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Original
The COVID-19 pandemic’s effects on voter turnout / Picchio, Matteo; Santolini, Raffaella. - In: EUROPEAN JOURNAL OF POLITICAL ECONOMY. - ISSN 0176-2680. - ELETTRONICO. - 73:(2022). [10.1016/j.ejpoleco.2021.102161]

Availability:
This version is available at: 11566/293942 since: 2024-09-24T09:22:21Z

Publisher:

Published
DOI:10.1016/j.ejpoleco.2021.102161

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10 November 2024

The COVID-19 Pandemic's Effects on Voter Turnout

Matteo Picchio[a,b,c,d], Raffaella Santolini[a*]

[a] *Department of Economics and Social Sciences, Marche Polytechnic University, Italy*

[b] *Department of Economics, Ghent University, Belgium*

[c] *IZA – Institute of Labor Economics, Bonn, Germany*

[d] *GLO – Global Labor Organization*

Abstract

The COVID-19 pandemic has increased the risk of participating in public events, among them elections. We assess whether the voter turnout in the 2020 local government elections in Italy was affected by the COVID-19 pandemic. We do so by exploiting the variation among municipalities in the intensity of the COVID-19 outbreak as measured by the mortality rate among the elderly. We find that a 1 percentage point increase in the elderly mortality rate decreased the voter turnout by 0.5 percentage points, with no gender differences in the behavioural response. The effect was especially strong in densely populated municipalities. We do not detect statistically significant differences in voter turnout among different levels of autonomy from the central government.

Keywords: COVID-19 outbreak; voter turnout; mortality rate; Italian municipalities

JEL classification codes: D72, D81, H70

*Corresponding author: Department of Economics and Social Sciences, Marche Polytechnic University, Piazzale Martelli 8, 60121 Ancona, Italy. Tel.: +39 071 220 7110.
E-mail addresses: m.picchio@staff.univpm.it (M. Picchio); r.santolini@staff.univpm.it (R. Santolini).
Declarations of interest: none.

1 Introduction

In late December 2019 a severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) was first identified in the city of Wuhan of the Republic of China and then rapidly spread to the rest of the world, causing a pandemic known as COVID-19. It has radically changed the lifestyle of people forced to stay at home, to wear face masks, and to maintain social distancing. These are only some of the restrictions imposed by national governments to curb the spread of the new coronavirus. Italy was the first European country to have been hard hit by COVID-19, with a significant increase in positive cases in March 2020. Italy immediately took draconian measures by stopping most economic activities, closing schools and universities, severely limiting the movement of people, and restricting social contacts.

Restrictive policies to contain the spread of COVID-19 have also led to a transformation of the political agenda by postponing the renewal of regional governments and of numerous municipal councils. Going to the polls to exercise the right to vote could indeed increase cases of virus infection among voters and the incidence of mortality from COVID-19, especially among elderly people (Bertoli et al., 2020; Santana et al., 2020). Moreover, participation in assemblies and rallies during the election campaign may make gatherings risky and spread the virus infection among political candidates and participants (Bach et al., 2021; Cipullo and Moglie, 2021). Voters can choose between not voting or exercising their civic duty with the risk of infection. This decision may depend on the voter's perception of the severity of the disease and the risk of catching it. In areas where citizens observe a higher number of positive cases and deaths from COVID-19, there may be a sharp decline in the voter turnout due to the fear of being infected at the polling station. Recent studies validate these hypotheses. Santana et al. (2020) show a significant decrease in electoral participation in those countries and regions where there have been a high number of deaths from COVID-19. Likewise, Fernández-Navia. et al. (2021) find for the Basque regional election held in Spain on 12 July 2020 a reduction in voter turnout of between 2.6 and 5.1 percentage points in those municipalities which had experienced a positive number of COVID-19 cases.

The scientific literature dealing with the electoral consequences of a pandemic is scant. The main contribution of our study is therefore to fill this gap by analyzing whether and to what extent voter turnout has decreased during the COVID-19 pandemic. The COVID-19 pandemic is still ongoing at the time of writing, more than one year after its outbreak, and there are signs that it is not going to fade away soon (Skegg et al., 2021). Understanding how electoral participation is affected is of utmost importance to prevent the eventual weakening of the democratic process, for example by designing different voting systems for the upcoming election or by making it easier to access already existing voting systems alternative to voting in person. Many countries decided to postpone elections to avoid low electoral participation, exposing themselves to criticism that such a decision would jeopardize democracy.

Our analysis is carried out on Italian municipalities holding elections in September and October 2020 and observed also in the previous electoral round of 2015. In a panel data framework, we estimate the differential effect of the mortality rate of elderly people on voter turnout after the COVID-19 outbreak, where the elderly mortality rate is a measure of the intensity of the COVID-19 outbreak.[1] The source of variation in the elderly mortality rate induced by the COVID-19 outbreak is plausibly exogenous with respect to unobserved determinants of the voter turnout, once one has controlled for the municipality fixed effects and a set of observed time-varying covariates. We will exploit this identification assumption to infer whether and to what extent the voter turnout has been affected by the mortality rate of the elderly since the COVID-19 outbreak.

We find that a 1 percentage point increase in the mortality rate of elderly people decreased the voter turnout by 0.5 percentage points. The effect was particularly strong in densely populated municipalities, where the decrease amounted to 1.2 percentage points: where the virus circulation was perceived as more likely due to lesser social distancing and the greater mobility of individuals, electoral participation may have been discouraged more. We find that the effect did not depend on the level of regional autonomy from the central government.

In the empirical analysis, we place especial emphasis on different gender behavioural responses. This is interesting for two main reasons. On the one hand, since there is emerging evidence that COVID-19 is deadlier for infected men (Gebhard et al., 2020),[2] eligible male voters may be less willing to go to the polls and cast their vote, so as to avoid a situation that could expose them to a higher risk of COVID-19 infection. On the other hand, men and women differ in their risk aversion, with women being more risk averse:

[1] In Italy, the mean age of patients dying from COVID-19 was 81 years in March 2021, while only 1.1% of the deceased where aged under 50 (Integrated COVID-19 Surveillance Group, 2021).

[2] In Italy, the share of women who died from COVID-19 infection was 43.9% while in the first wave of the pandemic (March-May 2020) it was even smaller, i.e. about 38.4% (Integrated COVID-19 Surveillance Group, 2021).

see e.g. Borghans et al. (2009) and the literature cited therein. There is also evidence that women are more aware of COVID-19 related risks (Dryhurst et al., 2020) and have had more psychological reactions to the COVID-19 outbreak than men, with higher level of stress, anxiety, and depression (Öcal et al., 2020). Since voting in-person entails a greater risk of COVID-19 infection and transmission (Cotti et al., 2021; Flanders et al., 2020), and if women are more risk averse than men, the female voter turnout may have reacted to the COVID-19 outbreak more markedly than the male one. We empirically assess whether these gender related forces have been at work. Empirical analysis shows a significant reduction in both female and male voter turnout during the COVID-19 pandemic. The effect is slightly larger in magnitude for men, although a formal test rejects the hypothesis of gender difference in the behavioural response.

This paper is organised as follows. Section 2 introduces the emerging literature on the consequences of the COVID-19 pandemic on political attitudes and presents hypotheses on the impact of the pandemic intensity on voter turnout. Section 3 describes the data and the method used in our empirical investigation. Section 4 presents the main findings and a battery of checks to assess the robustness of our results. Section 5 concludes.

2 The effects of COVID-19 on political attitudes

2.1 Literature background

The COVID-19 pandemic has had significant repercussions on the lifestyles of individuals, their trust in institutions, voting intentions, and electoral participation. In dramatic events such as wars, terrorist attacks, or natural disasters, citizens usually "rally around the flag" by increasing their support for the national government (Hetherington and Nelson, 2003; Dinesen and Jæger, 2013; Esaiasson et al., 2021). Emergency situations create an enormous sense of insecurity in citizens, who therefore expect the national government to find solutions, and support it through greater consensus on the national policies adopted. The occurrence of a pandemic event is one of these extraordinary circumstances in which citizens trust the national government to take effective action to eradicate the pandemic and rapidly restore normal life (Baekgaard et al., 2020; Bordandini et al., 2020; Devine et al., 2021; Esaiasson et al., 2021; Merkley et al., 2020; Schraff, 2021).[3]

[3] A drop in institutional trust during the COVID-19 pandemic has been found by Brück et al. (2020) and Daniele et al. (2020).

Depending on the effectiveness of the response by the national government to the health and economic emergency caused by the pandemic, citizens may change their voting intentions and may punish or reward the incumbent at the polls. Baccini et al. (2021) found that the COVID-19 outbreak had influenced voting intentions in the 2020 US presidential election by decreasing Donald Trump's share of votes and mobilizing votes for his opponent Joe Biden. Bol et al. (2021) showed that lockdown policies in 15 Western European countries in March-April 2020 increased the intentions to vote for the party of the prime minister/president. Leininger and Shaub (2020) found that the incumbent party and its candidates benefited in terms of larger vote share from the pandemic crisis in local elections in Bavaria in Germany.

The pandemic poses a serious threat to the maintenance of democracy because it undermines its proper functioning through political decisions aimed at limiting the freedom of electoral rallies, postponing elections, and introducing opaque voting mechanisms (e.g., postal and electronic voting) in order to prevent the spread of the virus and low voter turnout. High vote abstention is a serious problem for the democratic process because it makes elections potentially unrepresentative, with a consequent delegitimization of the government's mandate (Cipullo and Moglie, 2021; Landman and Di Gennaro Splendore, 2020). Hence, it is important to examine the effects of the pandemic and its intensity on voter turnout, and to determine which strategies to implement in order to curb the collapse of citizens' participation in the vote (James and Alihodzic, 2020).

In 2020 many countries postponed elections to avoid low levels of voter turnout and to curb the spread of the virus.[4] The UK local elections scheduled in May 2020 were postponed to 2021. Spain rescheduled the regional elections in the Basque country, Catalonia, and Galicia. The electoral appointment of Italian local governments and a national referendum were rescheduled for September 2020.[5] The French national government decided to maintain the first-round of municipal elections in March 2020 and to postpone the second-round in June. This political decision raised debate on the risk of exercising the right to vote during a pandemic, despite the adopted measures of social distancing, individual sanitation, and personal protection. The level of voting abstention was very high (55.4%) compared to previous municipal elections (36.5%) (Bertoli et al., 2020),

[4]For an exhaustive list of elections postponed worldwide, see "Global overview of COVID-19: Impact on elections" released by the International Institute for Democracy and Electoral Assistance, https://www.idea.int/news-media/multimedia-reports/global-overview-covid-19-impact-elections (last accessed on 23 March 2021).

[5]Only in Sicily and in Sardinia were the elections rescheduled for October 2020

suggesting that the COVID-19 pandemic may have exerted a strong influence on electoral participation in French. By contrast, in some countries like Switzerland and South Korea, thanks to postal system and early voting, electoral participation has increased significantly during the COVID-19 pandemic, reaching a record of voter turnout. The USA has regularly held presidential elections, in which large use has been made of postal voting.

The in-person voting system discourages voters, especially those with severe health issues from physically going the polling station to exercise their civic duty during the pandemic since it puts them at greater risk of contracting viruses and other diseases. Nevertheless, the experience of some countries, such as South Korea, has proved to be positive in terms of voter turnout thanks to the system of early in-person voting used during the outbreak (James and Alihodzic, 2020; Landman and Di Gennaro Splendore, 2020). In other countries, such as France, going to the polls during the pandemic has been costly in terms of human lives and new cases of virus contagion: in fact, Bertoli et al. (2020) showed that in France higher voter turnouts in the first-round of municipal elections held in March 2020 were associated with significantly higher death counts for the elderly in the five weeks after the elections. Noury et al. (2021) found that the risk of contracting and developing severe COVID-19 illness increased with voters' age, reducing voter turnout in the 2020 French municipal elections among elderly people. Haute et al. (2021) reported a significant reduction in age-related disparities in voter turnout in the 2020 French municipal elections, probably due to the increased risk of COVID-19 mortality experienced among the elderly. Flanders et al. (2020) found a greater risk of COVID-19 transmission 1-2 weeks after elections in those counties of Michigan where the voter turnout was particularly high during primary elections held on March 10, 2020.

2.2 Hypotheses

The health emergency caused by COVID-19 has discouraged voters from going to the polls because of the higher health risks incurred by them, with a consequent increase in voting abstention (Landman and Di Gennaro Splendore, 2020). Voting abstention may be higher in areas where the COVID-19 outbreak has had a more severe impact because people perceive a greater risk to their health (Santana et al., 2020). These considerations, supported by the recent empirical evidence mentioned above, lead to the formulation of the following hypothesis:

H. 1 Voter turnout decreases as the intensity of the COVID-19 pandemic increases.

The way in which people have reacted and modified their behaviour in facing the COVID-19 pandemic differs between men and women. Women are more likely than men to comply with health guidelines in order to avoid COVID-19 infection (Galasso et al., 2020). This attitude may be due to the fact that they are more fearful of contagion (Broche-Pérez et al., 2020), perceive a greater health risk associated with the COVID-19 (Dryhurst et al., 2020), and are therefore less willing to be exposed to situations which are health threatening. If women have a stronger perception of the risk of contagion and a greater fear of COVID-19, they may more intensively avoid social contacts and public events, including going to the polls. Alternatively, since it seems that men are more likely to die because of COVID-19 (Caramelo et al., 2020; Jin et al., 2020; Sepandi et al., 2020), they may respond more importantly to the pandemic and be more affected in terms of electoral participation. Given these considerations and the ambiguous predictions of the above arguments, we are undecided about how gender may determine the heterogeneity of the effect of the pandemic on voter turnout. Understanding if COVID-19 has impacted differently on the voter turnout of men and women may be important in terms of election results. In fact, men and women have different understandings of politics and party preferences. This "modern" gender voting gap is nowadays well present also in Italy (Abendschön and Steinmetz, 2014) and could be reinforced by a gender asymmetric impact of COVID-19 on electoral participation. This leads to the following hypothesis:

H. 2 The impact of the COVID-19 pandemic on voter turnout has been gender different.

In densely populated areas, such as large metropolitan and urban zones, individuals are more exposed to social contacts through economic, social, and commuting relationships, which foster the spread of the virus in those areas (Hamidi et al., 2020; Kadi and Khelfaoui, 2020; Bhadra et al., 2021; Coşkun et al., 2021). Recent empirical evidence shows that voting abstention has been greater in densely populated territories where individuals are highly exposed to the COVID-19 risk (Santana et al., 2020; Baccini et al., 2021; Leromain and Vannoorenberghe, 2021; Noury et al., 2021). In light of these considerations and empirical findings, we will test the following hypothesis:

H. 3 The COVID-19 pandemic has more intensively affected the voter turnout in densely populated areas.

Finally, Italian regions have different levels of autonomy from the central government. In fact, the Italian constitution states that there are five regions with special statute (Friuli-Venezia Giulia, Sardegna, Sicilia, Trentino-Alto Adige, and Valle d'Aosta), while all the remaining fifteen fall within the ordinary statute. The special statute regions have more autonomy. The main reasons for this constitutional asymmetry in favour of the special statute regions are the presence of significant ethnocultural minorities, a special political system, and a historical tradition of self-government and administrative capacity (Palermo and Valdesalici, 2019). On studying the variation in voter turnout in regional elections of some OECD countries, Henderson and McEwen (2010, 2014) found that the degree of political autonomy and the strength of the electorate's attachment to the region have a strong and positive impact on voter turnout. Thus, one may wonder whether the responsiveness of electoral participation to an external shock, like the COVID-19 outbreak, is more rigid in those regions with a higher level of autonomy, i.e. with special statute regions. This leads to our last hypothesis:

H. 4 Voter turnout has been less affected by the COVID-19 pandemic in autonomous regions.

3 Method

3.1 Data and sample

We used datasets at municipality level from different sources. First, we gathered from the Ministry of Interior data by gender on individuals eligible to vote and voters who actually cast a ballot in the 2020 municipality elections. In 2020, 1,170 Italian municipalities held elections. Apart from the municipalities in Sardegna and Sicilia, which voted respectively on 25-26 and 4-5 October, in the rest of the country the municipal elections took place on 20-21 September. Since in Italy the municipal governments are elected every 5 years, we also collected 2015 voting information, i.e. information on voting in the previous electoral round. In some cases, the local government is terminated earlier or lasts longer for political or juridical reasons. We retained in our sample those 933 municipalities with no missing information for electoral variables, which had elections in 2015 and 2020, and whose government remained in office for the entire 5-year electoral term. We then further removed 215 municipalities not reporting electoral data disaggregated by gender. Finally, we dropped 16 municipalities because their local government had been dismissed and elections had been prematurely held in 2015. Generally, this happens when there is evidence of mafia infiltration in the local government. When this is the case, the voter turnout may react significantly, introducing noise into the sample.

In a subsequent step, we matched the remaining sample of 709 municipalities with a series of characteristics at municipal level gathered from the National Institute of Statistics (ISTAT): population by age (January 1st of 2015 and 2020), population density, fraction of immigrants (December 31st 2014 and 2019), and taxable income per capita and the number of workers over the population (2013 and 2018).[6] In the process of matching the electoral data with municipal characteristics, we further lost 7 municipalities because of missing values in one of the covariates. The final sample ws a balanced panel made up of 1,404 observations of 702 municipalities as regards both 2015 and 2020.

Figure 1 displays the geographical location of these municipalities. It shows that in our sample we did not have municipalities located in Sicilia and Friuli-Venezia-Giulia. This is because we did not have gender disaggregated electoral data for the municipalities in these two regions which voted in 2020 and 2015. Figure 1 also shows that many observations are from Sardegna, Valle d'Aosta, and Trentino-Alto Adige. These are 3 of the 5 regions subject to a "special statute regime" in their relationships with the central government.[7] Table 1 reports the relative and absolute frequency of the observed municipalities by region. The municipalities of Sardegna, Valle d'Aosta, and Trentino-Alto Adige are largely over-represented: they amount to 41% of the municipalities in our sample, whereas they correspond to 11% nationwide. The population covered by the municipalities in our final sample amounts to 4.1 million persons in 2020, which is about 6.8% of the Italian population in the same year.

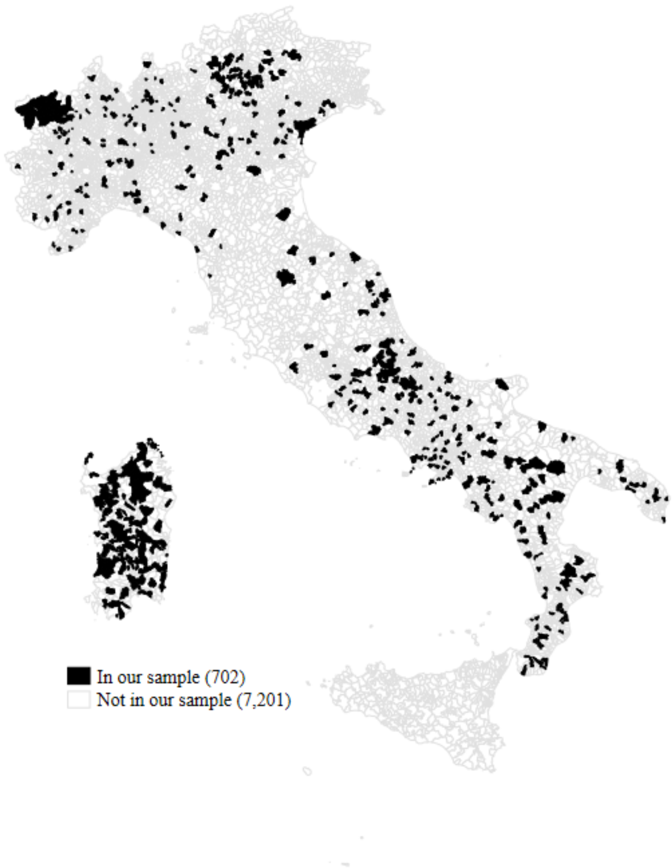
We measured the intensity with which the COVID-19 outbreak affected the various areas by looking at the death statistics for the elderly people. More precisely, we used the 2015–2020 data on mortality and causes of death that ISTAT has produced in response to the COVID-19 pandemic outbreak.[8] For both 2015 and 2020 and for each municipality, we computed the ratio between the number of people aged 70 or older who died from January until July and the population aged 70 or older on the 1st of January. In what follows, we will refer to this ratio as 'the elderly mortality rate' or 'the 70+ mortality rate'. We focus on the elderly because there is firm evidence that COVID-19 is associated with a sharp increase in the death rate among people aged over 70 (see, e.g., Bophal and Bophal, 2020; Michelozzi et al., 2020; Omori et al., 2020). Hence, the 70+ mortality rate

[6] At the time of writing, the 2019 taxable income and the 2019 number of workers were not available yet. We approximated the economic situation and the status of the labour market by using their lags of order 2.

[7] The other two regions with a "special statute" are Friuli-Venezia-Giulia and Sicilia.

[8] Data are available at www.istat.it/it/archivio/240401 (last accesed on 23 March 2021).

Figure 1: Municipalities in the final sample



Notes: The municipalities in the final sample are in black. We report in parenthesis the number of municipalities in each category.

Table 1: Sample composition by regions

Region	Absolute frequency	Relative frequency (%)	Region	Absolute frequency	Relative frequency (%)
Abruzzo	56	7.98	Molise	16	2.28
Basilicata	16	2.28	Piemonte	50	7.12
Calabria	44	6.27	Puglia	26	3.70
Campania	58	8.26	Sardegna	147	20.94
Emilia-Romagna	8	1.14	Sicilia	0	0.00
Friuli-Venezia Giulia	0	0.00	Toscana	6	0.85
Lazio	20	2.85	Trentino-Alto Adige	73	10.40
Liguria	12	1.71	Umbria	3	0.43
Lombardia	54	7.69	Valle d'Aosta	66	9.40
Marche	15	2.14	Veneto	32	4.56
			Total	702	100.00

should better reflect the local intensity of the COVID-19 outbreak and be a better measure of people's perception of the risks associated with the COVID-19 transmission than the same measure diluted over the whole population.

Table 2 reports summary statistics by election year of the elderly mortality rate and of the voter turnout across municipalities. It also reports summary statistics on the excess mortality of the elderly, as we will use this further variable to measure the intensity of the COVID-19 outbreak in a sensitivity analysis. The excess mortality rate is computed as the difference between the deaths of people aged 70 or more in January–July 2020 and the 2015–2019 average deaths in the same months per thousand inhabitants aged 70 or more. Despite the COVID-19 pandemic, the fraction of people aged 70 or more who died in the first seven months of the year was rather stable: 36.5‰ in 2015 and 35.6‰ in 2020. If we focus on the 70+ excess mortality rate, we detect an increase of about 1.6 deaths per thousand inhabitants aged 70 or more.

The voter turnout, defined as the ratio between the voters who cast a ballot and individuals eligible to vote, decreased by about 0.9 percentage points (pp). Similar variations are observed when considering the voter turnout by gender. These figures can tell us little (or nothing) about the causal impact of the COVID-19 pandemic on electoral participation. Indeed, there are multiple explanations for the decrease over time in voter turnout, which may be simply due to a common time trend in electoral participation, for example population ageing, because voter turnout is low among the elderly (Revelli, 2017).

Table 2: Summary statistics of voter turnout and the elderly mortality rate (death rate per thousand inhabitants aged 70 or older)

	Mean	Std. Dev.	Minimum	Maximum	Observations
Mortality rate 70+ (‰)					
2015	36.472	15.859	0.000	138.889	702
2020	35.624	15.728	0.000	133.333	702
70+ excess mortality in 2020 with respect to 2015–2019 (per 1,000 inhabitants aged 70+)					
2020	1.607	17.629	-87.671	87.179	702
Voter turnout (%)					
2015	66.333	10.651	20.938	91.818	702
2020	65.441	10.585	16.941	90.419	702
Female voter turnout (%)					
2015	65.740	10.822	13.836	91.781	702
2020	64.977	10.662	15.060	91.549	702
Male voter turnout (%)					
2015	66.948	10.682	27.950	92.771	702
2020	65.922	10.752	18.692	91.371	702

Better insight into the possible impact of the COVID-19 pandemic on electoral participation can be gained by comparing the variation in the voter turnout of municipalities with little change in the elderly mortality rate, with the variation in the voter turnout of municipalities where the mortality rate of the elderly displayed a significant increase. We split the sample into two by separating municipalities with a growth rate of the 70+ mortality rate below the 75th percentile, which played the role of the treated municipalities, from those with a growth rate of the 70+ mortality rate above the 75th percentile, which acted as controls.[9] Table 3 shows that the voter turnout decreased in both slightly and highly affected municipalities. However, the decrease was significant only in the latter. By taking the difference between the time differences of the two groups, we obtained a difference-in-differences (DiD) estimate of the impact on voter turnout, which is cleansed of the common time trend in voter turnout and from spurious components induced by time-constant determinants of both mortality and electoral participation rates. We find that experiencing a large increase in the mortality rate of the eldest reduced the voter turnout by about 2 pp. Female and male voter turnouts were equally affected.

Table 3: Difference-in-differences between municipalities highly ("treated") and slightly ("controls") affected by COVID-19[(a)]

Dependent variable: voter turnout	Total		Female		Male	
	Coeff.	Std. Err.[(b)]	Coeff.	Std. Err.[(b)]	Coeff.	Std. Err.[(b)]
High COVID-19 intensity ("treated")[(a)]						
2015	67.331		66.804		67.872	
2020	64.963		64.554		65.377	
Difference 2020-2015	-2.367***	0.610	-2.250***	0.628	-2.495***	0.612
Low COVID-19 intensity ("controls")[(a)]						
2015	66.001		65.387		66.642	
2020	65.600		65.118		66.103	
Difference 2020-2015	-0.401	0.325	-0.269	0.344	-0.539	0.319
Difference-in-differences	-1.966***	0.691	-1.981***	0.716	-1.956***	0.691

[(a)] We denote as municipalities highly (slightly) affected by COVID-19 as those municipalities which are above (below) the 75th percentile of the 2020-2015 relative variation in the elderly mortality rate. The 75th percentile of the relative variation in the elderly mortality rate is 26.6%. The number of treated (control) municipalities is 175 (527).

[(b)] Standard errors are estimated by linear regressions and are robust to heteroskedasticity and within-municipality correlation.

In the econometric analysis described in what follows, we refined this identification strategy in two ways. First, we controlled not only for time-invariant heterogeneity but also for a set of possible time-varying determinants of both the outcome variable and the

[9]The 75th percentile of the growth rate in the elderly mortality rate is 26.6%, i.e. 25% of the municipalities in our sample experienced an increase in the elderly mortality rate larger than 26.6%.

elderly mortality rate. Table 4 reports descriptive statistics of the time-varying covariates that we used as controls in the specification of the voter turnout equation. Second, we avoided the arbitrary separation of the sample into treated and control units used to build Table 3 and exploited instead the continuum of treatment intensity represented by the within-municipality variation in the 70+ mortality rate. The source of variation in the mortality rate of the elderly induced by the COVID-19 outbreak is plausibly exogenous with respect to unobserved determinants of the voter turnout, once one controls for the municipality fixed effects and a set of observed time-varying covariates. We exploited this identification assumption to infer whether and to what extent the voter turnout is affected by the elderly mortality rate since the COVID-19 outbreak.

Table 4: Summary statistics of time-varying covariates by electoral year

	2015				2020			
	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.
Time-varying covariates								
Population density (people per km^2)	278.9	816.7	1.0	11,031.1	272.8	795.4	1.0	10,554.2
Youth index (Jan. 1, %)[(a)]	56.742	24.288	3.571	173.856	48.121	19.725	0.000	135.392
Population 0-49 (Jan. 1)	3,473.6	8,626.1	22.0	134,971.0	3,163.4	7,940.8	14.0	125,335.0
Population 50-59 (Jan. 1)	857.3	2,207.5	5.0	40,075.0	922.7	2,382.2	6.0	42,944.0
Population 60-69 (Jan. 1)	713.3	1,860.6	11.0	34,321.0	732.0	1,853.7	8.0	33,760.0
Population 70-79 (Jan. 1)	555.3	1,589.6	7.0	32,385.0	587.3	1,624.3	10.0	31,740.0
Population 80+ (Jan. 1)	382.5	1,102.1	1.0	22,827.0	425.2	1,219.6	6.0	24,906.0
Ln(taxable income per capita)$_{t-2}$	9.283	0.278	8.472	10.072	9.343	0.283	8.475	10.115
(Number of workers/population)$_{t-2}$	0.185	0.131	0.009	1.022	0.193	0.151	0.000	1.673
Fraction of immigrants (Dec. 31 $t-1$, %)	5.301	4.266	0.000	33.654	5.414	4.256	0.000	37.599
2nd ballot (=1 if 2nd ballot took place)	0.068	0.253	0.000	1.000	0.040	0.196	0.000	1.000
Month of election								
May	0.991	0.092	0.000	1.000	0.000	0.000	0.000	0.000
September	0.000	0.000	0.000	0.000	0.791	0.407	0.000	1.000
October	0.000	0.000	0.000	0.000	0.209	0.407	0.000	1.000
November	0.009	0.092	0.000	1.000	0.000	0.000	0.000	0.000
Observations	702				702			

[(a)] The youth index is defined as the ratio between the population aged 0-14 and the population aged 65 or more (multiplied by 100).

3.2 Empirical strategy

We were interested in understanding whether and to what extent the intensity of the COVID-19 outbreak has impacted on electoral participation. The baseline variable that we used to measure this intensity was the elderly mortality rate, which we denote, for municipality i at time t, as mr_{it}, with $i = 1, \ldots, 702$ and $t = 2015, 2020$. In our preferred and most flexible specification, we modelled the voter turnout y_{it}, for $i = 1, \ldots, 702$ and $t = 2015, 2020$, as

$$y_{it} = \beta mr_{it} + \delta mr_{it} \times d2020_{it} + \eta d2020_{it} + \boldsymbol{\gamma}_t' \mathbf{x}_{it} + \phi_i + u_{it}, \tag{1}$$

where $d2020_{it}$ is the 2020 dummy, ϕ_i is the municipality fixed-effect, and u_{it} is an idiosyncratic error term. β is the impact of the 70+ mortality rate on the voter turnout in both the pre- and the post-COVID-19 elections. δ is the coefficient of interest, and it corresponds to the interaction term between the 2020 dummy and the 70+ mortality rate: it is the differential effect, with respect to β, of the elderly mortality rate since the COVID-19 outbreak. It therefore captures an eventual change in the way in which the 70+ mortality rate affects the voter turnout. If $\beta = 0$ or if $mr_{i2015} = 0$, $\forall i$, Equation (1) would turn into a typical DiD specification with two-way fixed effects and a continuous treatment. By focusing on δ in Equation (1), we identified the impact of the elderly mortality rate on the voter turnout, once we had netted out the impact that the elderly mortality rate used to have before the pandemic. We interpreted it as a pandemic-induced behavioral change in how participation in a public event responds to health conditions as approximated by the elderly mortality rate. Ferraresi and Gucciardi (2020, p. 124) used the same identification strategy and model specification to assess how the COVID-19 pandemic had affected the relation between the political alignment and the performance of mayoral governance.

Instead of modelling the voter turnout as a function of the elderly mortality rate and its interaction with the 2020 indicator, we could have opted for a standard DiD using only the 70+ excess mortality (or the 2020-2015 change in the elderly mortality rate). Excess mortality is a valid measure of the COVID-19 death toll. Indeed, taking the difference between what happened during the pandemic and what happened in preceding normal times removes spurious elements, like deaths that were not correctly diagnosed and reported or indirect deaths resulting from the overall crisis conditions. However, we wanted to assess the impact of a threatening situation as perceived by citizens on their participation in a public event. Risk perception plays a fundamental role in determining individuals' behaviour. Not only is a risk perceived differently according to experiential and social-cultural factors (Dryhurst et al., 2020), but the risk perception may be affected also by many other factors like communication and the media (Boholm, 1998). In our opinion, the mortality rate could better approximate the kind of information communicated to citizens and on the basis of which they form their risk perception. Indeed, the bulk of the deaths reported by the official communication channels as being related to COVID-19 might have happened anyway, and might not have been caused by the virus (Weinberger et al., 2020). Since these deaths are officially communicated as COVID-19 related, they contributed to the formation of individuals' risk perception. If we had used the excess mortality, the erroneously classified deaths would have not played a role, as removed from this variable by its computational method. In Subsection 4.3, as a sensitivity analysis, we report estimation results in which we used the 70+ excess mortality or the 2020-2015 difference in the elderly mortality rate as the continuous treatment in a DiD specification. We obtained results very similar to those from the baseline specification.

The term $\mathbf{x}_{it}$ is a $K \times 1$ vector of covariates to control for time-varying heterogeneity. In particular, since the demographic structure of the population may play a crucial role in determining both the elderly mortality rate and electoral participation,[10] we controlled for a large set of demographic features: the population size for different age ranges, the ratio between youths (aged 0-14) and persons older than 64, and the population density. Moreover, we also controlled for the natural logarithm of the lag of order two of the taxable income per capita (the lag of order one is not yet available from ISTAT at the time of writing), the fraction of immigrants, the month of the elections, and whether a second round of elections took place because no coalition reached the absolute majority in the first one.[11] γ_t is the conformable vector of coefficients of the covariates. It can vary over time, so as to represent heterogeneity in outcome dynamics (Abadie, 2005). We will also present results when the impact of covariates was constrained to being time-constant.

We estimated Equation (1) by OLS after time demeaning the dataset (fixed effects estimator). We conducted inference by using the cluster robust variance estimator (CRVE) (Liang and Zeger, 1986), which is robust to heteroskedasticity and within-municipality correlation.[12] Since in Italy the health system is organized at regional level and there are some peculiarities in terms of election organization in regions subject to the "special statute regime", electoral and health related data could be clustered at regional level.

[10] Revelli (2017) found that the demographic structure of Italian municipalities is significant in determining the voter turnout.

[11] In Italy, if no coalition achieves an absolute majority in the first round and the municipality has more than 15,000 inhabitants, a second round takes place in two weeks. Barone and de Blasio (2013) showed that the dual ballot increases electoral participation. For municipalities that went through two rounds, we compute the voter turnout as the average voter turnout across the two electoral stages.

[12] As we have two time periods, estimating by OLS after first differencing Equation (1) would deliver identical results and inferences.

Hence, to assess the reliability of our hypothesis testing, we also conducted inference robust to within-regional correlation. More in detail, since the number of regional clusters is small (18 regions in our sample) and the usual cluster-robust standard errors might be downwards biased, we computed the wild cluster bootstrap (WCB) p-values obtained from the wild cluster bootstrap-t procedure proposed by Cameron et al. (2008) with restricted residuals.[13]

4 Estimation results

4.1 Main findings

Table 5 reports the estimation results of the effect of the elderly mortality rate on voter turnout after the COVID-19 outbreak. It is divided into three panels. Whilst in panel a) the dependent variable is the voter turnout of the entire population, in panel b) and c) we focus instead on the female and male voter turnout, respectively. For each of these three dependent variables, we present the estimation results of three models. Model (1) is the most general specification, as discussed when commenting on Equation (1) in the previous section. In Model (2), we impose that the effect of the 70+ mortality rate is nil before the COVID-19 outbreak. This assumption is suggested by the very small point estimates and by the absence of significance of the coefficient $\widehat{\beta}$ of the 70+ mortality rate. Model (3) departs from Model (1) as we impose that the effect of the time-varying covariates $\mathbf{x}$ is constant over time.[14]

The estimated effect of the elderly mortality rate after the COVID-19 outbreak is very stable and similar across the 3 different specifications and between genders. Considering that, as is the usual practice, we are measuring the mortality rate in permillage points, we find that after the COVID-19 outbreak a 1 percentage point increase in the mortality rate significantly decreased the voter turnout by about 0.5 percentage points. If we compare this effect to the average voter turnout in 2015 (66.3%) to have a quantification of the relative impact (i.e. a semi-elasticity), our point estimates mean that a 1 percentage increase in the mortality rate in 2020 implied a 0.75% decrease in the voter turnout. The

[13] In the WCB procedure with restricted residuals, the model is re-estimated under the null hypothesis of no covariate effect. We use the Stata module `boottest` (Roodman, 2015; Roodman et al., 2019). We bootstrapped the residuals 5,000 times using the Webb six-point distribution as weights (Webb, 2014).

[14] Whereas in Model (1) and Model (2) we include the interactions between the time-varying covariates and the 2020 dummy, in Model (3) we do not.

Table 5: The impact of elderly mortality rate (‰) on voter turnout (%)

	(1)		(2)		(3)	
	Coeff.	WCB p-values[(a)]	Coeff.	WCB p-values[(a)]	Coeff.	WCB p-values[(a)]
a) Dependent variable: Voter turnout						
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.047**	0.026	-0.056***	0.019	-0.046**	0.036
	(0.022)		(0.019)		(0.022)	
70+ mortality rate ($\widehat{\beta}$)	-0.009	0.326	–	–	0.000	0.885
	(0.020)				(0.020)	
Municipality fixed-effects	Yes		Yes		Yes	
Time fixed effect	Yes		Yes		Yes	
$\widehat{\gamma}_t$ varies over time	Yes		Yes		No	
b) Dependent variable: Female voter turnout						
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.042*	0.033	-0.056**	0.025	-0.043*	0.040
	(0.023)		(0.021)		(0.023)	
70+ mortality rate ($\widehat{\beta}$)	-0.014	0.153	–	–	-0.006	0.646
	(0.021)				(0.022)	
Municipality fixed-effects	Yes		Yes		Yes	
Time fixed effect	Yes		Yes		Yes	
$\widehat{\gamma}_t$ varies over time	Yes		Yes		No	
c) Dependent variable: Male voter turnout						
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.052**	0.026	-0.055***	0.030	-0.049**	0.034
	(0.023)		(0.019)		(0.023)	
70+ mortality rate ($\widehat{\beta}$)	-0.004	0.721	–	–	0.002	0.889
	(0.019)				(0.020)	
Municipality fixed-effects	Yes		Yes		Yes	
Time fixed effect	Yes		Yes		Yes	
$\widehat{\gamma}_t$ varies over time	Yes		Yes		No	

Notes: In parenthesis we report CRVE standard errors, robust to heteroskedasticity and within municipality correlation. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively, according to the CRVE standard errors. The number of observations (municipalities) is 1,404 (702). All the regressions include as covariates all the time-varying regressors reported in Table 4, and apart from model (3), the interactions between these time-varying covariates and the 2020 dummy.
[(a)] WCB indicates that the p-values come from the wild cluster bootstrap-t statistics with clusters at regional level to make inference robust to within-region correlation of the observations.

effect is slightly larger in size for men, although a formal test for the null hypothesis of no gender difference suggests that we cannot reject it.[15] Therefore, while we find results supporting hypothesis H.1, the hypothesis on gender differences in the effect (H.2) is not corroborated.

Finally, inference robust to within-municipality correlation (by the CRVE) and inference robust to within-region correlation (by the WCB) deliver similar and very significance levels of the estimated parameters of interest. In what follows, for the sake of conciseness, we will only report standard errors robust to heteroskedasticity and within-municipality correlation.

The detected negative impact of the COVID-19 pandemic on the voter turnout may not necessarily reflect an increased perceived risk of participating in public events and therefore a change of behavior in order to avoid contagion. The negative impact of the COVID-19 pandemic on voter turnout may also be due to voters blaming the political system for mismanagement of the pandemic.[16] Even if the main decisions on how to deal with the COVID-19 outbreak were not taken at local level, voters may have blamed local politicians for the pandemic's consequences. Empirical findings have revealed that individuals blame others on the basis of events for which they are not responsible (Gurdal et al., 2013), and voters blame governments for events for which they are not generally responsible (Liberini et al., 2017). If so, a part of the detected negative impact on voter turnout may have been due to a greater dissatisfaction with the political system where COVID-19 hit more severely. To shed light on the importance of this factor in explaining our findings, we analysed whether the 70+ mortality rate had an impact on invalid votes, as a measure of voters' discontent. According to this line of reasoning, the higher the elderly mortality rate, the larger the fraction of invalid votes.

We modelled invalid votes as we did for voter turnout in Equation (1). We could not conduct a gender disaggregated analysis, since we did not have gender disaggregated data on invalid votes. The estimated effects are reported in Table 6. In panel a) the invalid votes are divided by the number of votes; in panel b) they are divided by the number of persons with right to vote. As expected, the estimated effect of the elderly mortality rate after the COVID-19 outbreak on the invalid votes is positive. However, it is not significantly different from zero. This suggests that voters' discontent with the management of the

[15]After the estimation of Model (1), an equality test robust to heteroskedasticity and within-municipality correlation returned a p-value of 0.482.

[16]We thank an anonymous reviewer for suggesting this explanation and the way to assess if it is empirically supported.

COVID-19 emergency is not the main factor explaining our principal results.

Table 6: The impact of elderly mortality rate (‰) on invalid votes (%)

	(1)		(2)		(3)	
	Coeff.	WCB p-values[(a)]	Coeff.	WCB p-values[(a)]	Coeff.	WCB p-values[(a)]
a) Dependent variable: Fraction of invalid votes over total votes						
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	0.022	0.359	0.029*	0.056	0.017	0.435
	(0.026)		(0.017)		(0.025)	
70+ mortality rate ($\widehat{\beta}$)	0.007	0.669	–	–	0.012	0.405
	(0.020)				(0.018)	
Municipality fixed-effects	Yes		Yes		Yes	
Time fixed effect	Yes		Yes		Yes	
$\widehat{\gamma}_t$ varies over time	Yes		Yes		No	
b) Dependent variable: Fraction of invalid votes over voters with right to vote						
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	0.017	0.175	0.017	0.080	0.012	0.305
	(0.016)		(0.011)		(0.016)	
70+ mortality rate ($\widehat{\beta}$)	0.0001	0.976	–	–	0.006	0.402
	(0.011)				(0.011)	
Municipality fixed-effects	Yes		Yes		Yes	
Time fixed effect	Yes		Yes		Yes	
$\widehat{\gamma}_t$ varies over time	Yes		Yes		No	

Notes: In parenthesis we report CRVE standard errors, robust to heteroskedasticity and within municipality correlation. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively, according to the CRVE standard errors. The number of observations (municipalities) is 1,404 (702). All the regressions include as covariates all the time-varying regressors reported in Table 4, and apart from model (3), the interactions between these time-varying covariates and the 2020 dummy.
[(a)] WCB indicates that the p-values come from the wild cluster bootstrap-t statistics with clusters at regional level to make inference robust to within-region correlation of the observations.

4.2 Effect by population density and regional level of autonomy

Being a highly contagious pathogenic viral infection (Yazdanpanah et al., 2020), COVID-19 could be and could be perceived as able to spread more rapidly in areas with high population density.[17] Engle et al. (2020) showed, in fact, that people living in more densely populated areas are more responsive to disease prevalence and mobility restriction orders. This suggests that eligible voters living in more densely populated areas could be more responsive in terms of electoral turnout to the COVID-19 outbreak. We therefore assessed if the impact of the 70+ mortality rate is heterogeneous across municipalities with different population densities, so as to test hypothesis H.3.

We split the sample between municipalities with a 2020 population density above the

[17] See Coşkun et al. (2021) for evidence on the relevance of population density to explaining the spread of COVID-19 in Turkey.

median and below the median. Then, we re-estimated Equation (1) for each subsample. Table 7 reports the estimation result of the differential effect of the 2020 mortality rate on the voter turnout for the most densely populated municipalities (Model (1)) and the least densely populated municipalities (Model (2)).

The results in Table 7 clearly suggest that the voting behaviour changed only in the most densely populated municipalities: an increase of 1 percentage point in the elderly mortality rate induced a 1.2 percentage points decrease in the voter turnout. In relative terms with respect to the voter turnout in the pre-COVID-19 election, this impact corresponds to a 1.8% decrease in the outcome variable. We detect no gender differences also. Hence, although the difference between low and high densely populated municipalities is significant only at the 10% statistical level,[18] we find some evidence in favour of hypothesis H.3.

Table 7: The impact of the elderly mortality rate (‰) on voter turnout (%) by population density

	(1) High population density[(a)]		(2) Low population density[(a)]		(3) Difference (2)−(1)
	Coeff.	Std. Err.[(b)]	Coeff.	Std. Err.[(b)]	p-value
a) Dependent variable: Voter turnout					
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.120***	0.043	-0.030	0.026	0.072*
70+ mortality rate ($\widehat{\beta}$)	0.057	0.040	-0.024	0.022	0.075*
b) Dependent variable: Female voter turnout					
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.123***	0.047	-0.022	0.027	0.065*
70+ mortality rate ($\widehat{\beta}$)	0.065	0.045	-0.032	0.024	0.055*
c) Dependent variable: Male voter turnout					
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.117***	0.041	-0.036	0.028	0.098*
70+ mortality rate ($\widehat{\beta}$)	0.050	0.037	-0.017	0.023	0.121
Observations (municipalities)	702 (351)		702 (351)		

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. All the regressions include municipality fixed effects, a 2020 dummy, all the time-varying regressors reported in Table 4, and the interactions between these time-varying covariates and the 2020 dummy.
[(a)] High (low) population density means that the municipality has a population density in 2020 higher (lower) than the median. The 2020 median population density in our sample is 59.9 inhabitants per square kilometre.
[(b)] CRVE standard errors, robust to heteroskedasticity and within municipality correlation.

In order to test hypothesis H.4, we divided the sample into municipalities in special statute regions and those in regions with ordinary autonomy and re-estimated the baseline

[18] A formal test for the equality of the effect in the high and low densely populated municipalities returns a p-value equal to 0.072.

model.[19] The results are reported in Table 8. It can be seen that the effect we found at national level is mainly driven by municipalities in ordinary statute regions, whereas the point estimates for municipalities in special statute regions are closer to zero. Although this finding supports hypothesis H.4, the last column of Table 8 shows that we cannot reject the null hypothesis that the effect is the same in special and ordinary statute regions.

Table 8: The impact of the elderly mortality rate (‰) on voter turnout (%) by level of autonomy from the central government

	(1) Special statute[(a)]		(2) Ordinary statute[(b)]		(3) Difference (2)−(1)
	Coeff.	Std. Err.[(c)]	Coeff.	Std. Err.[(c)]	p-value
a) Dependent variable: Voter turnout					
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.038	0.039	-0.060**	0.025	0.607
70+ mortality rate ($\widehat{\beta}$)	-0.017	0.031	-0.002	0.028	0.680
b) Dependent variable: Female voter turnout					
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.032	0.040	-0.055*	0.028	0.613
70+ mortality rate ($\widehat{\beta}$)	-0.020	0.032	-0.009	0.032	0.784
c) Dependent variable: Male voter turnout					
70+ mortality rate $\times d2020$ ($\widehat{\delta}$)	-0.045	0.042	-0.064**	0.025	0.640
70+ mortality rate ($\widehat{\beta}$)	-0.014	0.033	0.005	0.026	0.603
Observations (municipalities)	572 (286)		832 (416)		

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. All the regressions include municipality fixed effects, a 2020 dummy, all the time-varying regressors reported in Table 4, and the interactions between these time-varying covariates and the 2020 dummy.

[(a)] There are 3 special statute regions in our sample. They are Sardegna, Trentino-Alto Adige, and Valle d'Aosta.

[(b)] There are 15 ordinary statute regions in our sample. They are Abruzzo, Basilicata, Calabria, Campania, Emilia-Romagna, Lazio, Liguria, Lombardia, Marche, Molise, Piemonte, Puglia, Toscana, Umbria, and Veneto.

[(c)] CRVE standard errors, robust to heteroskedasticity and within municipality correlation.

4.3 Validity and sensitivity analysis

In this section, we initially report two placebo tests conducted to validate our identification strategy. First, we selected all the municipalities in our sample that held municipal elections also in 2010 (601 municipalities out of the original 702). We lost a further 2

[19] Another dimension along which the effect may be heterogeneous is the geographical one. Italy is affected by marked North-South differences in socio-economic measures, social norms, the ability to co-operate, and by less trust in institutions (Banfield, 1958; Guiso et al., 2004; Bigoni et al., 2016, 2018). We also tested if the effect in the South could be different from the effect in the Center-North. We did not detect any significant difference between the South and the Center-North. These results are available upon request from the authors.

municipalities because they did not exist in the past and were the result of the merger of pre-existing municipalities. For these 599 municipalities, we computed the elderly mortality rate in 2010 and 2015. Since for 2010 we did not have data disaggregated at municipal level on deaths per each day of the year, but only the total number of deaths in that year, we conducted this falsification test using the 70+ mortality rate computed over the whole year, instead of looking at the January-July period. We pretended that 2015 was the year of the COVID-19 outbreak and estimated Equation (1) using 2010 and 2015 data. Hence, in Equation (1) the 2020 dummy ($d2020$) is replaced by the 2015 dummy. Panel a) of Table 9 reports the estimated effects. We find that the interactions between the mortality rate and the 2015 dummy are not significantly different from zero and have opposite sign with respect to our baseline findings. Second, we re-estimated the baseline model on the original 2015 and 2020 sample, the only difference being that we used the mortality rate of people aged between 0 and 49 years. Unless spurious biases are induced by time-varying heterogeneity, we did not expect to find any significant effect, becuase the first wave of the COVID-19 pandemic severely hit only elderly people (Bophal and Bophal, 2020; Michelozzi et al., 2020; Omori et al., 2020). Panel b) of Table 9 shows that the 0-49 mortality rate plays no role in explaining the voter turnout. Although these two validation analyses are not proof of the validity of our identification strategy, they are firm evidence in its favour.

Second, we conducted further robustness checks to assess the sensitivity of our findings. In a first check, we changed the regressor of primary interest and instead used: i) the 70+ excess mortality from January until July 2020 with respect to the 2015–2019 average deaths in the same months; ii) the simple difference between the 70+ mortality rates in 2020 and 2015. When using one of these two regressors, we identified whether it was the variation in the 70+ mortality rate in 2020 with respect to what had happened in the past which affected the electoral participation. We explained in Subsection 3.2 why we preferred to keep the mortality rate as the main outcome variable and left the excess mortality (or the 2020-2015 variation in the mortality rate) for a sensitivity analysis. We denote the 70+ excess mortality rate per 1,000 inhabitants aged 70 or more (or the 2020-2015 variation in the 70+ mortality rate) as ed_{it}. Its value is set to 0 for $t = 2015$. The voter turnout equation in this case simplifies to

$$y_{it} = \delta ed_{it} \times d2020_{it} + \eta d2020_{it} + \boldsymbol{\gamma}_t' \mathbf{x}_{it} + \phi_i + u_{it}. \quad (2)$$

Table 9: Placebo tests

Dependent variable:	(1) Voter turnout		(2) Female voter turnout		(3) Male voter turnout	
	Coeff.	WCB p-value[(a)]	Coeff.	WCB p-value[(a)]	Coeff.	WCB p-value[(a)]
a) Using 2010 and 2015 and pretending that the COVID-19 outbreak was in 2015						
70+ mortality rate$\times d_{2015}$ ($\widehat{\delta}$)	0.017	0.646	0.024	0.627	0.012	0.662
	(0.028)		(0.028)		(0.029)	
70+ mortality rate ($\widehat{\beta}$)	0.021	0.289	0.010	0.691	0.032	0.062
	(0.022)		(0.023)		(0.023)	
b) Using mortality rate of population aged 0-49						
0-49 mortality rate$\times d_{2020}$ ($\widehat{\delta}$)	-0.134	0.790	-0.119	0.830	-0.151	0.773
	(0.573)		(0.582)		(0.598)	
0-49 mortality rate ($\widehat{\beta}$)	0.068	0.634	0.236	0.298	-0.104	0.611
	(0.309)		(0.337)		(0.319)	

Notes: In parenthesis we report CRVE standard errors, robust to heteroskedasticity and within municipality correlation. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively, according to the CRVE standard errors. All the regressions include the municipality fixed effects, all the time-varying regressors reported in Table 4 (apart from the number of workers per capita in panel a)), the 2020 dummy, and its interaction with the time-varying variables. The number of workers at municipal level is indeed available in the ISTAT *Atlante Statistico dei Comuni* only starting from 2012. The number of observations (municipalities) is 1,198 (599) in panel a) and 1,404 (702) in panel b).
[(a)] WCB indicates that the p-values come from the wild cluster bootstrap-t statistics with clusters at regional level to make inference robust to within-region correlation of the observations.

Table 10 reports the estimation results of the effect of the excess mortality (or the 2020-2015 variation in the 70+ mortality rate) on voter turnout. We find that a 1 more excess death out of 100 inhabitants (aged 70 or older) results in a decrease by about 0.4 pp in the voter turnout, both for men and women. We obtain similar findings when using the 2020-2015 variation in the 70+ mortality rate. These estimates closely match those of the baseline model.

In a second sensitivity analysis we modified the time window over which we computed the 70+ mortality rate. In the baseline specification, we computed the mortality rate over the period January-July 2020. We made this choice because on July 31 2020, in Italy the average number in the past 7 days of daily deaths from COVID-19, after constantly decreasing since the beginning of April 2020, reached the minimum of 6 and then remained stable until the second half of September.[20] Table 11 shows the estimates of the impact of the elderly mortality rate on voter turnout when we modify the time unit and use different time windows. Model (1) of Table 11 simply reports the baseline estimation results which

[20]These data are available from the official repository of the Dipartimento della Protezione Civile at https://github.com/pcm-dpc/COVID-19/tree/master/dati-andamento-nazionale.

Table 10: The impact of excess mortality or the 2020-2015 variation in the mortality rate of the elderly (‰) on voter turnout (%)

Dependent variable:	(1) Voter turnout		(2) Female voter turnout		(3) Male voter turnout	
	Coeff.	WCB p-value[(a)]	Coeff.	WCB p-value[(a)]	Coeff.	WCB p-value[(a)]
70+ excess deaths$\times d2020$	-0.039** (0.017)	0.038	-0.040** (0.019)	0.034	-0.038** (0.017)	0.046
2020-2015 variation 70+ mortality rate$\times d2020$	-0.033** (0.017)	0.032	-0.036** (0.018)	0.030	-0.030* (0.016)	0.037

Notes: In parenthesis we report CRVE standard errors, robust to heteroskedasticity and within municipality correlation. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively, according to the CRVE standard errors. All the regressions include the municipality fixed effects, all the time-varying regressors reported in Table 4, the 2020 dummy, and its interaction with the time-varying variables. The number of observations (municipalities) is 1,404 (702).
[(a)] WCB indicates that the p-values come from the wild cluster bootstrap-t statistics with clusters at regional level to make inference robust to within-region correlation of the observations.

we have already presented in Table 5. In Models (2), (3), and (4), the mortality rate is instead computed by counting the deaths from January the 1st until August 31, September 19 (the day before elections for all municipalities apart from those in Sardegna), and September 30, respectively. Independently of the choice of the time-window to compute the mortality rate, the point estimates are very stable and in line with those of the baseline model.

Finally, our sample size was significantly reduced by the fact that we excluded all the municipalities of Sicilia and Friuli-Venezia Giulia because they do not report gender-disaggregated voter turnout. In the appendix, we report the estimation results on the gender-aggregated voter turnout if we re-include them. The detected effects are somewhat closer to zero, but the main findings and conclusions are unchanged.

5 Conclusions

We studied whether and to what extent the voter turnout of Italians during the municipal elections held in September and October 2020 was affected by the intensity of the COVID-19 outbreak, as measured by the mortality rate among the elderly. Our empirical analysis showed that an increase of 1 percentage point in the elderly mortality rate decreased the voter turnout by 0.5 percentage points. We found no statistically significant differences in the impact on the voting behaviour of men and women.

Table 11: The impact of the elderly mortality rate (‰) on voter turnout (%) when changing the time interval over which the mortality rate is computed

From January 1 until:	(1) July 31 (baseline)		(2) August 31		(3) September 19 (day before elections)		(4) September 30	
	Coeff.	Std. Err.[(a)]	Coeff.	Std. Err.[(a)]	Coeff.	Std. Err.[(a)]	Coeff.	Std. Err.[(a)]
a) Dependent variable: Voter turnout								
70+ mortality rate × $d2020$ ($\widehat{\delta}$)	-0.047**	0.022	-0.043**	0.022	-0.039*	0.021	-0.039*	0.021
70+ mortality rate ($\widehat{\beta}$)	-0.009	0.020	-0.009	0.017	0.002	0.016	0.002	0.016
b) Dependent variable: Female voter turnout								
70+ mortality rate × $d2020$ ($\widehat{\delta}$)	-0.042**	0.023	-0.042*	0.023	-0.034*	0.022	-0.037*	0.022
70+ mortality rate ($\widehat{\beta}$)	-0.014	0.021	-0.014	0.019	-0.006	0.016	-0.005	0.016
c) Dependent variable: Male voter turnout								
70+ mortality rate × $d2020$ ($\widehat{\delta}$)	-0.052**	0.023	-0.043**	0.022	-0.043**	0.022	-0.039*	0.021
70+ mortality rate ($\widehat{\beta}$)	-0.004	0.019	-0.003	0.018	0.009	0.017	0.009	0.017
Observations (municipalities)	1,404 (702)		1,404 (702)		1,404 (702)		1,404 (702)	

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. All the regressions include municipality fixed effects, a 2020 dummy, all the time-varying regressors reported in Table 4, and the interactions between these time-varying covariates and the 2020 dummy.

[(a)] CRVE standard errors, robust to heteroskedasticity and within municipality correlation.

We also investigated whether the impact of the elderly mortality rate of the eldest is heterogeneous among municipalities with different levels of population density and degree of autonomy from the central government. A 1 percentage point increase in the elderly mortality rate decreased the voter turnout by about 1.2 percentage points in densely populated municipalities. We did not detect statistically significant heterogeneity in the effect among municipalities with different levels of autonomy from the central government.

Our findings suggest that holding elections during a pandemic may discourage voters from going to the polls and thereby weaken the democratic process. Postponing elections could be a short-term strategy to reduce the risks of the virus spreading and to ensure that the turnout will be greater in future (hopefully safer) elections. Alternatively, forms of postal and/or electronic voting could be means to limit the disruption of the democratic process, because they allow people to vote safely and they can curb the decline in the voter turnout during the pandemic. However, postal and electronic voting systems could generate other problems, like electoral fraud and poor reliability and transparency. The trade-off between reliability of voting and democratic representation should be carefully taken into account when designing the electoral procedures for voting during a pandemic.

Acknowledgements

We wish to thank two anonymous reviewers, whose comments were precious for an important improvement of the paper. We are also grateful to the participants at the XXXIII SIEP Conference for their remarks and suggestions.

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Appendix

Table A.1: The impact of elderly mortality rate (‰) on voter turnout (%) using the enlarged sample including municipalities not reporting gender disaggregated voter turnout

	(1)		(2)		(3)	
	Coeff.	WCB p-values	Coeff.	WCB p-values	Coeff.	WCB p-values
70+ mortality rate$\times d2020$ ($\widehat{\delta}$)	-0.035**	0.043	-0.039**	0.036	-0.031**	0.049
	(0.019)		(0.017)		(0.019)	
70+ mortality rate ($\widehat{\beta}$)	-0.005	0.519	–	–	-0.001	0.948
	(0.017)				(0.017)	
Municipality fixed-effects	Yes		Yes		Yes	
Time fixed effect	Yes		Yes		Yes	
$\widehat{\gamma}_t$ varies over time	Yes		Yes		No	

Notes: In parenthesis we report CRVE standard errors, robust to heteroskedasticity and within municipality correlation. WCB indicates that the p-values come from the wild cluster bootstrap-t statistics with clusters at regional level to make inference robust to within-region correlation of the observations. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively, according to the WCB p-values. The number of observations (municipalities) is 1,806 (903). All the regressions include as covariates all the time-varying regressors reported in Table 4, and apart from model (3), the interactions between these time-varying covariates and the 2020 dummy.

Table A.2: The impact of the elderly mortality rate (‰) on voter turnout (%) by population density using the enlarged sample including municipalities not reporting gender disaggregated voter turnout

	(1) High population density[a]		(2) Low population density[a]		(3) Difference (2)−(1)
	Coeff.	Std. Err.[b]	Coeff.	Std. Err.[b]	p-value
70+ mortality rate$\times d2020$ ($\widehat{\delta}$)	-0.062*	0.037	-0.020	0.024	0.347
70+ mortality rate ($\widehat{\beta}$)	0.037	0.034	-0.020	0.020	0.150
Observations (municipalities)	902 (451)		904 (452)		

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. All the regressions include municipality fixed effects, a 2020 dummy, all the time-varying regressors reported in Table 4, and the interactions between these time-varying covariates and the 2020 dummy.

[a] High (low) population density means that the municipality has a population density in 2020 higher (lower) than the median. The 2020 median population density in our enlarged sample is 61.97 inhabitants per square kilometre.

[b] CRVE standard errors, robust to heteroskedasticity and within municipality correlation.

Table A.3: The impact of the elderly mortality rate (‰) on voter turnout (%) by level of autonomy from the central government using the enlarged sample including municipalities not reporting gender disaggregated voter turnout

	(1) Special statute [a]		(2) Ordinary statute[b]		(3) Difference (2)−(1)
	Coeff.	Std. Err.[c]	Coeff.	Std. Err.[c]	p-value
70+ mortality rate$\times d2020$ ($\widehat{\delta}$)	-0.009	0.029	-0.060**	0.025	0.182
70+ mortality rate ($\widehat{\beta}$)	-0.019	0.022	-0.002	0.028	0.634
Observations (municipalities)	974 (487)		832 (416)		

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. All the regressions include municipality fixed effects, a 2020 dummy, all the time-varying regressors reported in Table 4, and the interactions between these time-varying covariates and the 2020 dummy.

[a] There are 5 special statute regions in our sample. They are Friuli-Venezia Giulia, Sardegna, Sicilia, Trentino-Alto Adige, and Valle d'Aosta.

[b] There are 15 ordinary statute regions in our sample. They are Abruzzo, Basilicata, Calabria, Campania, Emilia-Romagna, Lazio, Liguria, Lombardia, Marche, Molise, Piemonte, Puglia, Toscana, Umbria, and Veneto.

[c] CRVE standard errors, robust to heteroskedasticity and within municipality correlation.