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HOW DID THE 2020 PARLIAMENTARY ELECTIONS AFFECT THE SPREAD OF COVID-19?

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ABOUT CRRC GEORGIA

CRRC-Georgia is a non-governmental, non-profit research organization, which collects, analyzes and publishes policy relevant data on social, economic and political trends in Georgia. CRRC-Georgia, together with CRRC-Armenia and CRRC-Azerbaijan, constitutes a network of research centers with the common goal of strengthening social science research and public policy analysis in the South Caucasus.

FUNDING AND DISCLAIMER

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REPLICATION DATA AND CODE

Replication code and data for this policy brief is available from CRRC Georgia's Github repository: https://github.com/crrcgeorgia/excess_mortality

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HOW DID THE 2020 PARLIAMENTARY ELECTIONS AFFECT THE SPREAD OF COVID-19?

Abstract: COVID 19 has led to over 8000 deaths in Georgia. The data analysis presented in this policy brief suggests that between 1250 and 1450 COVID 19 deaths and between 100,000 and 140,000 cases of COVID were likely attributable to the October 2020 parliamentary elections. Georgia's COVID-19 case counts and deaths attributable to COVID-19 did not return to the levels that would be expected in the absence of an election for two to three months following the elections. This is demonstrated through the use of synthetic controls models, a rigorous quasi-experimental research method. The increase in cases is despite the fact that the Central Elections Commission put in place preventative measures at polling stations to prevent the spread of COVID-19. With local elections coming on October 2 and the country coming out of the worst wave of the pandemic it has experienced to date, policy makers and the Central Election Commission should have added focus on the safe conduct of elections. At the same time, citizens should be encouraged to engage responsibly in the vote. This brief takes no position on whether or not elections should be delayed. Instead, it aims to encourage voters and the government to focus efforts on holding safe elections.

INTRODUCTION

Georgia has lost over 8000 lives to the COVID 19 pandemic. Over 570,000 Georgians have been infected with the virus.[1] At the time of writing this brief (August and September 2021), Georgia was experiencing a wave of the pandemic in which the country led the world in daily infection rates,[2] with as many as one in every five hundred adults testing positive in a single day,[3] and the total number of people actively infected with COVID-19 around one in fifty adults.[4] By almost any measure, the epidemic has hit Georgia hard in recent months. Although the current wave of the pandemic has surpassed past waves in severity, this brief shows that a key accelerant of the wave from August 2020 through January 2021, was the October Parliamentary Elections. This is despite the fact that the Central Elections Commission put in place protocols for preventing the spread of COVID-19 in the elections.[5] This in turn calls for increased precautionary measures for the upcoming municipal elections.

The current situation stands in contrast to the early days of the pandemic in Georgia, during which Georgia was considered a success story.[6] The first case of COVID-19 was detected in late February 2020.[7] The government was swift to react. It created a multi-sectoral coordination council and placed

[1] Civil.ge, 2021.
[2] New York Times, 2021.
[3] For example, see Interpressnews, 2021a.
[4] For example, on August 18, 2021, there were 57,312 active COVID 19 infections in the country. Geostat estimates that there are 2.96 million adults in the country (15+). This is equivalent to 1.9% of the adult population or 1 in 51 adults. Given that more people have COVID 19 than is known at any given time, the figures are likely higher. For August 18, 2021 data, see Interpressnews, 2021b. For population size data, see GEOSTAT, 2021.
[5] OSCE, 2021.
[6] Lomsadze, 2020a.
[7] ibid.

public health officials at the vanguard of the response to the crisis.[8] Shortly after the virus entered the borders of Georgia, the government declared a nationwide state of emergency,[9] imposed restrictions[10] on socio-economic activities, and subsequently introduced a curfew.[11] As a result, the number of new daily cases of infection as well as deaths caused by COVID-19 remained low throughout the spring and summer of 2020.[12]

The epidemic took a turn for the worse from late August 2020, with a large part of the cases commonly attributed to spread in Batumi during the tourist season.[13] Throughout the winter, Georgia ended up being one of the worst-hit spots globally, leading the world in terms of new daily cases per 100,000 people daily.[14]

In the lead up to the parliamentary elections in 2020, a number of restrictions were in place to prevent the spread of the virus. Restaurants were not allowed to work in major cities after 10PM.[15] Large scale events were banned in September, and cinemas and theatres were not allowed to re-open.[16] However, campaign events were exempted from these restrictions.[17] Citizens were strongly encouraged to wear facemasks in open spaces, though fines were not in place.[18] Indoor spaces required the use of facemasks.[19] Schools were operating in either as distance education or in a hybrid mode, with most education taking place online during this period.[20] Some sectors were recommended or required to work from home. [21] Some restrictions on transportation were in place.[22] A number of restrictions on travel to the country for international travelers were in place.[23] Following elections, a wide range of restrictions were also introduced, including a strict curfew.[24]

The 2020 Parliamentary elections which were held on October 31, 2020 witnessed around 2 million[25] voters cast a vote. As a result, there were large lines of voters in and outside of polling stations.[26] In turn, it is intuitive that COVID-19 numbers increased substantially in the weeks following elections. In the United States, which held elections during a similar time period, some analyses have suggested

[8] GOG, 2020a.
[9] RFERL, 2020a.
[10] RFERL, 2020b.
[11] GOG, 2020b.
[12] Lomsadze, 2020b.
[13] Jamnews, 2020.
[14] RFERL, 2020c:
[15] Civil.ge, 2020a.
[16] Civil.ge, 2020b
[17] Ibid.
[18] Civil.ge, 2020a.
[19] Matsne.ge, 2020.
[20] Hale et. Al, 2021.
[21] Hale et. Al, 2021.
[22] Hale et. Al, 2021.
[23] Hale et. Al, 2021.
[24] Civil.ge, 2020c.
[25]CEC, 2020.
[26] For example, see Agenda.ge, 2020.

that in person voting in the primaries did not lead to an uptick in cases,[27] while analyses of the US presidential elections suggest that they did.[28] In the Georgian context, the question remains, what would have happened with COVID-19 deaths and case counts in the absence of elections?

To address this question, this brief presents synthetic controls models. The model creates a baseline or control scenario. This control scenario is created from combining data from other countries. If the model is successful, the baseline scenario is statistically indistinguishable from what was happening in the actual country of interest (treatment country) prior to some event. The baseline scenario is then compared to what actually happened to identify the effect of an event or policy change.

In this policy brief, the key difference between the baseline scenarios and real Georgia is that the baseline scenarios do not experience elections in the period under analysis. Data from the real Georgia and the baseline scenario are in turn compared, to identify the causal effect of holding elections. The key outcomes which the model is used to look at are a) COVID 19 deaths per million people, and b) COVID 19 cases per million people.

In preparing the brief, three different models were constructed with different inclusion and exclusion criteria for other countries to create a baseline scenario. The three models are summarized in the following table:

Figure 1: Inclusion criteria for synthetic controls models

Model 1	Model 2	Model 3
Countries that had no elections after April 2020. **AND** Countries with mean stringency index scores between 60 and 75. **OR** Countries with less than 1000 cases per million before October 2020. **OR** Countries with populations from 1-10 million. **OR** Countries with population densities between 50 and 90 people per square kilometer. **OR** Countries with GDP per capita between 3000 and 15000 USD, ppp.	Countries that had no elections after April 2020. **AND** Countries with populations from 1-20 million. **AND** Countries with “Free” or “Partly Free” status according to the Freedom House	Countries that had no elections after April 2020. **AND** Countries with populations from 1-20 million. **AND** Countries with “Free” or “Partly Free” status according to the Freedom House **AND** Countries with GDP per capita (ppp) below USD 30,000

[27] Feltham, E. and N. A. Christakis, 2020.
[28] The Economist, 2021.

In addition to the above inclusion/ exclusion criteria, the model used matching on the following characteristics to create a comparable baseline scenario for Georgia for all models:

- Cases per million or deaths per million (whichever is not the dependent variable);
- Stringency index;
- Population density;
- Total population;
- Diabetes prevalence;
- Hospital beds per thousand people;
- Life expectancy;
- GDP per capita.

The second and third models additionally used Freedom House scores in the matching process.

The main outcomes of each model is presented in the brief, however, graphical representations of all models are presented in appendix to the report. The appendix to the report also provides a robustness test using excess deaths data from the Economist.

The methodology is well-established in the literature, and has seen growing use over the last two decades.[29] A full explanation of the methodology as applied in the current context is presented in this document's Methodology Appendixes.

The synthetic controls analysis presented below suggests that the October 31, 2020 parliamentary elections:

- Were a significant contributor to Georgia becoming one of the worst hit spots in the world during the winter of 2020-2021;
- The models estimate between approximately 1250 and 1450 deaths and 100,000 to 140,000 cases of COVID-19 were attributable to elections;
- The level of COVID-19 fatalities and case counts did not recover to the baseline scenario expected levels for three months following the elections.

Given the above, the country needs to ensure that the coming October 2 local elections are as safe as possible.

THE IMPACT OF THE OCTOBER 2020 PARLIAMENTARY ELECTIONS ON COVID-19 DEATHS

The October 2020 parliamentary elections led to significant increases in COVID-19 deaths. Figure 1 displays the trend in new daily cases in Georgia and a baseline scenario from April 2020 to January 2021. The control scenario quite closely reproduces the fatality dynamics of Georgia in the period before October 31, 2020. This suggests that the baseline scenario can serve effectively as a control for

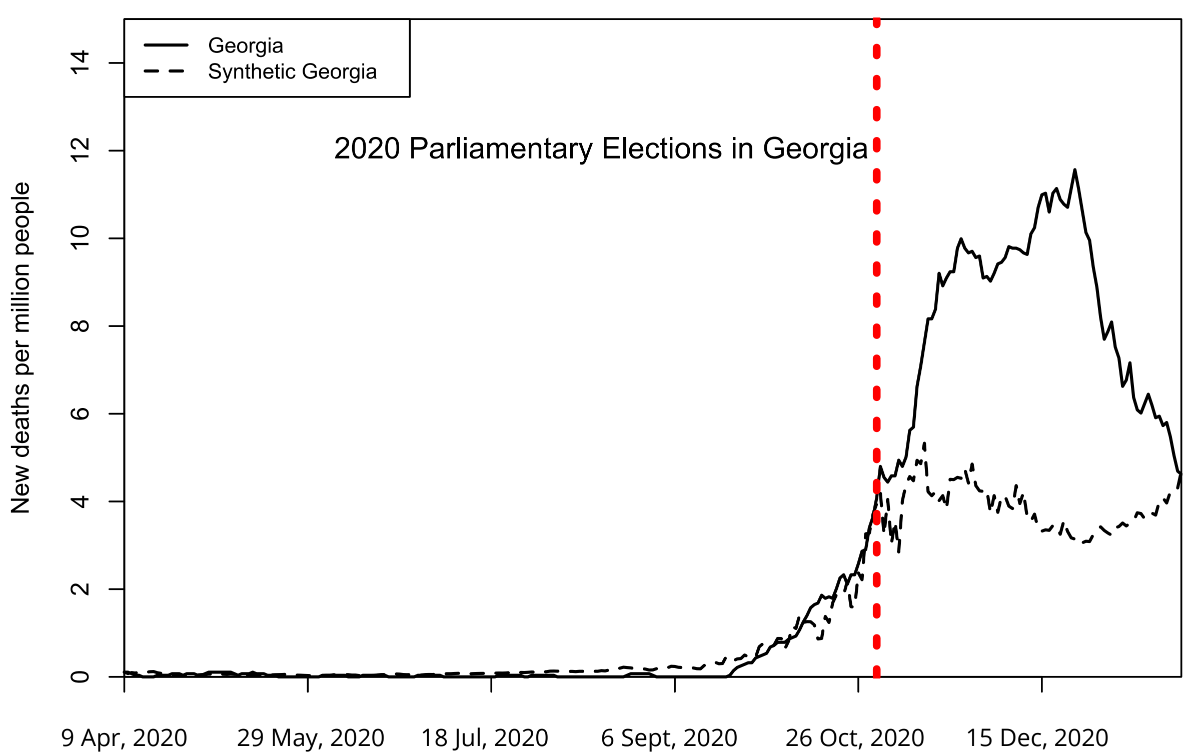
[29] For fuller treatments of the synthetic controls approach, see Abadie and Gardeazabal, 2003 and Abadie, Diamond, and Hainmueller, 2010.

Georgia. The situation is quite similar for the other two models, as shown in the Methodology Appendixes.

As shown on Figure 1 below, approximately two weeks following parliamentary elections, Georgia diverges from the baseline scenario in terms of deaths per million people. The two week lag time for the divergence is explained by the fact that COVID 19 deaths lag approximately two weeks behind new COVID 19 infections.

Ultimately, the two lines depicted in Figure 1 converge at the end of January 2021. The convergence of the two lines marks the point at which Georgia returned to where it would have been, had there been no elections. In other words, the elections lead to increased COVID-19 fatality rates for the months of November, December, and January. These patterns are highly consistent between the three models.

Figure 2: Model 1, trends in new deaths per million people: Georgia vs. baseline scenario



The models suggest that there were between 335.3 and 391.2 more COVID 19 deaths per million between November 2020 and January 2021 than if there had been no elections. In absolute terms, the models suggest 1240 to 1447 COVID-19 deaths are associated with the elections. To come to this estimate, the difference between actual Georgia and the baseline scenarios was calculated. This is equivalent to subtracting the dashed line from the solid one in Figure 1. The table below provides the estimates of each of the three different models in the study. For two of the three models, the quasi p-value was statistically significant, with one model at the 5% level and one model at the 10% level.[30] [31]

Figure 3: Estimated COVID-19 deaths

	COVID-19 deaths per million	**Total number of deaths**	**P-value**
Model 1	391.2	1447	0.04
Model 2	335.3	1240	0.07
Model 3	345.8	1279	0.25

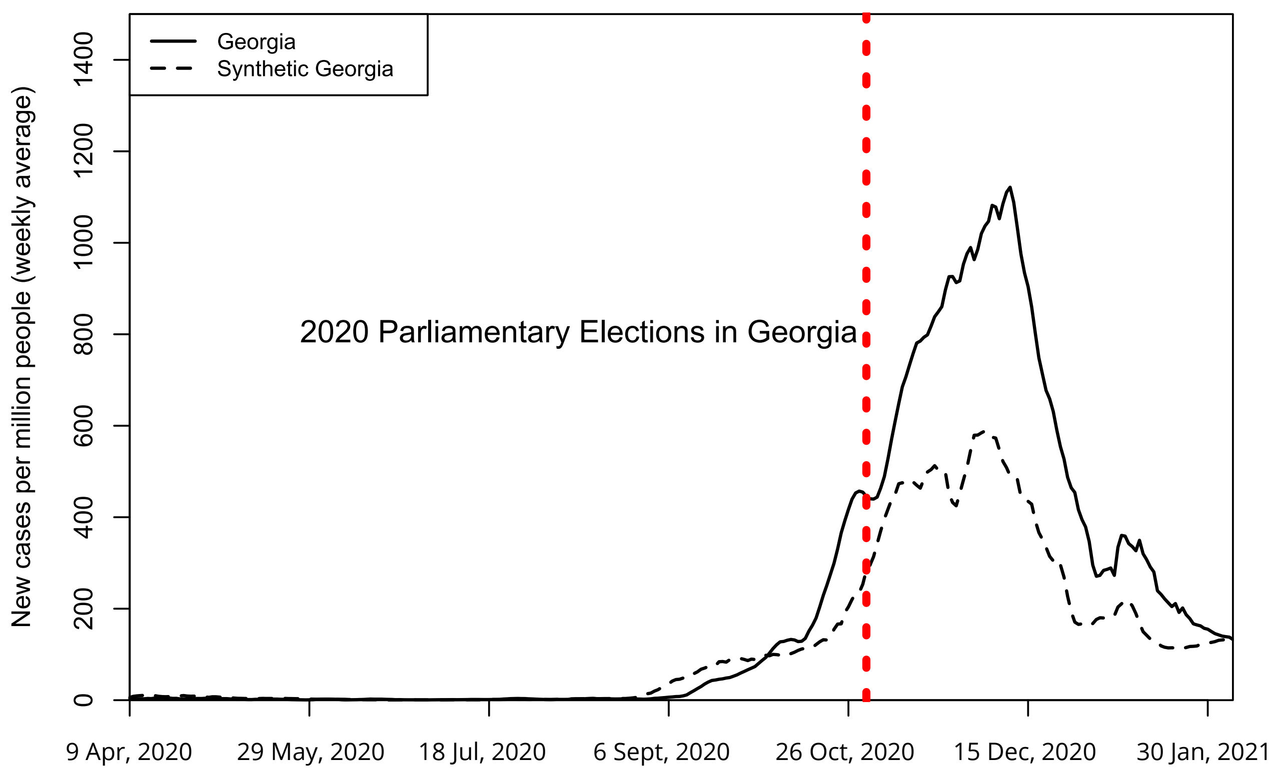
THE IMPACT OF THE OCTOBER 2020 PARLIAMENTARY ELECTIONS ON COVID-19 CASES

A second synthetic controls analysis was conducted on the number of COVID-19 cases that resulted from the 2020 Parliamentary elections. The results are depicted below in Figure X. The baseline scenario that results from the analysis performs relatively poorly in models 1 and 3 compared to the above analysis of COVID-19 deaths per million people. This may in part stem from the fact that not all countries report testing data in contrast to reporting COVID 19 deaths. COVID 19 deaths are not as dependent on testing rates as COVID 19 cases. Therefore, it was not possible to adjust for testing data in the model. As a result, this analysis should be taken as less reliable than the previous analysis for models 1 and 3 in particular.

Figure 4 shows that following the October 2020 elections, the number of cases per million people expanded rapidly compared with the baseline scenario. The divergence starts approximately two weeks before elections in models 1 and 3. The two lines converge in early February in models 1 and 3.

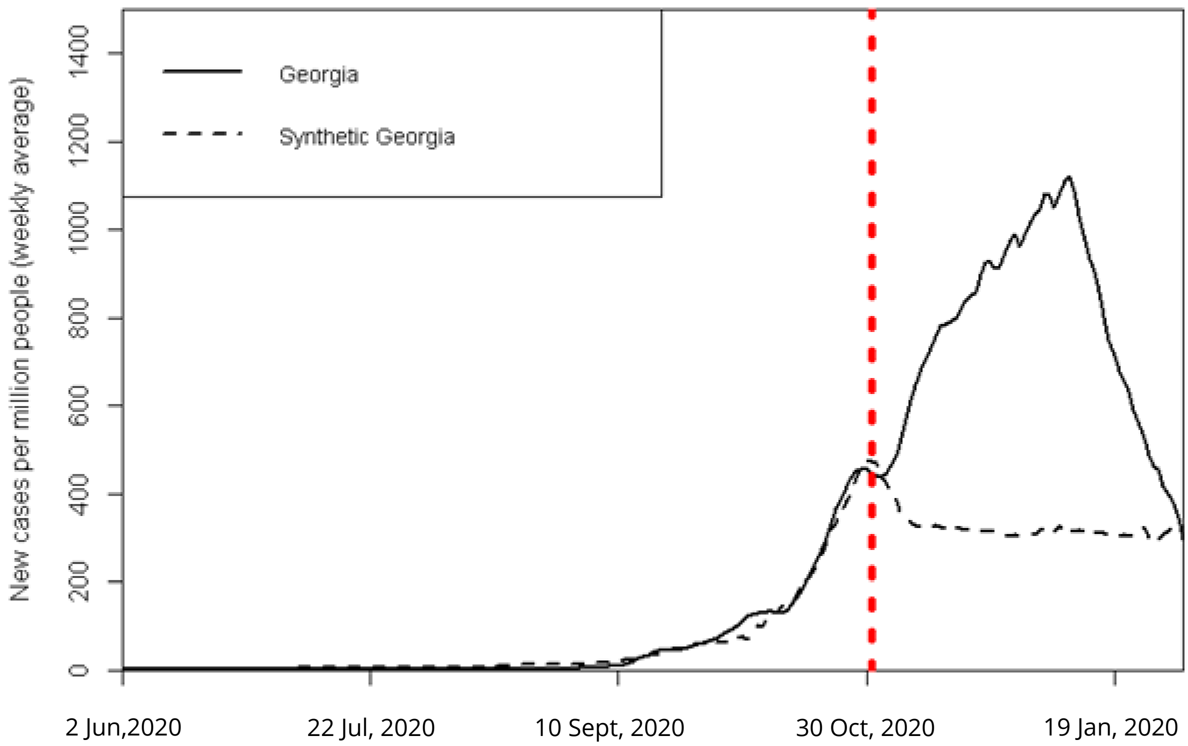
[30] For an extended explanation of why a quasi p-value instead of p-value is used in synthetic controls models, please see the Methods Appendixes.
[31] For robustness tests of these models, which are broadly in line with the findings in this analysis, using excess deaths data, please see the third methods appendix.

Figure 4: Model 1, trends in new COVID 19 cases per million people: Georgia vs. baseline scenario



In contrast to models 1 and 3, model 2 performs relatively well in the period prior to elections. In this model, the baseline scenario and Georgia track each other closely in the pre-election period. In this model, Georgia diverges from the baseline scenario shortly after elections and returns to the baseline scenario at the start of January. This is roughly in line with the evidence on deaths presented in the previous section, with cases returning to the baseline scenario roughly two and a half weeks before deaths return to the baseline scenario.

Figure 5: Model 2, trends in new COVID 19 cases per million people: Georgia vs. baseline scenario



Compared with the no election scenario, the models estimate between 26,595 and 37,768 more COVID 19 cases per million between November 2020 and January 2021. This is equivalent to an excess of between 99,597 and 139,743 cases in total compared with a no election scenario. These estimates are roughly in line with the above estimates of deaths attributable to the elections, and the reported case fatality rate of 1.1% for Georgia in this period of 2020.[32] These figures were estimated using the same approach as above for deaths attributable to the elections.

Figure 6: Estimated COVID 19 cases

	COVID-19 cases per million	Total number of cases	P-value	Ratio of cases to deaths attributable to elections
Model 1	37,931	140,345	0.3	1.03%
Model 2	27,595	102,101	0.06	1.21%
Model 3	26,918	99,597	0.67	1.28%

[32] Our World in Data, 2021.

While two of the three above estimates are not statistically significant, this primarily stems from the poor fit of the model prior to the elections. In model 1, Georgia experiences the largest shift in cases following elections of all countries, and in model 3, Georgia experiences the second largest change. This in turn supports the contention that the elections likely led to a significant increase in the number of cases.

CONCLUSIONS

The above data suggests that the 2020 parliamentary elections are associated with between 1240 and 1447 COVID 19 deaths, and between 100,000 and 140,000 COVID 19 cases above and beyond what would have happened had there been no elections. The models suggest Georgia experienced an elevated case load for two to three months due to the elections. These estimates are generally consistent between different models. While the world is different today and more and more Georgians are vaccinated, the more contagious delta variant predominates in Georgia. With elections coming on October 2, the above data suggests that policy makers should make every effort to ensure the public's safety. At the same time, the public should be strongly encouraged to follow relevant restrictions aimed at preventing the spread of the virus. This brief takes no position on the delay of elections. Rather, it only hopes to encourage safe conduct from the public and government.

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METHODOLOGY APPENDIX 1: SYNTHETIC CONTROLS AND DATA

In order to examine the potential impact of the first round of 2020 Parliamentary elections on the pandemic, a synthetic controls model was used. Synthetic control models are used in cases where a large event or policy change occurs and data is available at the aggregate level for (generally) a single treatment unit and multiple control units. The method compares data from a unit that received treatment (Georgia in the present case) to a synthetic control unit (referred to as a baseline scenario in the text above). The synthetic control unit is created from a weighted average of control units (i.e. other countries). It is constructed so that the pre-intervention time series data on the outcome of interest matches as closely as possible the trend in the actual pre-treatment unit. This is done through matching on pre-treatment outcome data as well as on other theoretically relevant covariates. For more information on the technical aspects of how this is achieved, see Abadie, Diamond, and Hainmueller, 2010.To construct a synthetic control for Georgia, data from the Our World in Data COVID-19 dataset are used.[33] The dataset is from a collaborative effort between researchers at the University of Oxford and the Global Change Data Lab. The unit of observation is a day. The panel data contains 296 observations (i.e. days) for each country which span from April 2020 to February 2021. Each model was run using the full range of dates at the start. Because there has not been a natural end date to the pandemic, the model was restricted to the period during which Georgia had an elevated caseload/ death toll due to the elections according to each model.

Generally, when conducting a synthetic controls model, it is important to create the synthetic control using countries that are similar in terms of theoretically relevant variables. In this regard, the inclusion/exclusion criteria used in the model are provided in the table below:

[33] Hasell, J., Mathieu, E., Beltekian, D. et al. A cross-country database of COVID-19 testing. *Sci Data* 7, 345 (2020)

Figure 7: Inclusion/Exclusion criteria for Synthetic controls models

Model 1	Model 2	Model 3
Countries that had no elections after April 2020. **AND** Countries with mean stringency index scores between 60 and 75. **OR** Countries with less than 1000 cases per million before October 2020. **OR** Countries with populations from 1-10 million. **OR** Countries with population densities between 50 and 90 people per square kilometer. **OR** Countries with GDP per capita between 3000 and 15000 USD, ppp.	Countries that had no elections after April 2020. **AND** Countries with populations from 1-20 million. **AND** Countries with “Free” or “Partly Free” status according to the Freedom House	Countries that had no elections after April 2020. **AND** Countries with populations from 1-20 million. **AND** Countries with “Free” or “Partly Free” status according to the Freedom House **AND** Countries with GDP per capita (ppp) below USD 30,000

Any country with missing data was also dropped from the donor pool.

This resulted in the following 25 country donor pool for Model 1: Albania, Algeria, Angola, Bahrain, Barbados, Bhutan, Botswana, Bulgaria, Cambodia, Cameroon, Congo, Estonia, Ethiopia, Haiti, Hungary, Kazakhstan, Kosovo, Laos, Panama, Timor, Latvia, Nicaragua, Tunisia, Uzbekistan, and Vietnam.

In model 2, the following 29 country donor pool was used: Albania, Belgium, Benin, Botswana, Bulgaria, Costa Rica, Denmark, Ecuador, El Salvador, Estonia, Finland, Greece, Guatemala, Haiti, Hungary, Ireland, Latvia, Lebanon, Mauritius, Netherlands, Norway, Panama, Paraguay, Slovenia, Sweden, Switzerland, Tunisia, Uruguay, and Zambia.

For model 3, the following donor pool was used, including 20 countries: Albania, Benin, Botswana, Bulgaria, Costa Rica, Ecuador, El Salvador, Estonia, Greece, Guatemala, Haiti, Hungary, Latvia, Lebanon, Mauritius, Panama, Paraguay, Tunisia, Uruguay, and Zambia.

In addition to the above inclusion/ exclusion criteria, the model used matching on the following characteristics to create a comparable baseline scenario for Georgia for all models:

- Cases per million or deaths per million (whichever is not the dependent variable) ;
- Stringency index;
- Population density;
- Total population;
- Diabetes prevalence;
- Hospital beds per thousand people;
- Life expectancy;
- GDP per capita;

The second and third models additionally used Freedom House scores in the matching process.

The two outcome variables used in the analysis are a) COVID-19 cases per million, and b) COVID-19 deaths per million. A synthetic Georgia was constructed for each. The tables below summarize the composition of the synthetic controls for each model used in the text. To take model one as an example, the synthetic control for Georgia is composed primarily (60.9% of synthetic Georgia) of Tunisia. Laos (12.1%), Cambodia (7.9%), Bulgaria (6.6%), and Timor (6.2%) are also contribute to the synthetic control along with a dozen other countries to a smaller degree.

For the COVID-19 cases per million, synthetic Georgia was composed of the following countries in model 1.

Figure 8: Model 1, Donor countries in synthetic Georgia (Deaths per million)

Model 1: Deaths per million	
Country	**Weight (% of synthetic Georgia)**
Tunisia	60.9
Laos	12.1
Cambodia	7.9
Bulgaria	6.6
Timor	6.2
Angola	4.3
Panama	0.6
Cameroon	0.3
Congo	0.3
Uzbekistan	0.2
Algeria	0.1
Bhutan	0.1
Botswana	0.1
Ethiopia	0.1
Kazakhstan	0.1
Kosovo	0.1
Latvia	0.1

For the second model of deaths per million, synthetic Georgia was composed of the countries listed in figure 9. The countries not listed had a weight of between 0.09% and 0%. In general, when countries are not used but in the donor pool, this only implies that a better synthetic control could be constructed without them.

Figure 9: Model 2: Donor countries in synthetic Georgia (Deaths per million)

Model 2: Deaths per million	
Country	**Weight (% of synthetic Georgia)**
Slovenia	59.5
Bulgaria	20.2
Mauritius	9.8
Botswana	8.7
Switzerland	1.1
Uruguay	0.5

For the third model of deaths per million, synthetic Georgia was composed of the following countries:

Figure 10: Model 3: Donor countries in synthetic Georgia (Deaths per million)

Model 3: Deaths per million	
Country	**Weight (% of synthetic Georgia)**
Tunisia	60.5
Zambia	26.6
Hungary	6.3
Greece	4
Lebanon	1
Albania	0.9
Paraguay	0.5
Costa Rica	0.1

The synthetic Georgia in the first model of cases per million included Hungary. The synthetic Georgia in the second model of cases per million included the following countries:

Figure 11: Model 2: Donor countries in synthetic Georgia (Cases per million)

Model 2: Cases per million	
Country	**Weight (% of synthetic Georgia)**
Tunisia	41.7
Slovenia	36.7
Benin	15.5
Belgium	5.9
Haiti	0.2

The synthetic Georgia in the third model of cases per million included the following countries:

Figure 12: Model 3: Donor countries in synthetic Georgia (Cases per million)

Model 3: Cases per million	
Country	**Weight (% of synthetic Georgia)**
Hungary	59.5
Bulgaria	30.5
Lebanon	10

METHODOLOGY APPENDIX 2: PLACEBO TESTS AND P-VALUE CALCULATIONS

Units in synthetic control models are not selected randomly. Therefore, a traditional p-value is not applicable. A common approach to creating a quasi-p-value is to conduct placebo tests for all untreated units within the donor pool. After placebo tests are conducted, the confidence in the estimates from the model depends on how unusually large the effect for Georgia is in comparison to the placebo effects. The ratio of the differences between the synthetic control and actual country pre- and post-intervention are then compared. The quasi p-value in turn is one minus the number of placebo effects which the treated unit is larger than. For instance if the ratio of effect sizes is larger for the treated unit than 23 of 25 countries, the quasi p-value is 2/25 =0.08. This section of the appendix provides placebo tests and p-value calculations for the three models presented in the text, first for the model.

Placebo tests and p-value for COVID-19 deaths per million people

Model 1

Figure 13 shows the estimated effect for Georgia juxtaposed with the placebo effects of 20 countries that did not have excessive mean square prediction errors (MSPE) in the pre-treatment period. Five countries were excluded, all of which had five times higher MSPE in the pre-treatment period than Georgia (Bahrain, Hungary, Kazakhstan, Kosovo, and Latvia). Georgia clearly stands out as an unusual case, with the second largest effect size following Bulgaria.

Figure 13: Model 1: Gaps of new deaths per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

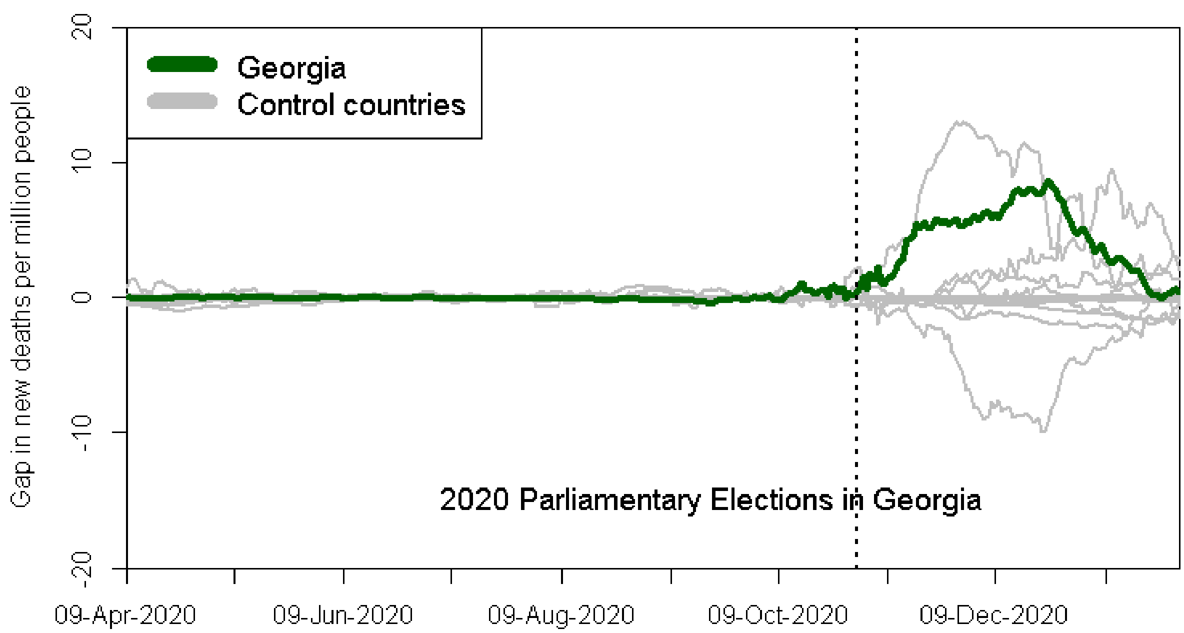
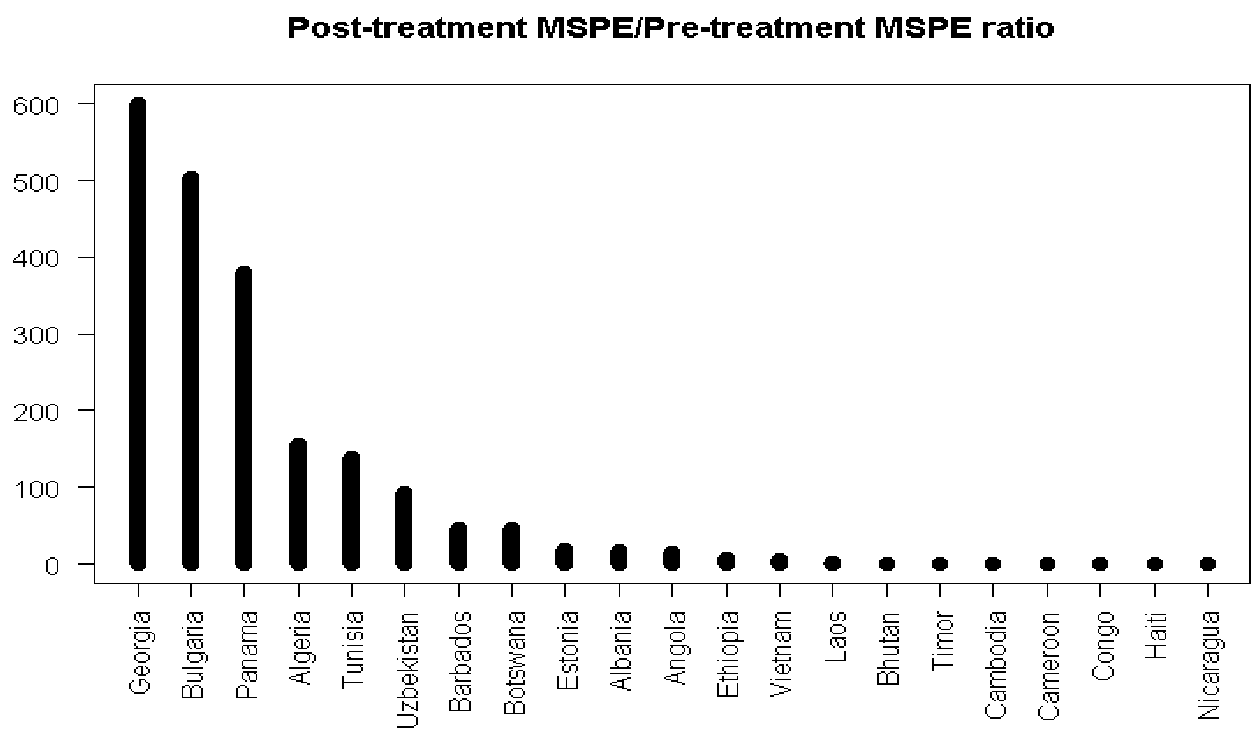


Figure 14 compares the ratio of post-treatment MSPE to pre-treatment MSPE for each country. As displayed in Figure 14, Georgia has the highest ratio. These results can be interpreted as a probability of obtaining an estimate at least as large as for Georgia. In this case, the p-value equals 1/21 ≈ 0.048, which is statistically significant at the 5% level.

Figure 14: Model 1: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries



Model 2

Figure 15 shows the estimated effect for Georgia juxtaposed with the placebo effects of 28 countries that did not have excessive mean square prediction errors (MSPE) in the pre-treatment period. One country was excluded, which had five times higher MSPE in the pre-treatment period than Georgia (Bulgaria). Georgia clearly stands out as an unusual case, with the second largest effect.

Figure 15: Model 2: Gaps of new deaths per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

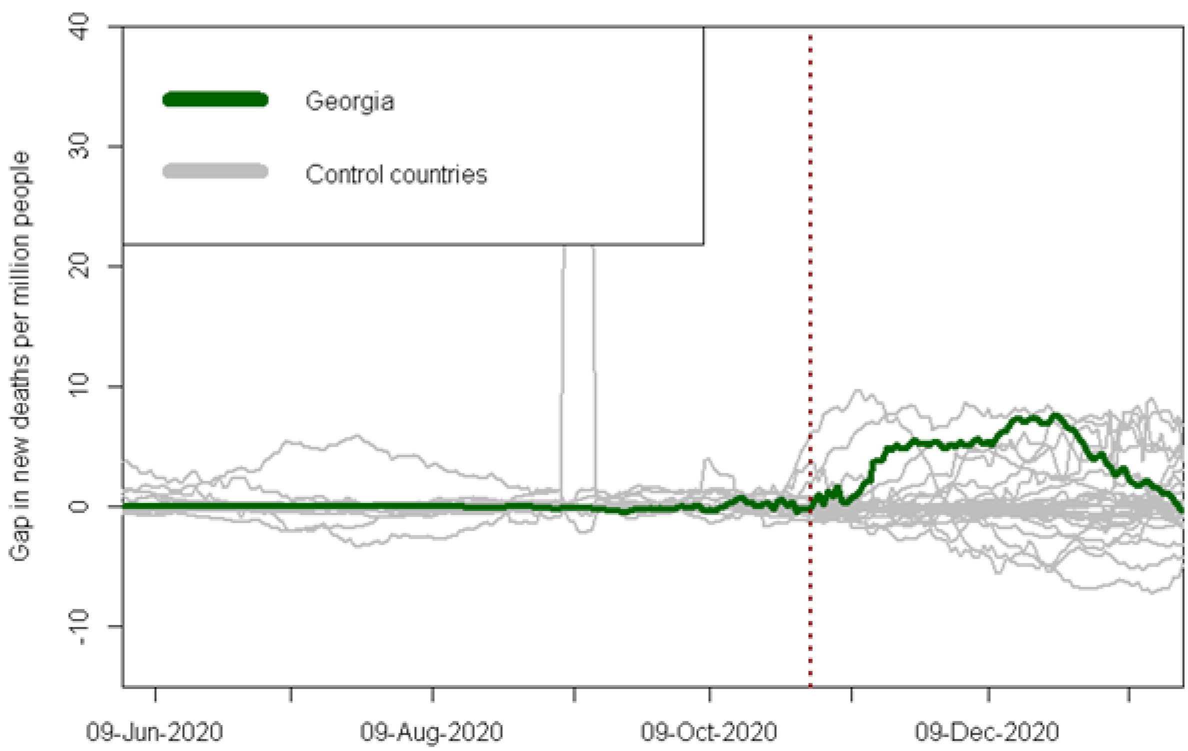
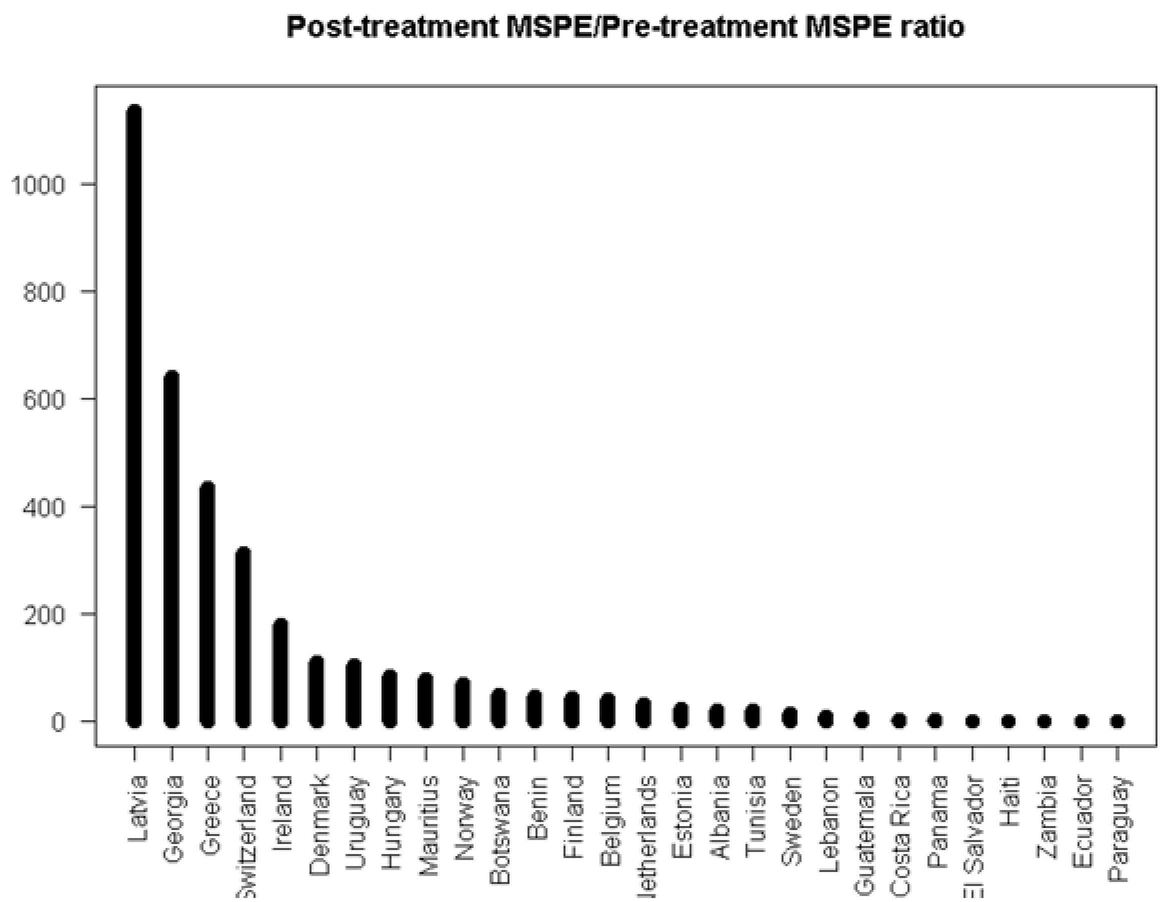


Figure 16 compares the ratio of post-treatment MSPE to pre-treatment MSPE for each country. As displayed in Figure 16, Georgia has the second highest ratio. the p-value equals 2/29 ≈ 0.07, which is statistically significant at the 10% level.

Figure 16: Model 2: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries



Model 3

Figure 17 shows the estimated effect for Georgia juxtaposed with the placebo effects of 19 countries that did not have excessive mean square prediction errors (MSPE) in the pre-treatment period. One country was excluded, which had five times higher MSPE in the pre-treatment period than Georgia (Ecuador). Georgia clearly stands out as an unusual case, with the second largest effect.

Figure 17: Model 3: Gaps of new deaths per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

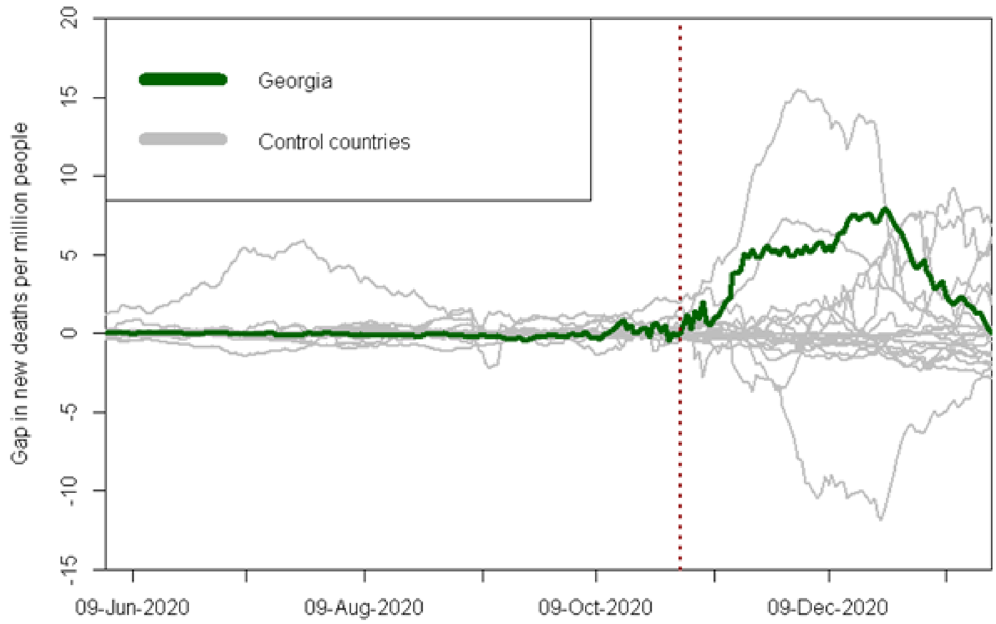
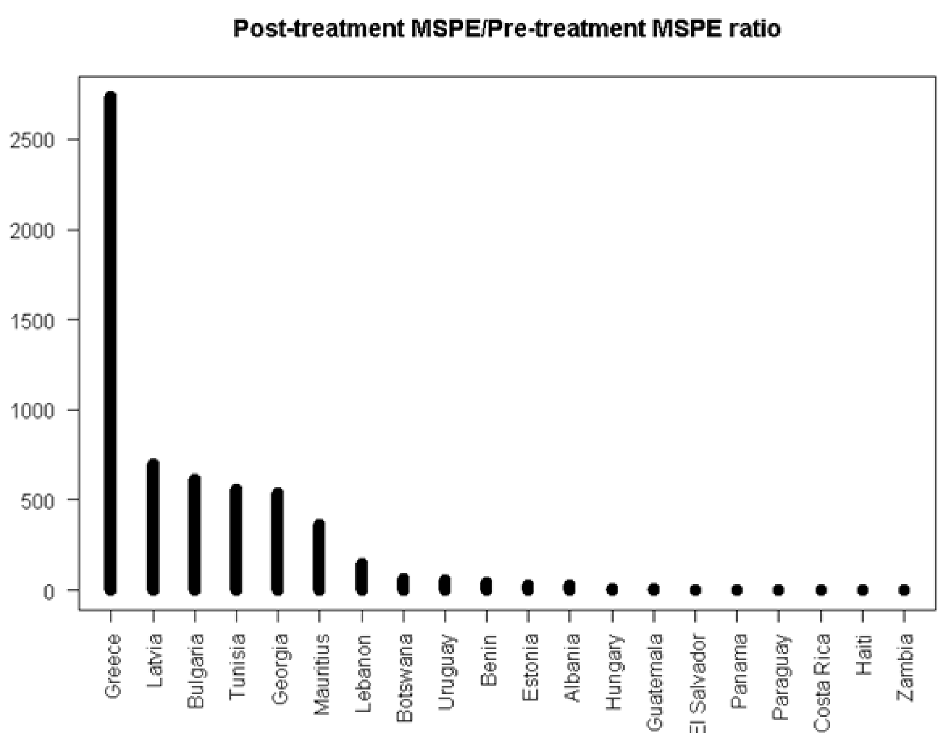


Figure 18 compares the ratio of post-treatment MSPE to pre-treatment MSPE for each country in model 3. As displayed in Figure 18, Georgia has the fifth highest ratio. In this case, the p-value equals 5/20 = 0.25, which is not statistically significant.

Figure 18: Model 3: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries



Placebo tests and p-value for COVID-19 cases per million people

Model 1

Figure 19 displays the estimated placebo effects for all 26 countries. Georgia has the largest estimated effect. However, unlike the model with deaths as a dependent variable, neither Georgia nor most other countries fit well in the pre-treatment period. As noted in the text above, this likely stems in part from the lack of ability to include testing data in the model, which is unavailable for many countries. While the fit of the synthetic control is less than ideal, post-treatment the simple effect size is larger than all other countries tested.

Figure 19: Model 1: Gaps of new cases per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

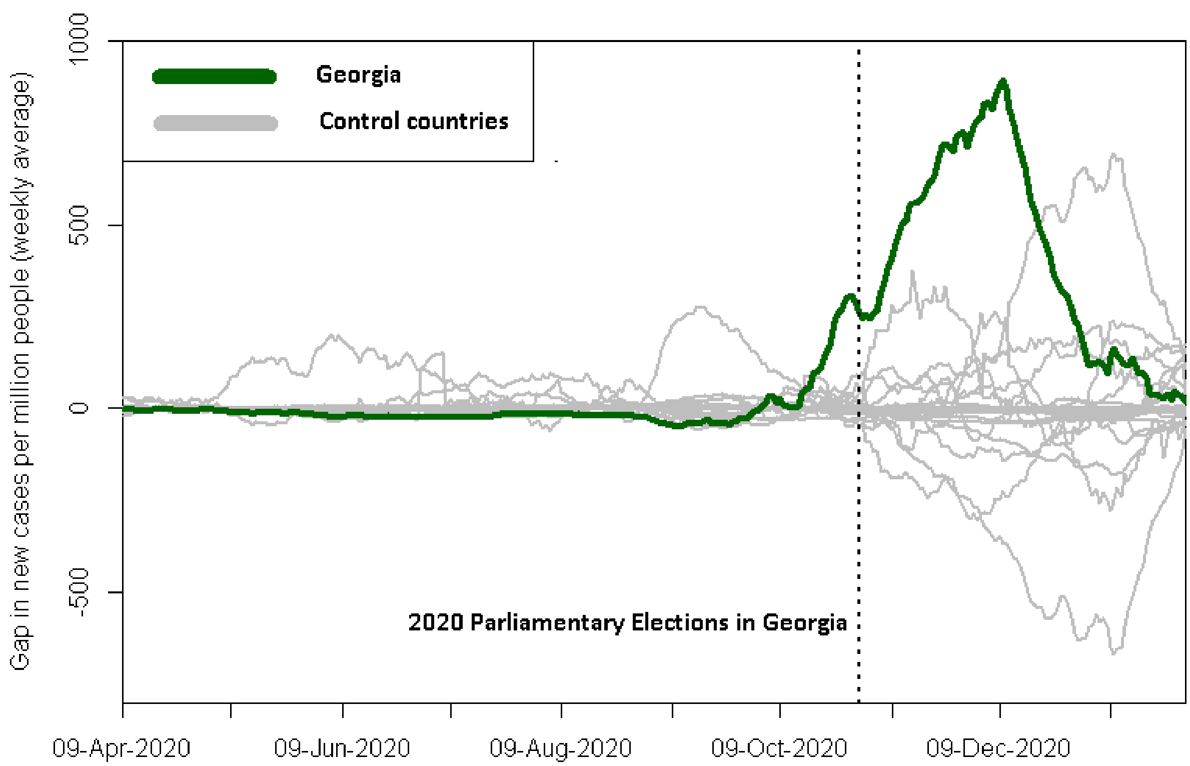
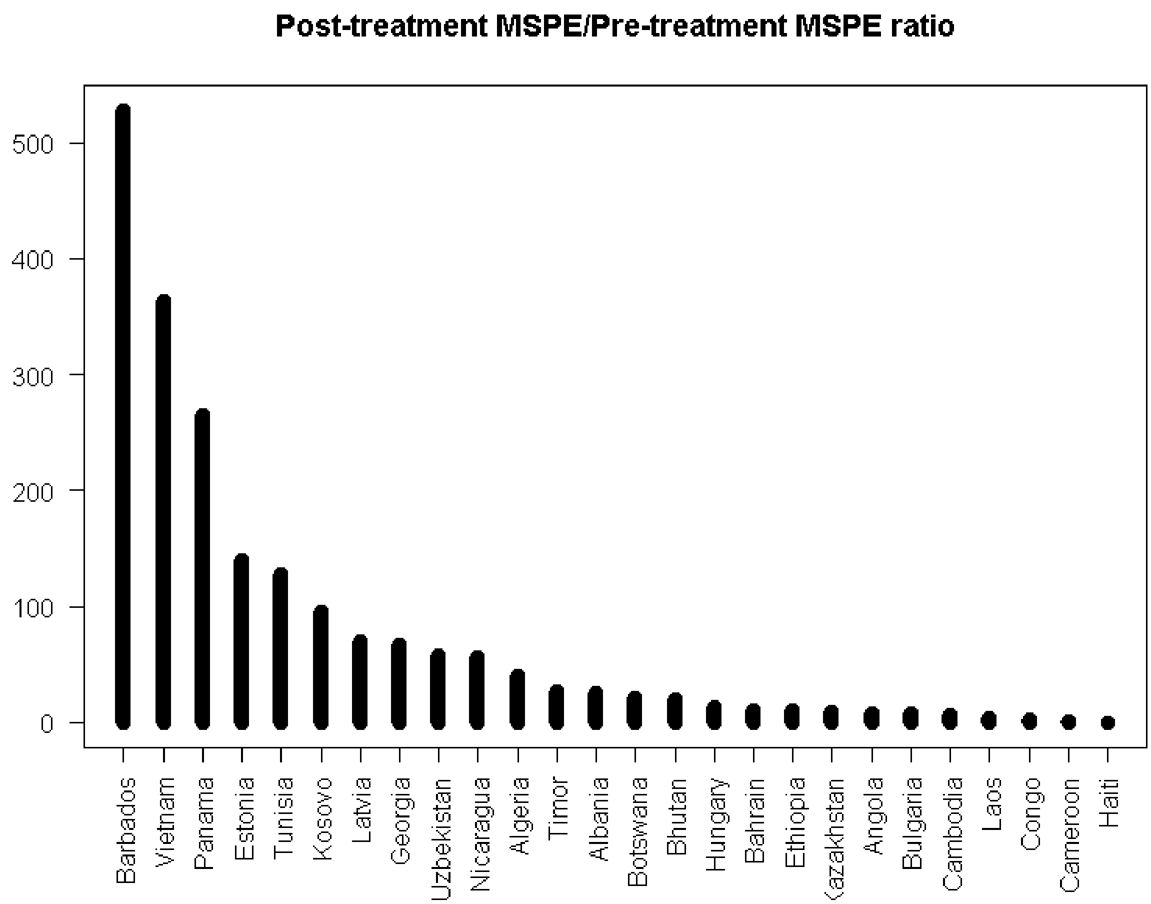


Figure 20 compares the ratio of post-treatment MSPE to pre-treatment MSPE for each country. As displayed in Figure 20, Georgia has the eighth highest ratio. None of the countries had five times higher MSPE in the pre-treatment period than Georgia and therefore, no country was excluded from this model. the p-value equals 8/26 ≈ 0.3, which is not statistically significant.

Figure 20: Model 1: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries



Model 2

Figure 21 shows the estimated effect for Georgia juxtaposed with the placebo effects of 29 countries that did not have excessive mean square prediction errors (MSPE) in the pre-treatment period. No country had five times higher MSPE in the pre-treatment period than Georgia**.** Georgia clearly stands out as an unusual case, with the largest effect.

Figure 21: Model 2: Gaps of new cases per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

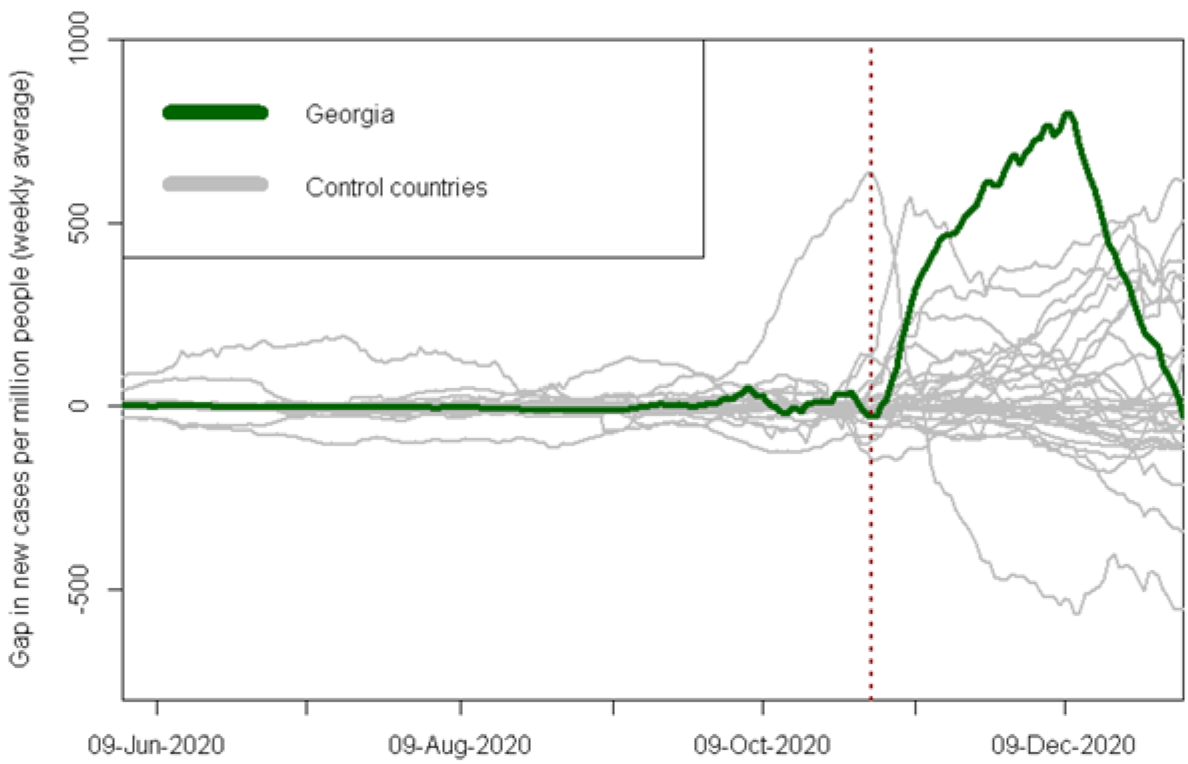
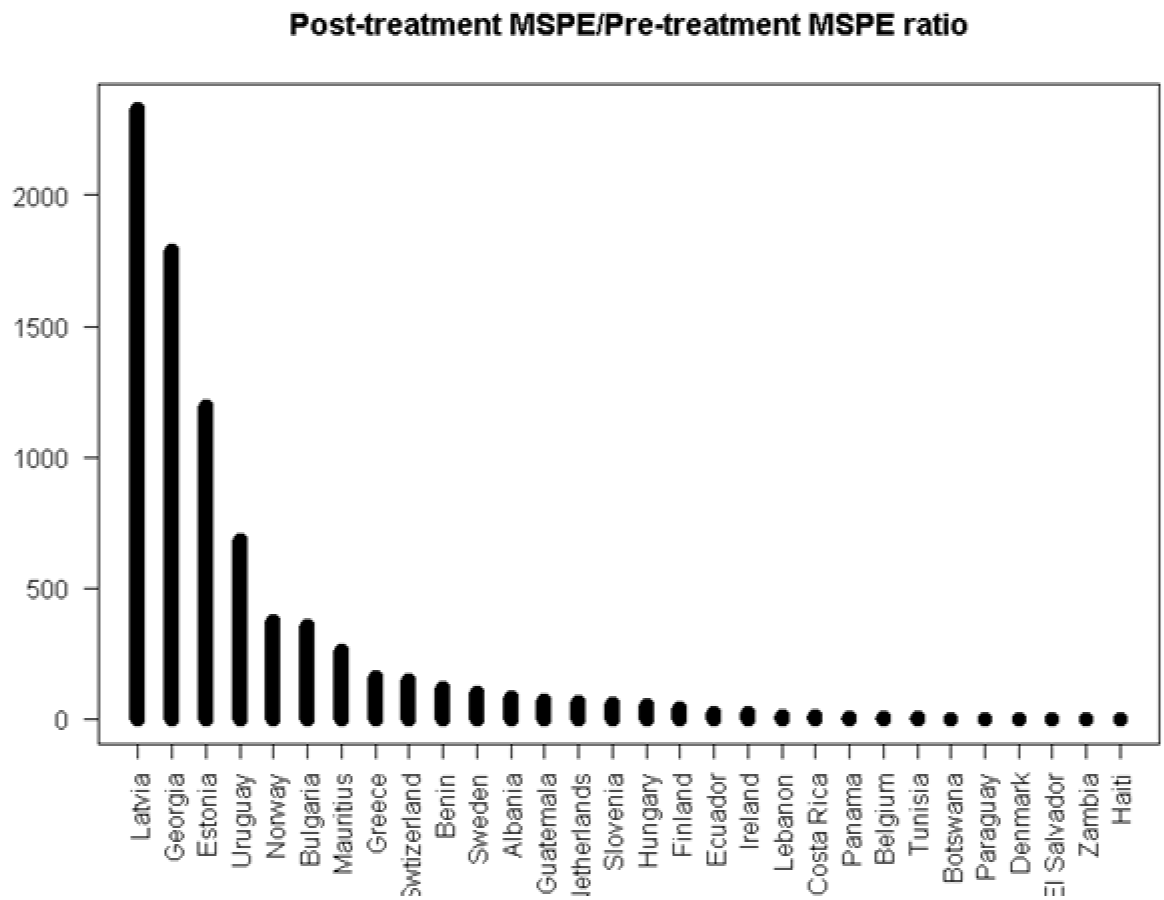


Figure 22 compares the ratio of post-treatment MSPE to pre-treatment MSPE for each country. As displayed in Figure 22, Georgia has the highest ratio. None of the countries had five times higher MSPE in the pre-treatment period than Georgia and therefore, no country was excluded from this model. The p-value equals 2/30 ≈ 0.06, which is statistically significant at the 10% level.

Figure 22: Model 2: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries



Model 3

Figure 23 shows the estimated effect for Georgia juxtaposed with the placebo effects of 20 countries that did not have excessive mean square prediction errors (MSPE) in the pre-treatment period. No country had five times higher MSPE in the pre-treatment period than Georgia. Georgia clearly stands out as an unusual case, with the second largest effect.

Figure 23: Model 3: Gaps of new cases per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

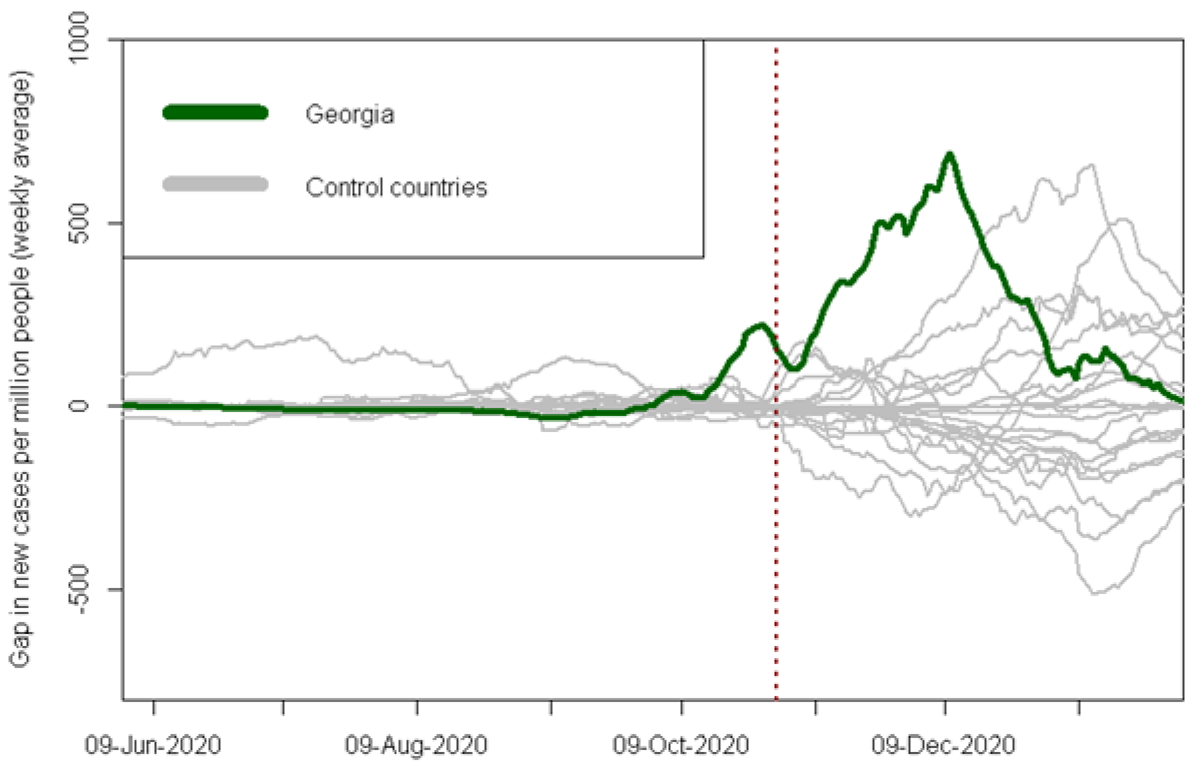
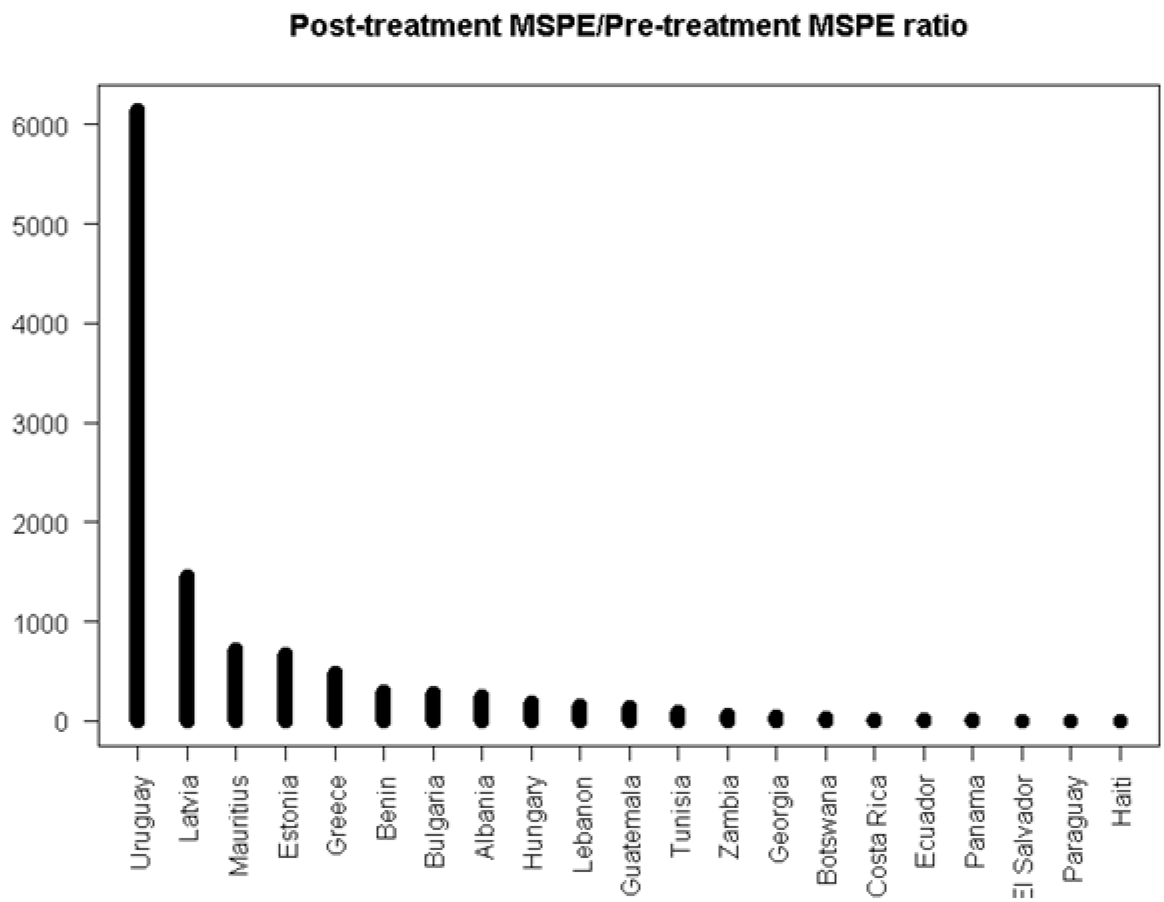


Figure 24 compares the ratio of post-treatment MSPE to pre-treatment MSPE for each country. As displayed in Figure 24, Georgia has the 14th highest ratio. None of the countries had five times higher MSPE in the pre-treatment period than Georgia and therefore, no country was excluded from this model. The p-value equals 14/21 ≈ 0.67, which is not statistically significant.

Figure 24: Model 3 : Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries



METHODOLOGY APPENDIX 3: PLACEBO TESTS WITH EXCESS DEATH DATA

An additional placebo test which is commonly seen in the synthetic controls literature is to replace the main outcome variables with either a related or entirely unrelated outcome variable to see if the results are substantively similar in the case of a related outcome variable or substantively different in the case of an unrelated outcome variable. For the present brief, a placebo test was conducted with monthly excess death data from the Economist. The data includes estimated monthly excess deaths for the year of 2020. Therefore, this section compares the results of this analysis to the results of the analysis of COVID 19 deaths per capita described in the main body of the text. The results are compared only for the months of November and December as these are the only months with available data. The placebo tests suggest that the models in the text are in line with the estimates using excess deaths data.

Excess deaths models

The synthetic controls were constructed from the following countries for the first excess deaths model: Tunisia, Estonia, Panama, Latvia, Albania, Bulgaria, Hungary, Kazakhstan, Kosovo, and Uzbekistan. The composition of the first synthetic control is as follows:

Figure 25: Model 1: Donor countries in synthetic Georgia (Excess deaths)

Model 1: Excess deaths	
Country	**Weight (% of synthetic Georgia)**
Tunisia	59
Estonia	27.1
Panama	13.8
Latvia	0.1

The synthetic controls were constructed from the following countries for the second excess deaths model: Tunisia, Guatemala, Lebanon, Uruguay, Bulgaria, Latvia, Albania, Belgium, Costa Rica, Denmark, Ecuador, Estonia, Finland, Greece, Hungary, Ireland, Mairitius, Panama, Paraguay, Sweden, and Switzerland. The composition of the second synthetic control is as follows:

Figure 26: Model 2: Donor countries in synthetic Georgia (Excess deaths)

Model 2: Excess Deaths	
Country	**Weight (% of synthetic Georgia)**
Tunisia	44.3
Guatemala	25.3
Lebanon	20.1
Uruguay	8.2
Bulgaria	2
Latvia	0.1

The synthetic controls were constructed from the following countries for the third excess deaths model: Tunisia, Guatemala, Lebanon, Uruguay, Albania, Bulgaria, Costa Rica, Ecuador, Estonia, Greece, Hungary, Latvia, Mauritius, Panama, and Paraguay. The composition of the third synthetic control is as follows:

Figure 27: Model 3: Donor countries in synthetic Georgia (Excess deaths)

Model 1: Excess deaths	
Country	**Weight (% of synthetic Georgia)**
Tunisia	45.8
Guatemala	25.8
Lebanon	20.7
Uruguay	7.7

The figures below display the difference between actual and synthetic Georgia for each of the three model specifications used in the text, but using excess deaths as the outcome variable. The charts suggest that excess deaths expanded quickly following the October 2020 elections in comparison to a baseline scenario. They also suggest that the models performed well based on the pre-treatment fit of the data.

Figure 28: Model 1: Synthetic Georgia versus Actual Georgia (Excess deaths)

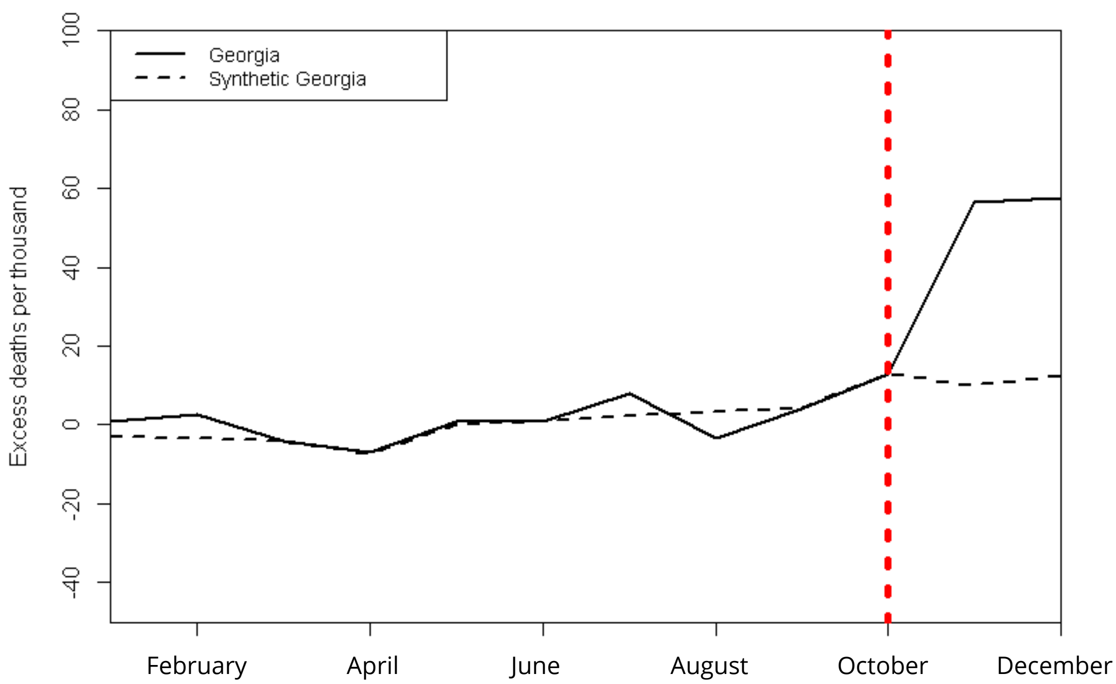


Figure 29: Model 2: Synthetic Georgia versus Actual Georgia (Excess deaths)

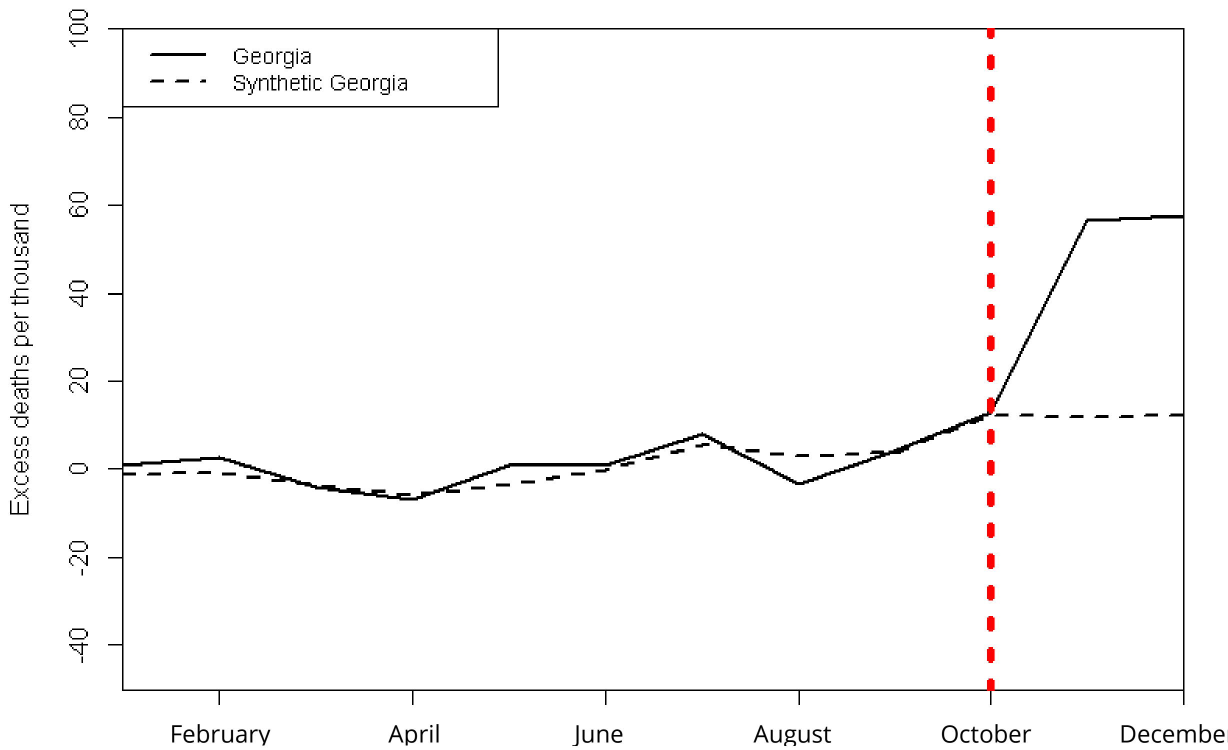
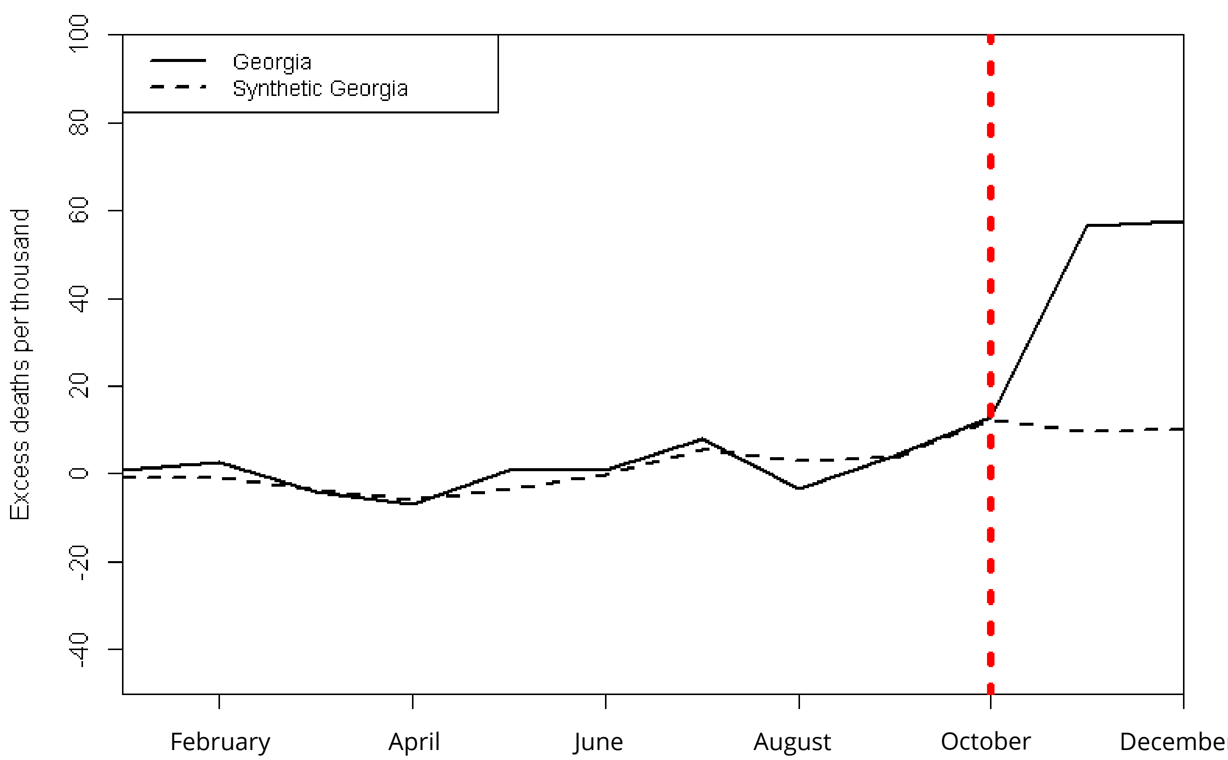


Figure 30: Model 3: Synthetic Georgia versus Actual Georgia (Excess deaths)



The models estimate an excess death count per 100,000 people of between 91 and 94.3 in November and December. This is an absolute value of between 3330 and 3489 excess deaths above and beyond the values anticipated in the absence of elections. The estimates are broadly in line with the estimates from the three models described above in that excess deaths are expected to be larger than COVID 19 deaths as discussed below.

Figure 31: Comparison of excess deaths to COVID 19 death counts

	Estimated COVID-19 excess deaths per 100,000 in November and December	Estimated total number of excess deaths in November and December (From models using excess deaths)
Model 1	91.1	3371
Model 2	90	3330
Model 3	94.3	3489

Figures 32, 33, and 34 show the estimated effect for Georgia juxtaposed with the placebo effects of countries that did not have excessive mean square prediction errors (MSPE) in the pre-treatment period. Georgia clearly stands out as an unusual case, with the second largest effect size during this period following Bulgaria in each model.

Figure 32: Model 1: Gaps of excess deaths per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

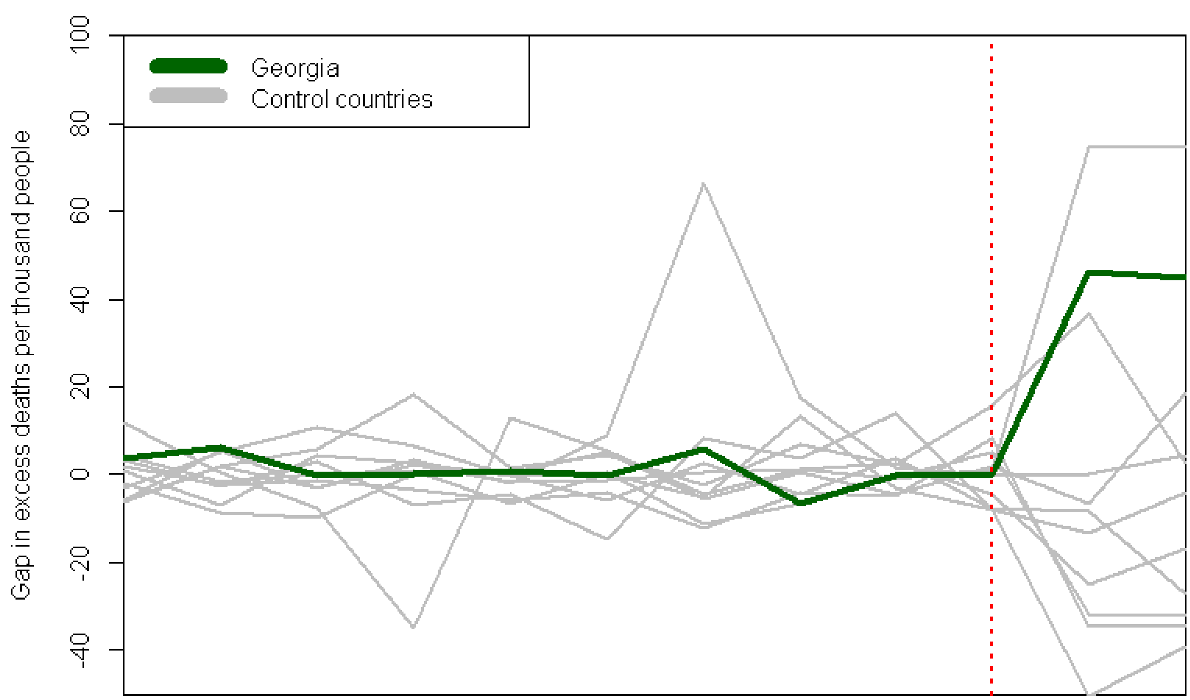


Figure 33: Model 2: Gaps of excess deaths per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)

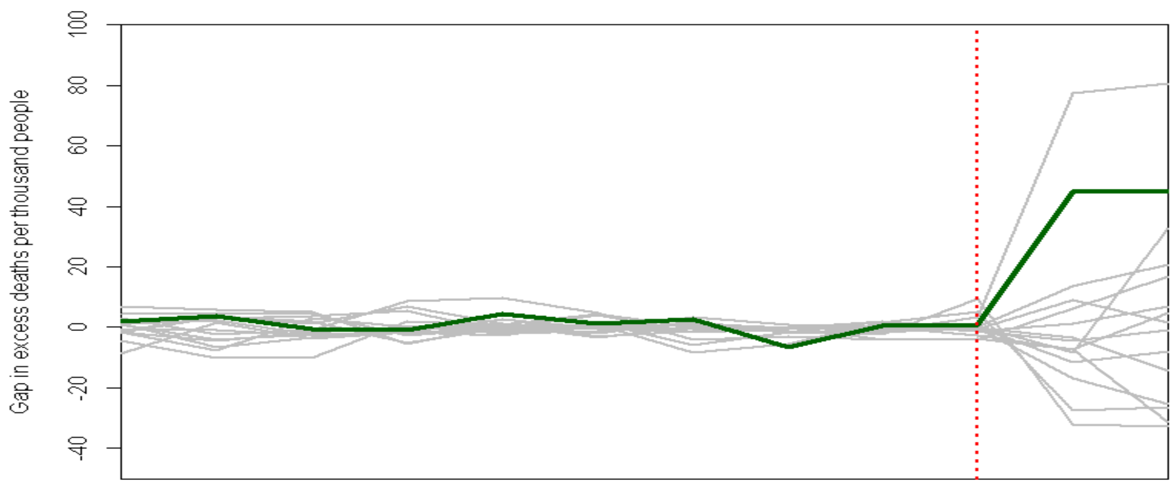
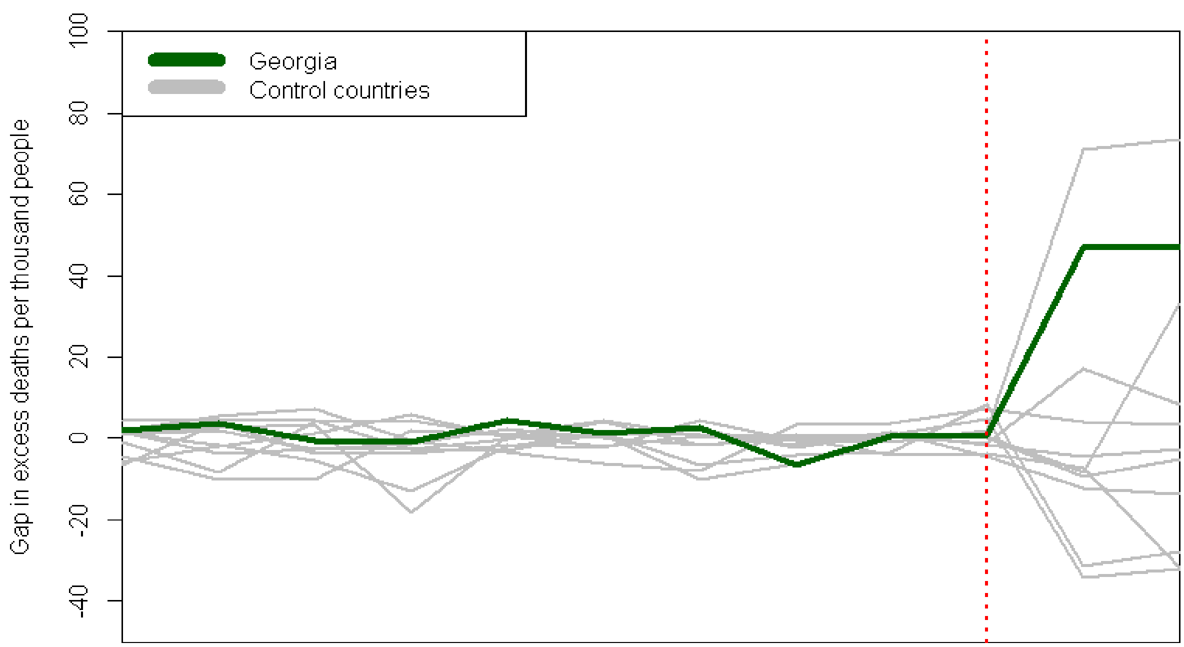


Figure 34: Model 3: Gaps of excess deaths per million people in Georgia and placebo gaps from applying the model to other countries (countries with pre-treatment MSPE five times higher than Georgia's are discarded)



Figures 35, 36, and 37 compare the ratios of post-treatment MSPE to pre-treatment MSPE for each country in each model. For model 1, Georgia has the 2nd highest ratio, resulting in a p-value of 2/11 = 0.18. For model 2, Georgia has the 2nd highest ratio, resulting in a p-value of 2/15 = 0.13. For model 3, Georgia has the 2nd highest ratio, resulting in a p-value of 2/11 = 0.18.

Figure 35: Model 1: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries

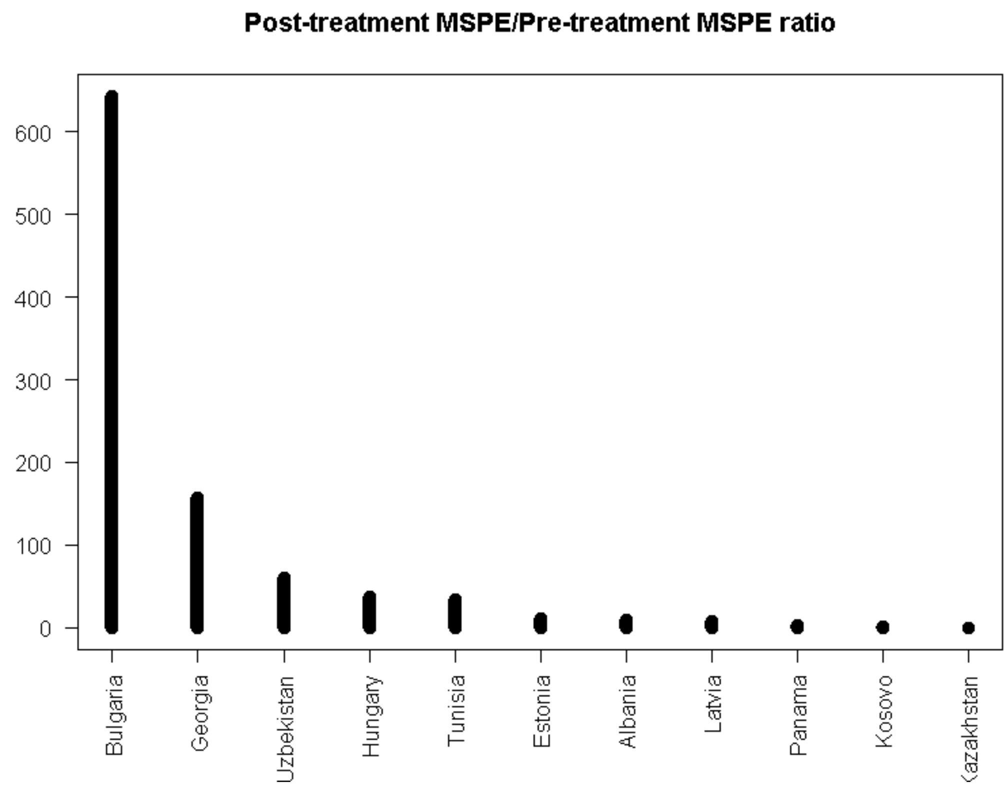


Figure 36: Model 2: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries

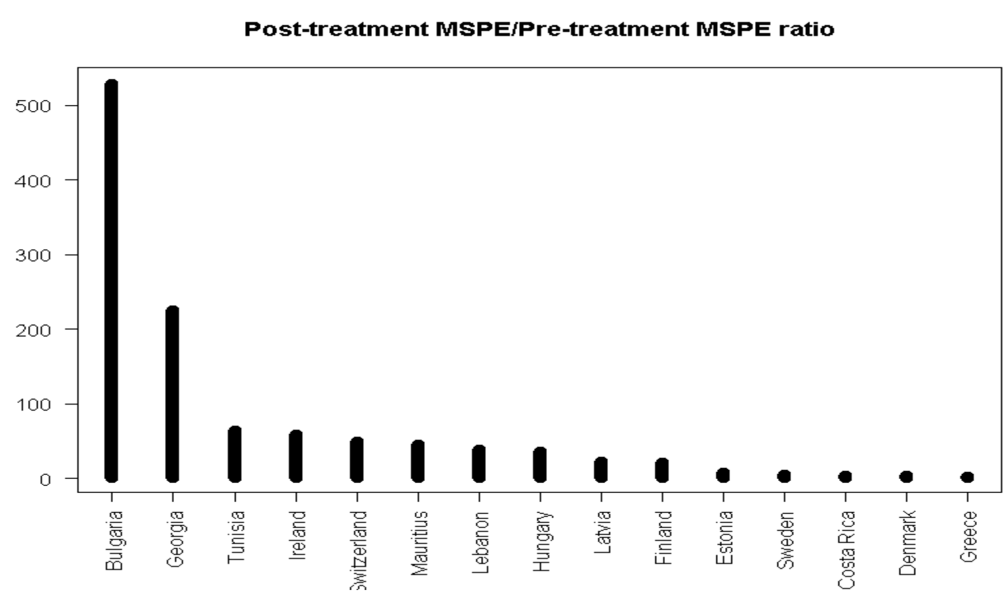
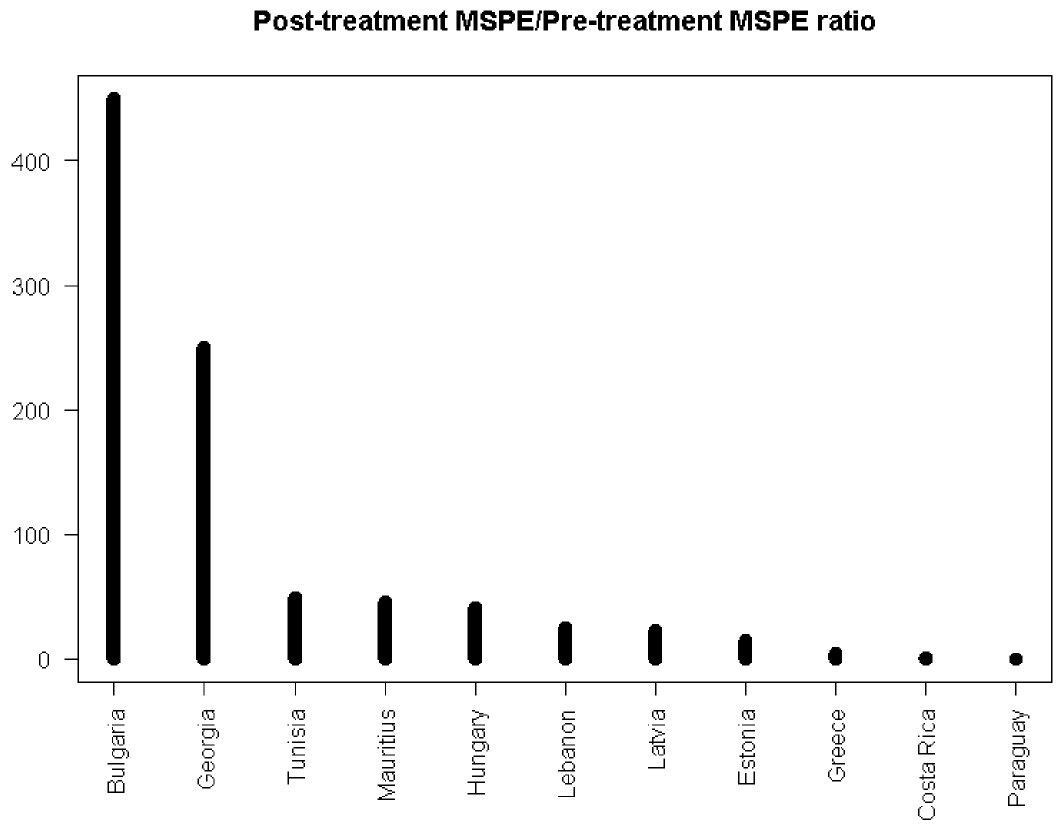


Figure 37: Model 3: Ratio of post-treatment MSPE to pre-treatment MSPE: Georgia and all control countries



The above data tend not to be statistically significant due to the small sample size in the analysis. Indeed, due to the small sample size it would only be possible to achieve statistical significance at the 10% level for the above models. Notably, without removing the countries with MPSEs of greater than five times Georgia in the pre-treatment period, the one of the estimates would be statistically significant at the 10% level due to the larger sample size and another would miss this mark by only 2%.

The models also do provide consistent estimates, with each model suggesting an excess death count of in the realm of 3300. The fact that the estimates are larger than the estimates for COVID 19 deaths is likely attributable to the fact that excess deaths are generally expected to exceed COVID 19 death statistics. Estimates of excess deaths would also include deaths associated with medical care not provided due to an overburdened medical system, people avoiding care due to a fear of catching COVID 19, and COVID 19 deaths not identified as such due to lack of testing among numerous other issues. Aside from this, the estimates are also broadly in line with estimates of total excess deaths provided by other CRRC Georgia researchers for this time period of 4038. [34] In this regard, the difference between the two numbers may be taken as how many excess deaths would have been expected in the absence of elections.

[34] See Sichinava, 2021, available at: https://github.com/davidsichinava/excess_mortality