needed to identify a sample of comparable elections. The International Idea Institute for Democracy and Electoral Assistance maintains an exhaustive list of elections successfully amid the COVID-19 pandemic. Due to the nature of this study – focussing on a *specific leader's* response – the list was then cut to a sample of elections that elected, directly or indirectly (in the case of general elections), a national leader with significant authority over the respective nation's pandemic response.

This was then further cut to a sample of elections in which a leader stood for *re-election*. Thus, the result became a list of elections that have taken place amid the COVID-19 pandemic in which the previously incumbent leader has stood – successfully or unsuccessfully – for re-election. This allows us to attribute their second election result at least partially to their respective COVID-19 response. Data on the incumbents' previous election result (in all cases a pre-pandemic election) was then gathered to allow comparison.

Finally, outliers were removed. This solely included Iceland's 2016 and 2020 elections, between which President Jóhannesson increased his vote share by 53.1%.

Next, data was gathered on the nine variables mentioned in section III for each national leader, with additional data gathered as control variables:

1. Each nation's population at the time of their election

2. Transparency International's 'Corruption Perceptions Index,' to investigate whether larger positive swings correlated with higher levels of corruption
3. Days elapsed since each country's first recorded case, considered to be 0 if the election took place before this event

Macroeconomic indicators such as GDP, inflation and unemployment were also investigated, but proved too time-consuming to be completed.

Several challenges were encountered during data collection which weaken the accuracy of our results. The greatest hurdle is found in trying to standardise electoral systems. Whilst some nations consider small percentage changes in votes to be significant (in the UK, for example, just a few percentage points can amount to a 'landslide victory'), it is more common in others (Tanzania, which is in our sample, often sees massive vote swings; between 2015 and 2020, the change was +25.9% for the incumbent). Accounting for these differences is beyond the reach of this project; we instead are forced to draw the assumption that all nations in our dataset have an identical electoral system.

Additional weaknesses can also be identified in our COVID-19 data. This is because each nation reports their own statistics for measures such as cumulative deaths and number of positive cases, though have varying definitions of each; Scotland, for example, only reports deaths that occur within 28 days of a positive COVID test, accounting for around 88% of all deaths in confirmed cases of COVID-19. England, until August 2020, reported *all* deaths with a positive COVID-19 test (UK Government's *Public Health Matters* blog, 2020). Each country has its own method of calculation, meaning there are unavoidable discrepancies in the data. This is also beyond the reach of this study, so we must assume all countries to have identical definitions.

The challenge of definitions also extends to the variable counting the number of days spent in lockdown; each country adopts a different set of rules, meaning what is a 'lockdown' in one nation may be comparably lax in another. To account for this, we consider the Oxford Stringency Index as a variable, which is a measurement of how strict each country's 'lockdown-style' policies are at any given point in time (lagged to allow electorate response time).

The largest barrier this project faced was its sample size. Due to the limited number of elections that have happened since the pandemic's outset – and the further need to cut the list to create a study on the evaluation of *individual* leaders – the project was limited to a sample size of 41. In conjunction with the traditional difficulty of modelling elections, we must accept that our resulting regressions are purely investigatory; we cannot perform the counterfactual exercises performed in Baccini, Brouder and Weymouth (2021) which allows an election result to be reimagined with differing numbers of COVID-19 incidence. Instead, this study is purely suggestive of the factors that influenced electorates internationally.

## V. Results

Table one shows the results of the first investigation, in which our dependent variable (difference in vote share, $Y$) was regressed against each of our variables individually. Each row represents a different regression following the structure:

$$Y = a + bX_1$$

In which $a$ is an intercept term and $X_1$ represents the variable in the first column, with $b$ as its coefficient.

**Table 1: Simple linear regression results**

| | $X_1$ | $b$ (Coefficient estimate) | Adjusted R-squared[1] | P-value for variable T-test[2] | Significance[3] |
|---|---|---|---|---|---|
| **1** | Cumulative deaths as a percentage of population | -64.39 | 0.005981 | 0.27 | |
| **2** | Rolling average of daily deaths in the month prior to election per 100,000 population | -5.14 | 0.001287 | 0.31 | |
| **3** | Deaths as a percentage of population, IHS applied[4] | -64.52 | 0.006043 | 0.27 | |
| **4** | Cumulative cases as a percentage of population | -1.15 | 0.04998 | 0.09 | . |
| **5** | Rolling average of daily cases in the month prior to election per 100,000 population | -0.13 | 0.04371 | 0.10 | . |
| **6** | Cases as a percentage of population, IHS applied | -3.58 | 0.0932 | 0.03 | * |
| **7** | Cumulative vaccines distributed per capita | -10.03 | 0.01122 | 0.24 | |
| **8** | Elapsed time since each nation's first recorded case | -0.01 | -0.001855 | 0.34 | |
| **9** | Number of days in which the country has been under significant 'lockdown' restrictions, as a percentage of days elapsed since first recorded case | -0.01 | -0.0268 | 0.93 | |
| **10** | Oxford Stringency Index | -0.06 | -0.01706 | 0.52 | |
| **11** | Oxford Health and Containment Index | -0.16 | 0.03577 | 0.14 | |
| **12** | Oxford Economic Support Index | -0.04 | -0.006675 | 0.39 | |
| **13** | Oxford Government Response Index | -0.16 | 0.03819 | 0.14 | |
| **14** | Corruption Perceptions Index | -0.16 | 0.05805 | 0.09 | . |

The majority of $b$-values coincide with what we would expect. Higher death and case rates correlate with worse electoral performance, and 'stricter' lockdown policies follow the same pattern. If we investigate the R-squared and T-test values, we find that most regressions are statistically 'weak' (as expected due to our small sample size), but that the strongest regressions belong to the number of cumulative confirmed cases (4), rolling confirmed cases in the month prior to election (5) and cases with IHS applied (6). We can be *more confident* that electorates respond to case numbers, controlled to account for varying populations, than the other variables tested; the higher the case rates, the worse their national leader performs in the election.

[1] 'Adjusted $R^2$' is a measure of how close the data is to the fitted regression line. For example, if $R^2$ is 0.5, approximately *half* the observed variation can be explained by the model.
[2] The P-value from a T-test in this context indicates whether the model can explain variations in the observations, or if no relationship exists. A lower P-value suggests that a relationship *is likely to* exist.
[3] This is simply a 'star rating' of the variable. Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
[4] IHS (inverse hyperbolic sine) is used to substitute a logarithm in this example because it allows retention of zero-valued observations. This is a commonly-used recent practice (Bellemare, 2018).

We can estimate that 1% of the population testing positive for COVID-19 would make it probable that the incumbent loses 1.15% of votes. This trend is more extreme in the short term; if just 10 per 100,000 population tested positive in the month before election, the incumbent would likely lose 1.2%. The relationship is more extreme for deaths; if 1% of the population was killed by COVID-19, we would expect the incumbent politician to lose *64% of votes* at the next election. This, however, requires extrapolation from an already weak regression and cannot be considered accurate (no country has, to date, recorded such high deaths).

Regression seven, investigating vaccination rates, is an outlier and suggests that electorates disprove of higher vaccination rates. It should be noted that this regression is *highly* confounded by factors such as specific countries ordering high numbers of vaccines in a short timeframe and a small sample size (just 11 of our sample had started vaccinating before their election date). We cannot draw conclusions from this result.

The four Oxford indexes (10-13) also appear to have a negligible effect on the leader's performance. They are weakly negative, suggesting that leaders taking more active approaches during the pandemic are punished. This, however, is confounded and requires further investigation.

Regressions eight, nine and fourteen were used to verify that their respective variables were uncorrelated with electoral performance, and we did not have to account for them in multivariate regressions. Eight shows that leaders perform, on average, just as well in the more recent stages of the pandemic than the initial stages. Nine verifies a similar lack of correlation for the number of days in which a country was in lockdown, as a percentage of total days elapsed since the first recorded case.

Thirteen, however, demonstrates that greater perceived electoral corruption *may* have been loosely correlated with stronger electoral performance. A leader in a country with a CPI of 0 would perform approximately *16% better* than a counterpart in a country with a CPI of 100.

Though the simple linear regressions provide interesting results, the aim of this study was to create a multivariate regression, meaning that we must consider more than one variable at a time. We now give our regressions the following form:

$$Y = a + bX_1 + cX_2 + dX_3 + \cdots$$

Now $X_1$ represents the first variable with coefficient $b$, $X_2$ is the second variable with coefficient $c$, and so on. $b$ remains an intercept term. Where there is an empty box in the $X_n$ columns, only the variables in the other columns are used in the regression.

One difficulty of this analysis is that independence between our variables is not guaranteed in all cases. Many of our variables are intrinsically connected; for example, if infections rise, as do deaths; greater distribution of vaccinations reduces both; etc. For this reason, we must be careful to choose combinations of variables that are as far from dependent as possible.

**Table 2: Multivariate regression results**

| | | | | Coefficient estimates and star rating | | | |
|---|---|---|---|---|---|---|---|
| | $X_1$ | $X_2$ | $X_3$ | ***b*** | **c** | **d** | **Adjusted R-squared** |
| 1 | Oxford Stringency Index | Oxford Health and Containment Index | Oxford Economic Support Index | 0.45 . | -0.67 * | 0.02 | 0.07904 |
| 2 | Deaths as a percentage of population, IHS applied | Days elapsed since first recorded case | | -0.01 | -0.01 | | -0.01461 |
| 3 | Cases as a percentage of population, IHS applied | Days elapsed since first recorded case | | -3.76 * | 0.01 | | 0.07809 |
| 4 | Rolling average of daily deaths in the month prior to election per 100,000 population | Oxford Stringency Index | Oxford Health and Containment Index | -0.63 | 0.42 . | -0.61 * | 0.07521 |
| 5 | Rolling average of daily cases in the month prior to election per 100,000 population | Oxford Stringency Index | Oxford Health and Containment Index | 0.00 | 0.42 . | -0.62 * | 0.07485 |

Our results give very little clarity. Two and three suggest that cumulative deaths and cases alongside time elapsed (to account for cases always increasing in time, but never decreasing) do not correlate with electoral performance. The Oxford indexes also appear uncorrelated when used alongside measures such as deaths and cases.

It is difficult to conclude whether these variables are, in fact, uncorrelated or an oversight in our methodology (such as non-independent variables or small sample sizes) produce these results.

## VI. Conclusion

We can infer from our regressions that voters do respond to certain COVID-19 factors when voting on an incumbent politician. The most significant appeared to be both cumulative cases and short-term case numbers, to which voters responded reasonably sharply. Though the trend is less clear-cut (possibly due to the various ways in which countries keep count), reported deaths show a similar relationship.

Most variables showed little-to-no reliable correlation. The only other variable suggestive of a relationship was the Corruption Perceptions Index, which demonstrated that leaders in countries perceived to have higher levels of corruption may have performed better; however it cannot be concluded from this study whether this relationship occurs exclusively in the pandemic or extends to all elections.

We must, however, consider our methodology. This study was intended to be purely indicative of relationships due to its small sample size and high number of simplifying assumptions; we cannot decisively conclude that these relationships do or do not exist.

Further research could contribute to this work by applying similar methods to a larger dataset to increase statistical power, which is entirely plausible given the ongoing nature of the pandemic. Beneficial additions could also be made through accounting for the extent to which a national leader is responsible for their health policy and whether the electorate considers this when voting, or introducing a greater number of controls (especially economic indicators) to account for other areas of a politician's performance.

## VII. Note of Thanks

I am eternally grateful for the guidance and support of my supervisors, Dr Margherita Negri and Dr Luc Bridet, of the St Andrews School of Economics. This study is also indebted to Dr Valentin Popov of the St Andrews School of Mathematics and Statistics for his statistical advice.

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International Idea's *Global Overview of COVID-19: Impact on elections* 2021, International Institute for Democracy and Electoral Assistance, accessed 25th August 2021 <https://www.idea.int/news-media/multimedia-reports/global-overview-covid-19-impact-elections>

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Abney, F., & Hill, L. (1966): Natural Disasters as a Political Variable: The Effect of a Hurricane on an Urban Election. *The American Political Science Review, 60*(4), 974-981. doi:10.2307/1953770

Hart, Joshua (2021): Did the COVID-19 pandemic help or hurt Donald Trump's political fortunes? *PLoS One* 16(2): e0247664

## Appendix

### i. Data sources

*Data on cases and deaths:*

John Hopkins University Center for Systems Science and Engineering, *2019 Novel Coronavirus Visual Dashboard*, GitHub, accessed 15th June 2021 <https://github.com/CSSEGISandData/COVID-19>

*Data on vaccinations:*

Our World in Data's *COVID-19 Data Explorer*, Github, accessed 21st June 2021, < https://github.com/owid/covid-19-data/tree/master/public/data>

*Election data:*

International IDEA's *Global overview of COVID-19: Impact on elections*, International IDEA, accessed 15th June 2021 <https://www.idea.int/news-media/multimedia-reports/global-overview-covid-19-impact-elections>

*Oxford Government Response Indexes:*

University of Oxford's *COVID-19 Government Response Tracker (OxCGRT)*, Github, accessed 3rd July 2021 <https://github.com/OxCGRT>

*Corruption Perceptions Index:*

Transparency International's *Corruption Perceptions Index 2020*, Transparency International, accessed 29th June 2021 <https://www.transparency.org/en/cpi/2020/index>

*Lockdown dates:*

Wikipedia's *National responses to the COVID-19 pandemic*, Wikipedia, accessed 29th June 2021 <https://en.wikipedia.org/wiki/National_responses_to_the_COVID-19_pandemic>

## ii. Collated data

# Table 3: Data table for final regression study

| County | Date of election | Corruption Perceptions Index | Difference in vote share | Cumulative deaths | Monthly rolling average deaths | Cumulative cases | Monthly rolling average cases | Population | Cumulative vaccines distributed | Date of first recorded case | Cumulative days in lockdown | Oxford Stringency Index | Oxford Health and Containment Index | Oxford Economic Support Index | Oxford Government Response Index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Albania | 25/04/2021 | 36 | 0.34 | 2342 | 6.258065 | 129594 | 250.6452 | 2877239 | 332905 | 09/03/2020 | 80 | 54.63 | 64.17 | 50 | 62.4 |
| Anguilla | 29/06/2020 | | 10.33 | 0 | 0 | 3 | 0 | 15026 | 0 | 28/03/2020 | 0 | | | | |
| Belarus | 09/08/2020 | 47 | -4.04 | 576 | 4.451613 | 68067 | 143.1935 | 9448772 | 0 | 28/02/2020 | 0 | 31.48 | 38.69 | 0 | 33.85 |
| Bermuda | 01/10/2020 | | 3.21 | 9 | 0 | 180 | 0.290323 | 62237 | 0 | 08/03/2020 | 28 | 35.19 | 46.43 | 62.5 | 48.44 |
| Bulgaria | 04/04/2021 | 44 | -6.85 | 594 | 99.45161 | 15908 | 3148.968 | 6939018 | 436541 | 08/03/2020 | 164 | 61.11 | 61.31 | 62.5 | 61.46 |
| Burkina Faso | 22/11/2020 | 40 | 4.25 | 68 | 0.096774 | 2641 | 10.35484 | 20997293 | 0 | 10/03/2020 | 45 | 22.22 | 32.14 | 0 | 28.12 |
| Cape Verde | 18/04/2021 | 58 | -5.68 | 182 | 1.096774 | 19005 | 134.4516 | 557026 | 2184 | 20/03/2020 | 62 | 59.26 | 57.26 | 75 | 59.48 |
| Central African Republic | 27/12/2020 | 26 | -8.79 | 63 | 0 | 4936 | 1.129032 | 4843954 | 0 | 15/03/2020 | 0 | 20.37 | 24.4 | 50 | 27.6 |
| Cote d'Ivoire | 31/10/2020 | 36 | 11.6 | 121 | 0.193548 | 20429 | 32 | 26486282 | 0 | 11/03/2020 | 53 | 30.56 | 36.9 | 62.5 | 40.1 |
| Cote d'Ivoire | 06/03/2021 | 36 | -1.08 | 121 | 1.354839 | 20429 | 199.871 | 26486282 | 0 | 11/03/2020 | 53 | 25.93 | 35.71 | 50 | 37.5 |
| Croatia | 05/07/2020 | 47 | 0.99 | 107 | 0.322581 | 2691 | 29.16129 | 4100719 | 0 | 25/02/2020 | 54 | 54.63 | 56.55 | 87.5 | 60.42 |
| Curacao | 19/03/2021 | | -9.42 | 22 | 0.032258 | 4960 | 32.93548 | 164211 | 19609 | 14/03/2020 | 39 | | | | |
| Cyprus | 30/05/2021 | 57 | -6.5 | 354 | 1.935484 | 71911 | 646.2258 | 1208886 | 522144 | 09/03/2020 | 54 | 62.96 | 70.6 | 100 | 74.27 |
| Czech Republic | 02/10/2020 | 54 | 0.77 | 581 | 8.83871 | 61318 | 1707.548 | 10712481 | 0 | 01/03/2020 | 27 | 38.89 | 44.64 | 62.5 | 46.88 |
| Democratic Republic of the Congo (Congo Kinshasa) | 21/03/2021 | 18 | 28.21 | 717 | 1 | 27014 | 89 | 90003954 | 14297 | 11/03/2020 | 90 | 32.41 | 28.57 | 0 | 25 |
| Ghana | 07/12/2020 | 43 | -2.4 | 323 | 0.16129 | 51667 | 112.4516 | 31181428 | 0 | 14/03/2020 | 13 | 38.89 | 46.43 | 0 | 40.62 |
| Guinea | 18/10/2020 | 28 | 1.66 | 180 | 0.225806 | 5821 | 44 | 13191279 | 0 | 13/03/2020 | 0 | 55.56 | 51.19 | 0 | 44.79 |
| Israel | 23/03/2021 | 60 | -5.27 | 6048 | 19.22581 | 822703 | 2747.613 | 8678517 | 9494810 | 21/02/2020 | 72 | 60.19 | 70.24 | 75 | 70.83 |
| Jamaica | 03/09/2020 | 44 | 6.97 | 19 | 0.548387 | 1870 | 64.22581 | 2963429 | 0 | 11/03/2020 | 7 | 78.7 | 72.62 | 50 | 69.79 |
| Kazakhstan | 10/01/2021 | 38 | -11.11 | 2771 | 9.483871 | 203,563 | 830.2903 | 18815231 | 0 | 13/03/2020 | 99 | 68.52 | 55.36 | 0 | 48.44 |
| Kiribati | 22/06/2020 | | -0.68 | 0 | 0 | 0 | 0 | 119760 | 0 | 18/05/2021 | 0 | 22.22 | 16.67 | 0 | 14.58 |
| Lithuania | 11/10/2020 | 60 | -4.38 | 81 | 0.645161 | 5180 | 94.16129 | 2715340 | 0 | 29/02/2020 | 94 | 31.48 | 38.1 | 62.5 | 41.15 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malawi | 23/06/2020 | 30 | 1.35 | 6 | 0.258065 | 564 | 23.25806 | 19211425 | 0 | 02/04/2020 | 0 | 60.19 | 50 | 100 | 56.25 |
| Moldova | 01/11/2020 | 34 | -9.83 | 1685 | 14.96774 | 71503 | 726.3871 | 4032294 | 0 | 08/03/2020 | 0 | 48.15 | 53.57 | 37.5 | 51.56 |
| Netherlands | 17/03/2021 | 82 | 0.6 | 15948 | 0.419355 | 1133474 | 36.70968 | 17141544 | 1676006 | 27/02/2020 | 99 | 75 | 69.17 | 75 | 69.9 |
| New Zealand | 17/10/2020 | 88 | 11.18 | 25 | 0 | 1793 | 2.483871 | 4829021 | 0 | 28/02/2020 | 105 | 22.22 | 30.36 | 87.5 | 37.5 |
| North Macedonia | 15/07/2020 | 35 | -1.98 | 359 | 6.612903 | 7406 | 144.2903 | 2083359 | 0 | 26/02/2020 | 30 | | | | |
| Poland (2nd round) | 12/07/2020 | 56 | -0.5 | 1517 | 11.48387 | 35950 | 312.5806 | 37839255 | 0 | 04/03/2020 | 29 | 50.93 | 47.02 | 37.5 | 45.83 |
| Portugal | 24/01/2021 | 61 | 8.7 | 8861 | 130.8387 | 549801 | 8017.871 | 10191409 | 129098 | 02/03/2020 | 16 | 65.74 | 65.95 | 75 | 67.08 |
| Samoa | 09/04/2021 | | -1.5 | 0 | 0 | 3 | 0 | 198643 | 7411 | 18/11/2020 | 13 | | | | |
| Serbia | 21/06/2020 | 38 | 12.4 | 254 | 0.774194 | 12310 | 63.70968 | 8731081 | 0 | 06/03/2020 | 37 | 27.78 | 34.52 | 37.5 | 34.9 |
| Singapore | 10/07/2020 | 85 | -8.63 | 26 | 0.032258 | 44479 | 229.0323 | 5858322 | 0 | 23/01/2020 | 55 | 50.93 | 56.55 | 100 | 61.98 |
| Syria | 26/05/2021 | 14 | 2.99 | 1714 | 6.870968 | 23884 | 70.32258 | 17571053 | 264589 | 22/03/2020 | 67 | 57.87 | 49.05 | 0 | 42.92 |
| Tajikistan | 11/10/2020 | 25 | 8.16 | 78 | 0.225806 | 9935 | 41.3871 | 9573310 | 0 | 30/04/2020 | 0 | 39.81 | 36.9 | 50 | 38.54 |
| Tanzania | 28/10/2020 | 38 | 25.94 | 21 | 0 | 509 | 0 | 60012400 | 0 | 16/03/2020 | 0 | 17.59 | 16.37 | 0 | 14.32 |
| Trinidad and Tobago | 10/08/2020 | 40 | -2.6 | 8 | 0 | 182 | 4.774194 | 1400283 | 0 | 14/03/2020 | 14 | 60.19 | 54.76 | 0 | 47.92 |
| Turks and Caicos Island | 19/02/2021 | | -7.84 | 12 | 0.193548 | 1833 | 28.35484 | 38806 | 0 | 28/03/2020 | 87 | | | | |
| Uganda | 14/01/2021 | 27 | -2.24 | 297 | 2.580645 | 37074 | 332.871 | 45974931 | 0 | 21/03/2020 | 14 | 47.22 | 43.75 | 0 | 38.28 |
| USA | 03/11/2020 | 67 | 0.8 | 227688 | 798.3548 | 8806323 | 67690.97 | 3.31E+08 | 0 | 22/01/2020 | | 56.48 | 58.33 | 25 | 54.17 |
| Venezuela | 06/12/2020 | 15 | 28.42 | 897 | 3.225806 | 102394 | 339.3871 | 28421581 | 0 | 14/03/2020 | 57 | 87.96 | 70.83 | 50 | 68.23 |

### iii. Collated results

### Table 4: Complete univariate regression results

| | | | | Intercept | | | Variable 1 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Regression Index** | **Adjusted $R^2$** | **Residual Standard Error** | **F-statistic P-value** | **Estimate** | **Standard error** | **T-test P-value** | **Coefficient estimate** | **Standard error** | **T-test P-value** |
| 1 | 0.005981 | 9.645 | 0.2735 | | | | Deaths as a percentage of population | | |
| | | | | 2.73 | 1.79 | 0.14 | -64.39 | 57.95 | 0.27 |
| 2 | 0.04998 | 9.429 | 0.08872 | | | | Cases as a percentage of population | | |
| | | | | 3.23 | 1.73 | 0.07 | -1.15 | 0.66 | 0.09 |
| 3 | -0.01787 | 9.76 | 0.5779 | | | | Average daily new deaths per 100,000 in the week before election | | |
| | | | | 2.02 | 1.65 | 0.23 | -1.95 | 3.48 | 0.58 |
| 4 | 0.001287 | 9.668 | 0.3119 | | | | Average daily new deaths per 100,000 in the month before election | | |
| | | | | 2.37 | 1.67 | 0.16 | -5.14 | 5.01 | 0.31 |
| 5 | -0.00844 | 9.715 | 0.4169 | | | | Average daily new deaths per 100,000 in the week before election, IHS applied | | |
| | | | | 2.23 | 1.67 | 0.19 | -3.93 | 4.79 | 0.42 |
| 6 | 0.00847 | 9.633 | 0.2555 | | | | Average daily new deaths per 100,000 in the month before election, IHS applied | | |
| | | | | 2.51 | 1.68 | 0.14 | -6.90 | 5.97 | 0.26 |
| 7 | 0.01604 | 9.596 | 0.2087 | | | | Average daily new cases per 100,000 in the week before election | | |
| | | | | 2.68 | 1.70 | 0.12 | -0.08 | 0.06 | 0.21 |
| 8 | 0.04371 | 9.46 | 0.1035 | | | | Average daily new cases per 100,000 in the month before election | | |
| | | | | 3.03 | 1.70 | 0.08 | -0.13 | 0.08 | 0.10 |
| 9 | 0.006043 | 9.645 | 0.273 | | | | Cumulative deaths one week before election as a percentage of population, IHS applied. | | |
| | | | | 2.74 | 1.79 | 0.14 | -64.52 | 58.01 | 0.27 |
| 10 | 0.0932 | 9.212 | 0.03117 | | | | Cumulative cases one week before election as a percentage of population, IHS applied. | | |
| | | | | 4.12 | 1.82 | 0.03 | -3.58 | 1.60 | 0.03 |
| 11 | 0.01122 | 9.62 | 0.2372 | | | | Vaccinations per capita one week prior to election | | |
| | | | | 2.19 | 1.58 | 0.17 | -10.03 | 8.35 | 0.24 |
| 12 | 0.01415 | 9.606 | 0.2194 | | | | Vaccinations per capita one week prior to election, IHS applied | | |
| | | | | 2.23 | 1.58 | 0.17 | -11.82 | 9.46 | 0.22 |
| 13 | -0.00186 | 9.802 | 0.3412 | | | | Days elapsed since first recorded case | | |
| | | | | 5.45 | 4.15 | 0.20 | -0.01 | 0.02 | 0.34 |
| 14 | -0.0213 | 9.903 | 0.6514 | | | | The number of days during which a significant quantity of the country has been in lockdown | | |
| | | | | 2.50 | 2.35 | 0.29 | -0.02 | 0.04 | 0.65 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15 | -0.0268 | 9.93 | 0.9281 | | | | The percentage of days since the first recorded case during which a significant quantity of the country has been in lockdown | | |
| | | | | 1.88 | 2.45 | 0.45 | -0.01 | 0.11 | 0.93 |
| 16 | -0.01706 | 9.977 | 0.5167 | | | | Oxford Stringency index | | |
| | | | | 5.13 | 4.73 | 0.29 | -0.06 | 0.09 | 0.52 |
| 17 | 0.03577 | 9.714 | 0.1421 | | | | Oxford Containment index | | |
| | | | | 10.04 | 5.45 | 0.07 | -0.16 | 0.11 | 0.14 |
| 18 | -0.00668 | 9.926 | 0.3852 | | | | Oxford Economic Support index | | |
| | | | | 4.11 | 2.72 | 0.14 | -0.04 | 0.05 | 0.39 |
| 19 | 0.03819 | 9.702 | 0.1348 | | | | Oxford Government Response index | | |
| | | | | 9.90 | 5.27 | 0.07 | -0.16 | 0.11 | 0.14 |
| 20 | 0.05805 | 9.758 | 0.09116 | | | | Corruption Perceptions index | | |
| | | | | 9.22 | 4.39 | 0.04 | -0.16 | 0.09 | 0.09 |

**Table 5: Complete multivariate regression results**

| | | | | Intercept | | | Variable 1 | | | Variable 2 | | | Variable 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Regression Index | Adjusted $R^2$ | RSE | F-statistic Pval | Estimate | Standard error | T-test P-value | Coefficient estimate | Standard error | T-test P-value | Coefficient estimate | Standard error | T-test P-value | Coefficient estimate | Standard error | T-test P-value |
| 21 | | 9.746 | 0.1449 | | | | Cumulative cases as a percentage of population, IHS applied | | | Corruption Perceptions Index | | | | | |
| | | | | 8.52 | 4.43 | 0.06 | -2.15 | 2.07 | 0.31 | -0.11 | 0.10 | 0.29 | | | |
| 22 | 0.07809 | 9.403 | 0.08745 | | | | Cumulative cases as a percentage of population, IHS applied | | | Elapsed time since first recorded case (days) | | | | | |
| | | | | 2.61 | 4.21 | 0.54 | -4.25 | 2.07 | 0.05 | 0.01 | 0.02 | 0.65 | | | |
| 23 | | 9.449 | 0.1017 | | | | Cumulative cases as a percentage of population, IHS applied | | | Cumulative number of days spent in lockdown. | | | | | |
| | | | | 3.87 | 2.33 | 0.11 | -3.76 | 1.74 | 0.04 | 0.01 | 0.04 | 0.86 | | | |
| 24 | 0.07904 | 9.494 | 0.1386 | | | | Oxford Stringency Index | | | Oxford Health and Containment Index | | | Oxford Economic Support Index | | |
| | | | | 12.39 | 5.48 | 0.03 | 0.45 | 0.24 | 0.07 | -0.67 | 0.31 | 0.04 | 0.02 | 0.06 | 0.71 |
| 25 | -0.01461 | 9.864 | 0.4906 | | | | Deaths as a percentage of population, IHS applied | | | Elapsed time since first recorded case (days) | | | | | |
| | | | | 4.62 | 4.33 | 0.29 | -0.01 | 69.24 | 0.47 | -0.01 | 0.02 | 0.65 | | | |
| 26 | 0.07521 | 9.513 | 0.1466 | | | | Rolling average deaths per 100,000 in the month prior to election | | | Oxford Stringency Index | | | Oxford Health and Containment Index | | |
| | | | | 12.04 | 5.64 | 0.04 | -0.63 | 5.48 | 0.91 | 0.42 | 0.23 | 0.08 | -0.61 | 0.28 | 0.04 |
| 27 | 0.07485 | 9.515 | 0.1474 | | | | Rolling average cases per 100,000 in the month prior to election | | | Oxford Stringency Index | | | Oxford Health and Containment Index | | |
| | | | | 12.28 | 5.94 | 0.05 | 0.00 | 0.11 | 0.97 | 0.42 | 0.24 | 0.09 | -0.62 | 0.30 | 0.05 |
| 28 | | | | | | | Rolling average deaths per 100,000 in the month prior to election | | | Vaccinations distributed per capita, IHS applied | | | Oxford Government Response Index | | |
| | | | | 8.37 | 5.85 | 0.16 | -1.93 | 5.70 | 0.74 | -6.66 | 10.81 | 0.54 | -0.12 | 0.13 | 0.36 |