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The political economy of lockdown: Does free media matter?☆

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ABSTRACT

This paper studies the role of free media in how governments and the public responded to the COVID-19 pandemic. We first document the presence of policy and behavioural responsiveness during the early phase of the pandemic. Using a panel data of daily COVID-19 deaths, lockdown policies, and mobility changes in 155 countries, we find that governments were more likely to impose a lockdown, and citizens to reduce their mobility, as the initial number of deaths increased. To measure the role of media freedom on responsiveness given endogeneity in death reporting, we simulate deaths from a calibrated SEIR model as an instrument for reported deaths. Using this approach, we find evidence that the presence of free media mattered for the timing of early responses to COVID-19. Responsiveness to deaths was limited to citizens in free-media countries, and accounted for 40% of the difference in lockdown decision and mobility changes between free-media and censored-media countries. In support of the role of free media, we show that differences in responsiveness are not explained by a range of other country characteristics such as the level of income, education or democracy. We also find evidence that citizens with access to free media were better informed about the pandemic and had more responsive levels of online searches about COVID-19, supporting the view that free media served to inform the public on the risks of COVID-19.

Introduction

The COVID-19 pandemic has highlighted the importance of responsiveness and access to truthful information during a public health crisis. Timely responses have been crucial to halt the spread of the virus by limiting community transmission and avoiding health system saturation. At the same time, knowledge of local peaks in infections was central to tailor responses to changes in circumstances such as the emergence of new variants. Non-pharmaceutical interventions, and in particular lockdowns, are dependent on responsiveness and access to trustworthy information for their effectiveness as they require widespread compliance.

This paper studies the role of free media in affecting lockdown decisions and social distancing during the early phase of the pandemic. We provide a conceptual framework and supporting evidence to motivate why free media increased pandemic responsiveness. Conceptually, free media makes citizens better informed about the severity of the pandemic, which can affect their compliance and the decision by governments to impose lockdowns.

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We use a panel data of daily reported deaths, lockdown decisions and mobility trends during the initial phase of the pandemic (December 1, 2019–May 1, 2020) in all countries affected by COVID-19. We measure government responsiveness as changes in the decision to impose a lockdown in response to an increase in COVID-19 deaths. Citizen responsiveness is measured as reduced mobility during lockdowns when COVID-19 deaths increase.[1]

Although deaths statistics are not the only trigger that could motivate governments and citizens to act,[2] they were a salient indicator of the severity of the outbreak, especially in the early period with shortages of testing. That said, there are reasons to think that they are somewhat imprecise reflecting the competence of government and any incentive to misreport deaths for political reasons. We will account for misreporting of deaths in our empirical analysis, as detailed below. Given the role of the media in reporting on COVID-19 and avoiding misinformation,[3] we expect both death reporting and responsiveness to the pandemic to vary depending on whether countries have free or censored media.

We begin by documenting responsiveness to COVID-19 deaths. We show that a doubling of deaths early in the pandemic was associated with a 15.5 percentage points (p.p.) increase in the likelihood of imposing a lockdown by governments, as well as a 6 p.p reduction in time spent outside and a 2.8 p.p. increase in time at home during lockdowns by citizens. We find a similarly large level of responsiveness across all types of mobility, for alternative definitions of media freedom and death statistics, and when looking at responsiveness to cases instead of deaths (see Appendix E for a discussion of these robustness checks).

To address concerns about misreporting of deaths, we develop an instrumental variables (IV) approach using simulated deaths from a calibrated Susceptible–Exposed–Infected–Recovered (SEIR) model as an instrument for reported death. To do so, we use a popular epidemiological model developed by Noll et al. (2020) and widely used at the time.[4] This model includes with age-specific parameters and several categories of infectious severity. The model has a range of inputs including population and age distribution, estimates of the spread and intensity of the disease from Noll et al. (2020), as well as country-level calibrated parameters of the initial time of the outbreak, basic reproduction number R_0, and healthcare capacity.[5]

We provide evidence that simulated deaths from the SEIR model are a good benchmark for the evolution of mortality in the initial phase of the pandemic, and serve as a valid instrument for reported deaths. The identification strategy requires that simulated deaths are exogenous to media freedom and lockdown decisions. In support of these assumptions, we show that the inputs used in the SEIR model are unrelated to the media status of a country and that, as expected by construction,[6] death simulations are not affected by actual decisions in response to the pandemic.

The IV results show that *only* free-media countries were responsive to COVID-19 deaths. Specifically, citizens in free-media countries tend to reduce their time outside and increase time at home after COVID-19 death spikes, while we find no significant relationship between deaths and mobility in censored-media countries. We also find that governments in free-media countries were more likely to impose a lockdown following an increase in COVID-19, although the difference is not statistically significant. As a robustness test, we obtain similar results using excess mortality as an indicator of the true death toll of COVID-19 for a subset of 39 countries. Using a decomposition exercise to attribute differences in lockdown decisions and mobility between free- and censored-media countries, we find that responsiveness to deaths accounted for more than 40% of the difference in mobility and lockdown, and was quantitatively more important than the number of deaths in explaining mobility differences between free- and censored-media countries.

We then provide evidence that free media was an important mechanism behind higher responsiveness through the provision of information. First, we show that differences in responsiveness cannot be explained by other country characteristics such as income, education or democracy using a similar empirical strategy as described above. Second, we provide evidence from online searches that citizens in free-media countries were both better informed about the pandemic and more responsive in their COVID-19 online searches (they tended to increase their online searches for COVID-19 as deaths increased). This is consistent with responsiveness caused by being better informed about changes in health risks.

Our study relates to several strands of literature. First, this paper contributes to the literature exploring drivers of government effectiveness. Authors such as Acemoglu and Robinson (2012) have emphasised differences in institutions, while Glaeser et al. (2007) focus on the importance of education. It is well known that there are large differences in observable measures of government quality across the world (La Porta et al., 1999). Besley and Persson (2011) draws attention to how this reflects incentives to invest in state capacities, including public health systems. Related to this, is a large body of literature that has studied how political

[1] Responsiveness to a crisis is characterised by the speed and magnitude of the economic policy response, uncertainty about the nature of the threat and the importance of individual compliance. See Besley (2020) for a general discussion of government responsiveness and preparedness.

[2] It was unclear during the early phase of the pandemic which indicators would be most useful to identify at-risk populations (Dhami et al., 2022) and calibrate policy responses. Testing in most countries was established later in the pandemic. We have focused on the COVID-19 death toll as an indicator for policy response at it was widely reported and discussed at the time very often with the media reporting such figures. Moreover, it is probably more comparable than case data for cross-country comparisons. It is striking that a fast and coordinated early response to identifying cases was pursued in some countries. For example, this was the case in Taiwan in early 2020 (Wang et al., 2020). However, most countries did not follow this strategy to calibrating the need for a national lockdown to contain the epidemic.

[3] See e.g. Mian and Khan (2020) and Brennan et al. (2020). Hensel et al. (2022) report that the majority of respondents find factual information provided by their government on COVID-19 to be untruthful based on an international survey of 58 countries conducted between March 29 and April 7, 2020.

[4] The website used to generate simulations from their model had on average 8 thousand page loads per day between March and May 2020 (Noll et al., 2020).

[5] We take calibrated parameters from epidemiological simulations by Noll et al. (2020) and Walker et al. (2020). See full details on the SEIR model in Appendix D.

[6] Our simulations do not take as input actual mitigation strategies by countries.

institutions shape policy incentives (e.g., Persson and Tabellini, 2002), in particular how health outcomes are impacted by political institutions (Besley and Kudamatsu, 2006; Kudamatsu, 2012) as well as a wider range of societal, political and economic factors as argued by Case and Deaton (2020) in the case of the United States. During the COVID-19 pandemic, several studies have documented the importance of social norms and trust in compliance with social distancing (Bargain and Aminjonov, 2020; Barrios et al., 2021; Bazzi et al., 2021; Besley and Dray, 2021; Bosancianu et al., 2020; Campos-Mercade et al., 2021; Durante et al., 2021; Hensel et al., 2022). For instance, Bargain and Aminjonov (2020) show that high-trust countries had higher levels of compliance with social distancing, and more efficiency of policy stringency. We contribute to this line of inquiry by highlighting the independent role of access to free media in increasing compliance with social distancing in response to higher COVID-19 mortality. Relatedly, Alsan et al. (2020) examine the extent to which citizens are willing to sacrifice civil rights in exchange for health security during the COVID-19 pandemic. Our paper contributes to this literature by providing evidence that free media is a significant determinants of both government and citizen responsiveness across a wide range of economic, social and political country characteristics.

Second, this paper contributes to the growing literature on media and politics as reviewed, for example, by Coyne and Leeson (2009), Prat and Strömberg (2013), and Strömberg (2015). It is increasingly recognised that democratic accountability is enhanced when citizens have better information (e.g., Maskin and Tirole, 2004; Besley, 2006; Ferraz and Finan, 2011; Snyder and Strömberg, 2010). Within this line of work, our findings are most closely related to Besley and Burgess (2002) and Eisensee and Strömberg (2007) who focus on how media make governments more responsive to shocks which ties in with debates about how democracy and free media have reduced the incidence of famine in India (Sen, 1981). In the context of COVID-19, Allcott et al. (2020) and Barrios et al. (2021) have shown partisan differences in the perception of and social distancing during the pandemic in the United States. Our work contributes to this literature by shedding light on the role of free media as an accountability mechanism and the role of access to independent information to reinforce the complementarity between public and private actions (lockdown policy and social distancing) during the early phase of the pandemic.

Third, the paper is linked to work on censorship and media bias. The fact that media freedom is sometimes censored is not an accident since, as discussed in, for example, Besley and Prat (2006), there are incentives for governments to silence the media in order to retain power. Such activities have been linked to media ownership patterns by Djankov et al. (2003). There are also reasons to believe that citizens sometimes receive biased and distorted views from media coverage (Mullainathan and Shleifer, 2005; Gentzkow and Shapiro, 2006; DellaVigna and Kaplan, 2007), including in the case of COVID-19 (see Bursztyn et al. (2022)) and attention has recently switched to role of social media in propagating and perpetuating misinformation (Allcott et al., 2019; Enikolopov et al., 2011). Several studies have also documented the presence of media bias in the United States in their coverage of the pandemic (e.g. Simonov et al., 2020; Ash et al., 2020).[7] Our paper generally contributes to this literature by providing global evidence that media censorship reduces responsiveness during a pandemic.

The remainder of the paper is organised as follows. Section 1 presents the data and some core facts. Section 2 presents evidence on responsiveness to deaths in free-media and censored-media countries. Section 3 describes additional results and empirical support for the role of free media to inform citizens about the spread of COVID-19. Section 4 concludes. We describe additional results and provide a theoretical framework to motivate the empirical findings in the Appendix.

1. Data

This section presents the data used in the empirical analysis regarding reported and simulated COVID-19 deaths, lockdown decisions, mobility and search trends, and media characteristics. Additionally, Table A1 reports summary statistics on these measures by the media freedom status of countries.

Death statistics and lockdown. Data on COVID-19 deaths come from the European Centre for Disease Prevention and Control (ECDC) and are based on national reports, mainly from health authorities. The ECDC collects and harmonises these reports on a daily basis worldwide. We focus on deaths as this is the most comparable statistics across countries. Data on lockdown decisions by countries comes from Lejeune (2020). We consider that a country is under a lockdown when national measures restricting movements are in place at a national level for at least part of the day.

Simulated SEIR deaths. We simulate daily COVID-19 deaths for each country using a SEIR model developed by Noll et al. (2020). Compared to the "standard" SIR model, our simulation includes a category for the exposed and allows for differences in healthcare availability and vulnerability of countries. Specifically, it takes as parameters the number of available hospital and beds and intensive care units (ICUs), has additional categories of infectious individuals for those that are infectious but not hospitalised, hospitalised and hospitalised in critical care, and allows for age-specific transition rates. The inputs into the model include epidemiological parameters that are common across countries, hypothetical mitigation dates calibrated by income group, and epidemiological estimates to predict the initial onset of outbreaks and basic reproduction number in each country.[8] Further details on the calibration of the SEIR model can be found in Appendix D.

[7] Garz and Zhuang (2021) also show the impact of media coverage on social distancing in Swedish municipalities.

[8] We use epidemiological parameters for the length of infectious period, length of hospital stay, length of ICU stay and severity of ICU overflow, and country-specific estimates of reproduction R_0, as well as estimated initial size and date of the outbreak from Noll et al. (2020). The number of hospital beds and intensive care units (ICUs) is estimated by Walker et al. (2020) which uses data from the World Bank and a systematic review. We account for mitigation interventions by governments using the average lockdown date by income group as the starting date and hypothese that these measures reduce social contact rates by 60% following enhanced social distancing scenarios discussed by Ferguson et al. (2020) and Walker et al. (2020).

The SEIR model allows us to generate a simulated death toll due to the spread of COVID-19 infections in each country over time. We use this measure as an instrument for the evolution of mortality for reported mortality and may help to deal with concerns that death rates are inaccurate due either to incompetent or deliberately misleading reporting.

Mobility trends. Data on mobility trends comes from Google Community Mobility reports.[9] Mobility trends refer to changes in visits and length of stay at different places after lockdown compared to a median value, for the corresponding day of the week, during the 5-week period from January 3rd to February 6th, 2020. We normalise baseline mobility to be 0, so that a value indicates a percentage change in mobility compared to baseline. We focus on mobility trends after governments implemented a lockdown to capture compliance with lockdown measures.

Media freedom. Media freedom is measured using data from the Varieties of Democracy project,[10] which calculates a freedom of expression and alternative sources of information index which comprises: (i) the extent to which a government respects press and media freedom, (ii) the freedom ordinary people to discuss political matters at home and in the public sphere, and, (iii) the freedom of academic and cultural expression. It is based on indicators for media censorship effort, harassment of journalists, media bias, media self-censorship, print/broadcast media critical and print/broadcast media perspectives, freedom of discussion for men/women, and freedom of academic and cultural expression. We classify a country as having free media if it has a score above the median score of 0.7 out of 1. See Figure A.3 for a list of countries according to their media freedom status. Free-media and censored-media countries differed in when they decided to impose lockdowns, and in the date of initial outbreak.[11]

As a robustness check, we also use the Media Freedom index from Freedom House.[12] In addition, we use the World Press Freedom index.[13] We classify a country as having free media or free press if it has a score above or equal to 50 out of 100 on the corresponding index. These robustness results are discussed in Appendix E.

Search trends. We measure trends in internet searches about COVID-19 using Google search trends. Search trends indicate the share of Google searches including one of the following terms: "covid", "coronavirus", "covid19", "COVID-19", "covid 19", "ncov", or "nCoV2019". Daily national search trends are normalised to be relative to the COVID-19 search share in the United States on January 30, 2020.[14] Any value therefore indicates the percentage change in search share compared to that baseline.

2. Evidence of responsiveness and role of free media

The core results on responsiveness focus on governments' decision to impose a lockdown in response to an increase in reported deaths along with citizens' compliance with such lockdowns.[15] We think of publicly available data on COVID-19 deaths as informing beliefs about the severity of the outbreak. And we look at how citizens comply with lockdown measures using data on daily mobility trends. We expect countries with free media to be more responsive to deaths than censored-media countries.[16] All specifications will include country fixed effects, outbreak × time fixed effects and the global number of COVID-19 deaths.

2.1. Empirical specification

The empirical analysis aims to capture the determinants of the lockdown decision, as well as private compliance with lockdowns. The IV specification is discussed in Section 2.3. We begin, however, with the following OLS regression:

$$Y_{it} = \alpha_i + \delta_{tM} + \beta D_{it} + \gamma D_{it} \times M_i + \varepsilon_{it} \tag{1}$$

The outcome of interest, denoted by Y, is either the government decision to impose a lockdown or mobility changes during periods of lockdown. M_i indicates whether a country enjoys media freedom. We denote α as country fixed effects, and δ are media-specific outbreak time fixed effects that are dummies for each day since a country reached a total of 10 deaths to pick up a typical progression of the disease across free-media and censored-media countries.[17] Further, The coefficient β estimates the

[9] www.google.com/covid19/mobility/

[10] From www.v-dem.net.

[11] Table A.1 presents summary statistics for free-media and censored-media countries using a balanced panel of all countries with reported deaths statistics from COVID-19 between December 1st, 2019 and May 1st, 2020. We report average country characteristics, COVID-19 infections and mortality, lockdown and mobility changes by media freedom status.

[12] From www.freedomhouse.org The score is from index D1 which assesses the extent to which there are free and independent media. Media in this case refers to all relevant sources of news and commentary—including formal print, broadcast, and online news outlets, as well as social media and communication applications when they are used to gather or disseminate news and commentary for the general public.

[13] From www.rsf.org. This scores the degree of freedom available to journalists in 180 countries using both the survey responses of experts and quantitative data on abuses and acts of violence against journalists during the period evaluated. The criteria evaluated in the questionnaire are pluralism, media independence, media environment and self- censorship, legislative framework, transparency, and the quality of the infrastructure that supports the production of news and information.

[14] On January 30, 2020, the WHO announced that COVID-19 was a Public Health Emergency of International Concern.

[15] Appendix B presents a conceptual framework on lockdown decisions and compliance that formalises the idea that free media provides information on health risks.

[16] This argument is formalised in the model presented in Appendix B.

[17] Given significant differences in the timing of outbreaks between free- and censored-media countries, we allow these indicators to vary by media status. This allows us to capture the fact that outbreaks occurred at significantly later dates in censored-media countries (close to 13 days later, see Table A1). We report results without these flexible fixed effects in Appendix E.

Table 1
Responsiveness and media freedom: OLS results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lockdown decision	Retails and recreation	Public transport	Workplaces	Groceries and pharmacies	Parks	Residentials	Time outside
Log deaths	0.155***	−6.951**	−7.213*	−5.621**	−4.207**	−6.022**	2.846**	−6.009**
	(0.0538)	(3.362)	(3.680)	(2.740)	(2.003)	(2.589)	(1.267)	(2.839)
Log deaths × Media freedom	−0.0328	−4.333	−3.406	−3.665	−2.197	−1.851	1.071	−2.987
	(0.0612)	(3.965)	(4.230)	(3.228)	(2.480)	(3.425)	(1.503)	(3.318)
Observations	23,549	22,874	22,874	22,876	22,874	22,876	22,872	22,953
Country FE	X	X	X	X	X	X	X	X
Outbreak time FE	X	X	X	X	X	X	X	X

Notes: Clustered standard errors at the country-level in parentheses. Significance levels: * 10%, ** 5%, *** 1%. Each regression includes as covariate the log number of global COVID-19 deaths. Log deaths indicates the log cumulative deaths. Each regression includes country fixed effects and outbreak time fixed effects (time since first 10 cumulative deaths) that is allowed to vary by media status given differences in timing and evolution of outbreaks. Media freedom indicates a country with a value above the median value of 0.7 in the V-Dem Freedom of Expression and Alternative Sources of Information index in 2018. The dependent variable for Column 1 is a dummy variable for the implementation of a national lockdown for at least part of the day. Columns 2 to 7 indicate percentage changes in visits and length of stay after lockdown compared to a median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020. Column 8 is the unweighted average of mobility change in outside categories. Free- and censored-media countries in the sample are listed under Figure A.3.

magnitude of government and citizens responsiveness to deaths. Given our theoretical framework, we also expect responsiveness to be heterogeneous across free-media and censored-media countries, which is captured by γ. We also include country fixed effects, and outbreak time fixed effects which is the time since the first 10 cumulative deaths.

This specification exploits the variation in the timing of COVID-19 deaths and responses to deaths (lockdown, mobility reduction) to estimate responsiveness. The coefficient of interest is the interaction of media status with the log number of deaths, therefore we measure the effect of media freedom on lockdown and mobility over the course of the pandemic (as the number of deaths increases), which we term *responsiveness*, rather than the average differences in response between countries, which are captured by country fixed effects. The variation left to estimate responsiveness is the timing of deaths on the right-hand-side, and the timing of response to deaths on the left-hand-side, by media status.[18]

Our main sample includes 155 countries that (i) have reported at least 10 cumulative deaths as of May 1, 2020 at the end of our sample period (ii) have a national lockdown policy or documented mobility data[19] (iii) have a media freedom score. The list of these countries is shown in Appendix.[20]

2.2. OLS results

Table 1 reports our main estimates of responsiveness using the above OLS specification. We find evidence of responsiveness to COVID-19 deaths by both governments and citizens. As show in Column 1, a doubling of COVID-19 deaths is associated with a 15.5 percentage points increase in the likelihood of imposing a lockdown, which is statistically significant. Columns 2 to 8 provide evidence of responsiveness of citizens. We find that an increase is deaths is associated with significantly more reductions in mobility outside across all types of outside places, and more time spent at home (shown by an increase in time spent in residential areas). For both governments and citizens, we find no evidence of differences in responsiveness between free-media and censored-media countries using OLS results. This is shown by the absence of statistical significance for the point estimate of the interaction between log deaths and a country media freedom status.

2.3. IV results

We now explore an IV approach to deal with concerns about potential misreporting of deaths due to either differences in competence or government incentives to accurately report deaths. We use country-specific simulated deaths from a SEIR model as instrument for reported deaths; we first discuss the results and then provide evidence of the validity of the instrument.

Simulated deaths using SEIR model. The OLS gives an unbiased estimate of the impact of reported deaths on government and citizen responsiveness if D_{it} is uncorrelated with the error term ε_{it}. There are two natural concerns with this assumption: measurement error and endogenous reporting of deaths by governments. Measurement error could come from the misattribution of the cause of death, a common problem while pandemics are ongoing, and would lead to an attenuation bias towards zero. In the case of endogenous death reporting, the direction of bias is not as clear *a priori*. If governments face political costs from reporting higher

[18] Besley and Dray (2022a) present findings on both the determinants of social distancing and responsiveness for the United States.

[19] We have excluded the United States as lockdown policies were taken at the state-level. In a companion paper, we examined differences in responsiveness between US States, see Besley and Dray (2022a).

[20] See Figure A.3.

Table 2
Responsiveness and media freedom: IV results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lockdown decision	Retails and recreation	Public transport	Workplaces	Groceries and pharmacies	Parks	Residentials	Time outside
$\widehat{\text{Log deaths}}$	0.0303	2.496	2.566	1.343	1.139	2.330	-1.685	1.979
	(0.121)	(7.406)	(7.614)	(5.879)	(4.155)	(5.679)	(2.710)	(6.056)
$\widehat{\text{Log deaths} \times \text{Media Freedom}}$	0.200	-21.57**	-21.45**	-16.99**	-13.50**	-18.89***	8.860***	-18.39**
	(0.132)	(8.385)	(8.710)	(6.851)	(5.210)	(7.002)	(3.185)	(7.053)
Observations	21,708	21,183	21,183	21,185	21,183	21,185	21,181	21,262
F-stat First stage	17.30	13.98	13.98	13.97	13.98	13.97	13.98	13.98
F-statistic death	35.82	29.19	29.19	29.19	29.19	29.19	29.19	29.20
F-statistic death × Media freedom	67.40	61.52	61.52	61.52	61.52	61.52	61.55	63.15
Country FE	X	X	X	X	X	X	X	X
Outbreak time FE	X	X	X	X	X	X	X	X

Notes: Clustered standard errors at the country-level in parentheses. Significance levels: * 10%, ** 5%, *** 1%. Each regression includes as covariate the log number of global COVID-19 deaths. $\widehat{\text{Log deaths}}$ indicates the log cumulative deaths from a first stage regression of log deaths using as instruments log simulated deaths and log simulated deaths × media freedom status. Media freedom indicates a country with a value above the median value of 0.7 in the V-Dem Freedom of Expression and Alternative Sources of Information index in 2018. Simulated deaths are based on a SEIR model with several levels of infectious severity, age-specific transition rates, epidemiological parameters, and average mitigation measures and healthcare availability by income group. Each regression includes country fixed effects and outbreak time fixed effects (time since first 10 cumulative deaths). We allow the outbreak time fixed effects to vary by media status given the difference in timing and evolution of outbreaks. F-stat First stage indicates the Kleibergen–Paap rk Wald F statistic of the excluded instrument in the first stage. The dependent variable for Column 1 is a dummy variable for the implementation of a national lockdown for at least part of the day. Columns 2 to 7 indicate percentage changes in visits and length of stay after lockdown at different places compared to a median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020. Column 8 is the unweighted average of mobility change in outside categories. Free- and censored-media countries in the sample are listed under Figure A.3.

death rates, this will tend to reduce responsiveness to deaths. But deaths themselves will also not be reported to justify a lockdown. Either way, this might induce a correlation between D_{it} and ε_{it}. Moreover, there are good reasons to think that the bias due to any strategic death reporting can vary depending on whether media is censored or free and lead to an overestimation of responsiveness for censored-media countries.

Our IV approach uses the simulated death rate from the SEIR model as an instrument for D_{it}. As discussed above, these simulations rely on a minimal set of country specific parameters, none of which are directly related to observed policy choices. Model parameters are R_0, the initial date of the outbreak, country population and age distribution, healthcare capacity and the average mitigation start and efficiency from a country's income group.[21] Additionally, we expect that the first stage relationship between SEIR-simulated deaths and reported deaths will be heterogeneous for free-media and censored-media countries.

Empirical specification. The second stage equation is

$$Y_{it} = \alpha_i + \delta_{tM} + \beta \widehat{D}_{it} + \gamma \widehat{D_{it} \times M_i} + \varepsilon_{it} \tag{2}$$

Compared to the OLS specification, we simultaneously instrument in the first stage for D_{it} (log deaths) and $D_{it} \times M_i$ (log deaths × media freedom status) using E_{it} (log SEIR deaths) and $E_{it} \times M_i$ (log SEIR deaths × media freedom status). $\widehat{D}_{it}$ and $\widehat{D_{it} \times M_i}$ are the fitted values from the first stage regressions.

Results. Table 2 reports the main responsiveness results using the IV approach detailed above. Column 1 estimates the responsiveness of governments to COVID-19 deaths based on their decision to impose a lockdown. Here, we find no evidence of responsiveness to COVID-19 deaths by governments. For censored-media countries, a doubling of total deaths during the Great Lockdown is associated with only a, statistically insignificant, 3 percentage points increase in the likelihood of imposing a lockdown. For free-media countries, the point estimate of responsiveness is higher at 23 percentage points (as given by the sum of point estimates for both log deaths and its interaction with the media freedom indicator), but also not statistically significant

Columns 2 to 8 focus on private compliance with lockdown, using mobility changes during lockdowns as outcomes. Citizens in censored-media countries are found to not be responsive to deaths when reducing their social contacts: an increase in deaths is not estimated to lead to more reduction in time outside or increase in time indoor (the point estimate are of reverse sign compared to the OLS results and not statistically significant). On the contrary, citizens in free-media countries are found to be highly responsive. An increase in deaths leads to less social contacts across all outside categories and more time at home.

[21] In particular, we do not use any observed measure of responsiveness for predicting the trajectory of deaths in a country. Instead, we impute a *hypothetical* date for severe mitigation measures in each country measured as the average time of implementing a lockdown relative to the start of the outbreak by country income group. We rely on epidemiological parameters and the estimated date of first case used in the epidemiological modelling by Noll et al. (2020). See details on the SEIR model in Appendix D.

Table 3
Correlations between media freedom and SEIR parameters for simulated deaths instrument.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	R_0	Outbreak start	Mitigation trigger	Hospital beds	ICU Beds	Log population	Share 70+	SEIR death index
Media Freedom	0.464*	−4.616	3.690	0.842	0.364	−0.498	3.576	0.0421
	(0.174)	(2.866)	(2.065)	(0.515)	(0.261)	(0.239)	(3.020)	(0.119)
Observations	158	158	174	174	174	174	158	144
R^2	0.034	0.013	0.11	0.10	0.063	0.022	0.13	0.00088

Notes: Significance levels: * 10%, ** 5%, *** 1%. Media freedom indicates a country with a value above the median value of 0.7 in the V-Dem Freedom of Expression and Alternative Sources of Information index in 2018. See Appendix Section D for full details on the calibration of the SEIR model.

Fig. 2 illustrates the heterogeneity in mobility response to deaths between free-media and censored-media countries, giving the 90 percent and 95 percent confidence intervals for the two subsamples. The estimated elasticity response of mobility appears to be different in free-media and censored-media countries, and their associated confidence intervals barely overlap.

Taken together, these results suggest that only countries with free media have taken lockdown measures that are responsive to the severity of the outbreak.[22]

Validity of the instrument. We now provide evidence in support of the exclusion restriction needed for the IV results to be valid. First, we show that model parameters used to predict deaths using the SEIR model are uncorrelated with media freedom in a country. Second, we show that, holding all other country parameters equal, having free media is *not* associated with significantly different *simulated* deaths.

Table 3 shows the correlation between media freedom and the seven country-specific parameters that enter the SEIR simulation: R_0, the simulated start date of the outbreak in the country, the simulated date of the first mitigation measure, number of hospital beds, number of ICU beds, log population and share of elderly population. We find no statistically significant correlations between the media freedom status of a country and any of these parameters, with the exception of R_0 with a difference significant at the 10% level and small in magnitude (0.46 i.e. 0.38 SD, see Table C.1). Further, we also construct a SEIR death index that captures any country-specific differences in simulated deaths over time by regressing SEIR deaths per million on country fixed effects, after controlling for date, outbreak time and income groups. We then regress these country fixed effects coefficients on media freedom status. This aims to capture any residual differences in SEIR deaths attributable to country characteristics. Reassuringly, we find no significant correlation between SEIR death index and media freedom status as shown in column 8.

These results provide evidence that the instrument based on using the simulations from the SEIR model is not biased towards predicting more or fewer deaths in free- versus censored-media countries. What Table 3 indicates is that none of the parameters that enter the simulation differ significantly by media status, therefore any difference in simulated deaths reflects differential parameter values (such as a larger share of vulnerable population) but not differences in the media status of the country.[23]

Fig. 1 visually confirms that the distribution of country-specific epidemiological parameters used to simulate COVID-19 deaths do not differ by media freedom status. For each of the parameters and for the SEIR death index, there is common support and limited differences between the distribution of parameters for free-media and censored-media countries. Reassuringly, there is little difference in the distribution of R_0. As detailed in section D, parameters for the mitigation trigger and healthcare capacity (subpanels 6–8) are calibrated by income group following Walker et al. (2020).[24]

2.4. Mobility decomposition

We now decompose differences in mobility in response to death between free- and censored-media countries into what is attributable to differences in responsiveness and what can be attributed to other factors. To do so, we us a standard Oaxaca–Blinder decomposition approach traditionally used in labour economics (see Fortin et al., 2011). To this end, we use a subsample analysis as:

$$m_{ist}^{M} = \alpha^{M} \hat{D}_{ist}^{M} + \sum_{k} \beta_{k}^{M} X_{kist}^{M} + \epsilon_{ist}^{M} \tag{3}$$

where M denotes whether a country has free media (F) or censored media (C), m indicates lockdown mobility outcomes, $\hat{D}$ is the simulated death toll per million from the first stage of the IV approach and X captures all other covariates from Eq. (2).

[22] We find corroborating evidence looking at responsiveness to simulated deaths as reported in Table A.4, when instrumenting for COVID-19 cases or recent deaths instead of total deaths as reported in Tables D.2 and D.3. We also find similar results using excess mortality as an indicator of the true death toll in a subset of 39 countries as reported in C.2.

[23] Censored-media countries have, in fact, reported fewer deaths than free-media countries, and this is also a feature of the simulations from the SEIR model as shown in Figure A.1.

[24] This calibration choice is due to the lack of country-level data and to avoid any potential endogeneity between the instrument that would arise if we used actual dates of lockdown measures.

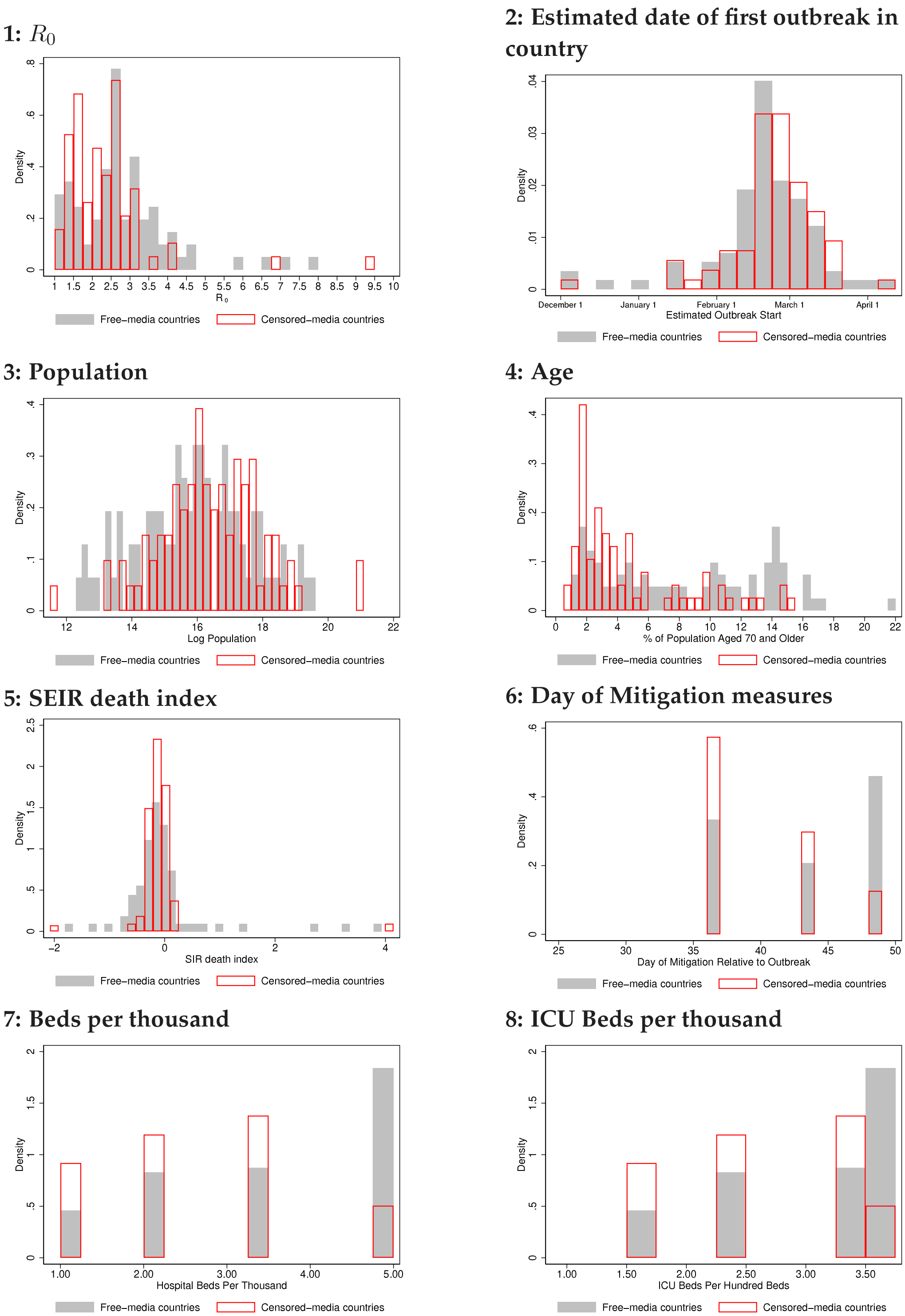

Fig. 1. Parameters for SEIR deaths by media freedom status.
Notes: Day of mitigation measures relative to outbreak, beds and ICU beds are calibrated by income group following Walker et al. (2020). Country SEIR death index is obtained using the standardised country fixed effects when regressing SEIR deaths per million on country, date, outbreak time and income group fixed effects.

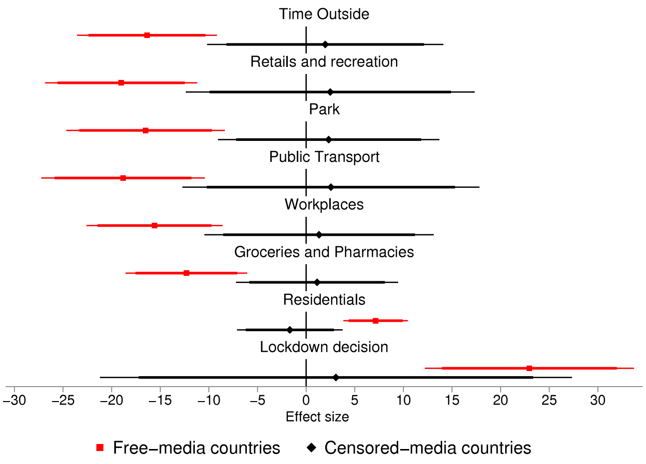

Fig. 2. Responsiveness of lockdown mobility by media freedom.
Notes: This figure shows the coefficients of deaths on mobility from Table 5. A thick line indicate a 90% confidence interval, a thin line indicates a 95% confidence interval. A free-media country has a score above the median value of 0.7 in the V-Dem Freedom of Expression and Alternative Sources of Information index in 2018. Each panel indicates percentage changes in visits and length of stay after lockdown at different places compared to a median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020.

The mean mobility difference is $\Delta \equiv \bar{m}^F - \bar{m}^C$ and can be written as:

$$\hat{\Delta} = \underbrace{(\hat{\alpha}^F - \hat{\alpha}^C)\bar{\hat{D}}^F}_{\text{Responsiveness effect}} + \underbrace{\hat{\alpha}^C(\bar{\hat{D}}^F - \bar{\hat{D}}^C)}_{\text{Death toll effect}} + \underbrace{\sum_k (\hat{\beta}_k^F \bar{X}_{kist}^F - \hat{\beta}_k^C \bar{X}_{kist}^C)}_{\text{Other factors}} \tag{4}$$

The first term on the right-hand side represents average differences in responsiveness to death between free-media and censored-media countries. It refers to the "unexplained effect" in the language of the decomposition literature (difference in the responsiveness coefficients). The second term captures the average effect of differences in death toll that affect mobility (differences in values of $\hat{D}$ or "explained effect"). The last term represents the overall effect of other covariates, namely outbreak time dummies, country dummies and the log global death toll. Provided that the responsiveness effects are correctly identified by the IV approach (as argued above), our decomposition should be viewed as causal rather than pure correlations.

Table 4 presents results of the decomposition for both the decision to lockdown and mobility trends following lockdowns. The first part of the Table shows the average overall difference in outcomes by media freedom, while the second part decomposes these differences following Eq. (4). Overall, free-media countries are on average more likely to lock down by 2 percentage points, while also more effectively reducing time outside (−1.75 percentage point). Turning to the decomposition, we see across all outcomes that differences in responsiveness are large and account for about 40% of the absolute decomposed difference. Differences attributed to responsiveness are much larger than the observed overall difference in mobility by an order of magnitude. This is due to other effects such as time and country differences reducing observed differences in mobility (e.g. censored-media countries having outbreaks at a later date). Interestingly, the number of fatalities alone explains very little in observed mobility differences between free-media and censored-media countries. In other words, responsiveness to deaths rather than the number of deaths explain more of the difference in lockdown behaviour between free-media and censored-media countries. As a result, controlling for other factors, censored media could have further reduced outdoor mobility by 15 percentage points had they been as responsive as free-media countries.

3. Additional results

3.1. Evidence of information mechanism from internet searches

We now explore the information mechanism through which the presence of free media can influence government and public decisions on lockdowns. We look at how media freedom affects the magnitude of COVID-19 internet searches following spikes in COVID-19 reported deaths. We hypothesise that seeing more reporting in the media might lead citizens to search more intensively online for information on COVID-19. As such, free media would increases citizens' awareness of the severity of COVID-19, driving higher responsiveness from citizens and governments according to our model.

Our core specification to investigate this is:

$$S_{it} = \alpha_i + \delta_t + +\eta D_{it} + \phi \left(D_{it} \times M_i\right) + \varepsilon_{it} \tag{5}$$

This regresses daily Google searches for COVID-19 on log deaths in free-media and censored-media countries, including country and outbreak time fixed effects. We also include day fixed effects to capture differences in aggregate daily patterns in searches

Table 4
Decomposition of responsiveness by media freedom.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lockdown decision	Retails and recreation	Public transport	Workplaces	Groceries and pharmacies	Parks	Residentials	Time outside
Overall								
Free media	0.17	−9.90	−9.75	−8.10	−5.96	−6.33	3.80	−8.07
Censored media	0.15	−7.69	−7.86	−6.08	−4.60	−5.37	2.74	−6.32
Difference	0.02	−2.21	−1.88	−2.02	−1.37	−0.97	1.06	−1.75
Decomposition								
Responsiveness to death	0.17	−17.13	−17.13	−13.46	−10.71	−15.17	6.89	−14.86
Number of fatalities	0.04	−3.32	−3.17	−2.84	−2.21	−2.69	1.29	−2.95
Other covariates	−0.19	18.24	18.42	14.27	11.55	16.90	−7.12	16.07
Observations	21,708	21,183	21,183	21,185	21,183	21,185	21,181	21,262

Notes: This table show the Oaxaca–Blinder decomposition based on Equation (4). The measure of COVID-19 deaths is the instrumented log number of deaths from the first stage regression in Table A3. Other covariates include outbreak time dummies , country dummies, and the log number of global deaths each day. Media freedom indicates a country with a value above the median value of 0.7 in the V-Dem Freedom of Expression and Alternative Sources of Information index in 2018. The dependent variable for Column 1 is a dummy variable for the implementation of a national lockdown for at least part of the day. Columns 2 to 7 indicate percentage changes in visits and length of stay after lockdown at different places compared to a median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020. Free- and censored-media countries in the sample are listed under Figure A.3.

as the pandemic unfolded. We interact media freedom with log deaths instead of simulated deaths to capture whether citizens in free-media countries are differently aware of deaths spikes. Our framework would lead us to expect individuals to react more strongly to a public signal on the severity of the disease such as death reporting.

Table 7 reports the results and shows in Columns 1–3 that countries with free media experience more online searches about coronavirus and see a larger increase in COVID-19 searches in response to higher reported deaths compared to censored-media countries. In column 4, we include country fixed effects, and also find that citizens are more inclined to search online about COVID-19 follow death spikes in free-media countries. These findings suggest that, apart from the direct impact of media freedom, citizens may choose to find additional ways of becoming informed. This reinforces the channel posited in the model linking media freedom to better informed citizens.

3.2. Subsample analysis

We now show that the core findings are robust to a different choice of specification that separately estimates responsiveness for free-media countries and censored-media countries as follows:

$$Y_{it}^{M} = \alpha_i^{M} + \delta_t^{M} + \gamma^{M} D_{it}^{M} + \varepsilon_{it}^{M} \tag{6}$$

This more flexible specification allows fixed effect and first-stage estimates to vary by media freedom status. Estimating the first stage separately on free-media and censored-media countries, also mitigates concerns about the IV estimator being biased in the presence of parameter heterogeneity.

Table 5 reports both OLS and IV results using the specification above. Columns 1–8 shows the main OLS results when dividing the sample between free-media and censored-media countries. In column 1, we find that a doubling of deaths is associated with a 12.2 percentage points increase in the likelihood of imposing a lockdown in free-media countries, compared to 15.9 percentage point increase in censored-media countries. While the responsiveness is statistically significant in both samples, we cannot reject that the difference in point estimate is different from 0 at the 5% level. As shown in columns 2 to 8, we find strong evidence of responsiveness in both samples of countries. An increase in deaths is associated with a significant reduction in time spent outside – and also specifically at retails shops, public transportation, workplaces, groceries or parks – and an increase in time at home. Here again, we find evidence of responsiveness for citizens in both samples and we reject the null hypothesis that private responsiveness differs by media status.

Columns 9–16 of Table 5 report IV results from the subsample analysis. We replicate our previous results and find that, when accounting for misreporting, only governments and citizens of free-media countries are responsive to COVID-19 deaths. We find that free-media governments were responsive in their lockdown decision: a doubling of deaths is associated with a 23 percentage points increase in the likelihood to impose a lockdown in free-media countries. While we find no equivalent responsiveness for censored-media governments, the difference in coefficients for free- and censored-media governments is not statistically significant in part due to the large standard errors around our estimates of responsiveness by censored-media governments. Second, we find robust evidence of citizens in free-media countries being responsive to COVID-19 when complying with lockdowns, and no similar evidence in censored-media countries. This result is found across all the range of outcomes in Columns 10–16 that capture both time indoor (Residential) and outdoor. Overall, we find similar results using a subsample analysis or our baseline IV specification in Section 2.3

Table 5
Responsiveness and media freedom: Subsample analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lockdown decision	Retails and recreation	Public transport	Workplaces	Groceries and pharmacies	Parks	Residentials	Time outside
	OLS estimates							
Panel A: Free-media countries								
Log deaths	0.122***	-11.29***	-10.62***	-9.287***	-6.405***	-7.874***	3.918***	-8.997***
	(0.0291)	(2.108)	(2.092)	(1.713)	(1.467)	(2.249)	(0.811)	(1.722)
Observations	11,822	11,547	11,547	11,547	11,547	11,547	11,545	11,624
Panel B: Censored-media countries								
Log deaths	0.155***	-6.930**	-7.190*	-5.601**	-4.188**	-6.006**	2.838**	-5.991**
	(0.0541)	(3.378)	(3.698)	(2.754)	(2.015)	(2.603)	(1.274)	(2.854)
Observations	11,727	11,327	11,327	11,329	11,327	11,329	11,327	11,329
Country fixed effect	X	X	X	X	X	X	X	X
Outbreak time fixed effect	X	X	X	X	X	X	X	X
H_0: Equality of coefficients (*p-value*)	0.73	0.13	0.24	0.11	0.20	0.37	0.27	0.19

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Lockdown decision	Retails and recreation	Public transport	Workplaces	Groceries and pharmacies	Parks	Residentials	Time outside
	2SLS estimates							
Panel A: Free-media countries								
$\widehat{\text{Log deaths}}$	0.230***	-19.02***	-18.83***	-15.59***	-12.31***	-16.52***	7.150***	-16.37***
	(0.0540)	(3.929)	(4.225)	(3.515)	(3.140)	(4.093)	(1.670)	(3.613)
Observations	11,363	11,115	11,115	11,115	11,115	11,115	11,113	11,192
F-stat First stage	33.27	34.22	34.22	34.22	34.22	34.22	34.25	35.89
Panel B: Censored-media countries								
$\widehat{\text{Log deaths}}$	0.0306	2.481	2.549	1.330	1.126	2.318	-1.678	1.965
	(0.122)	(7.443)	(7.653)	(5.910)	(4.177)	(5.706)	(2.722)	(6.088)
Observations	10,345	10,068	10,068	10,070	10,068	10,070	10,068	10,070
F-stat First stage	34.47	27.83	27.83	27.82	27.83	27.82	27.83	27.82
Country fixed effect	X	X	X	X	X	X	X	X
Outbreak time fixed effect	X	X	X	X	X	X	X	X
H_0: Equality of coefficients (*p-value*)	0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Notes: Clustered standard errors at the country-level in parentheses. Significance levels: * 10%, ** 5%, *** 1%. Each regression includes as covariate the log number of global COVID-19 deaths. $\widehat{Logdeaths}$ indicates the value of log deaths from a first stage regression of log reported deaths using as instrument log simulated deaths based on a SEIR model with several levels of infectious severity, age-specific transition rates, epidemiological parameters, and average mitigation measures and healthcare availability by income group. F-stat First stage indicates the Kleibergen–Paap rk Wald F statistic of the excluded instrument in the first stage. Media freedom indicates a country with a value above the median value of 0.7 in the V-Dem Freedom of Expression and Alternative Sources of Information index in 2018. The dependent variable for Column 1 is a dummy variable for the implementation of a national lockdown for at least part of the day. Columns 2 to 7 indicate percentage changes in visits and length of stay after lockdown at different places compared to a median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020. Free- and censored-media countries in the sample are listed under Figure A.3.

3.3. Media freedom versus other country characteristics

Media freedom might reflect other sources of heterogeneity across countries, giving a false impression of what drives differential responsiveness.

To address the potential misattribution of the impact of media freedom on responsiveness, we report a wide range of subsample analysis to explore a wide range of subsample analysis to compare results using the following specification:

$$Y_{it}^C = \alpha_i^C + \delta_t^C + \gamma^C D_{it}^C + \varepsilon_{it}^C \quad (7)$$

where C indicates a specific country characteristic. In each case, we split the data into two sub-samples based on different characteristics, including democratic institutions, executive constraints, an index of general preparedness for a pandemic, measures

Table 6
Drivers of responsiveness using alternative subsample analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lockdown decision	Retails and recreation	Public transport	Workplaces	Groceries and pharmacies	Parks	Residentials	Time outside
Media Freedom	[0.10]	[< 0.01]	[< 0.01]	[< 0.01]	[< 0.01]	[< 0.01]	[< 0.01]	[< 0.01]
Free and fair elections	[0.42]	[0.03]	[0.07]	[0.05]	[0.07]	[0.03]	[0.03]	[0.04]
Election in 2020	[0.27]	[0.03]	[0.10]	[0.04]	[0.10]	[0.01]	[0.08]	[0.05]
Most people can be trusted	[0.39]	[0.26]	[0.27]	[0.24]	[0.24]	[0.54]	[0.32]	[0.28]
Confidence in government	[0.81]	[0.60]	[0.56]	[0.73]	[0.88]	[0.40]	[0.61]	[0.59]
Confidence in the press	[0.89]	[0.46]	[0.44]	[0.50]	[0.52]	[0.38]	[0.50]	[0.43]
Satisfaction with democracy	[0.36]	[0.22]	[0.43]	[0.23]	[0.58]	[0.29]	[0.29]	[0.27]
Willingness to fight for country	[0.42]	[0.11]	[0.17]	[0.10]	[0.14]	[0.11]	[0.13]	[0.11]
Democracy	[0.75]	[0.30]	[0.39]	[0.36]	[0.48]	[0.23]	[0.34]	[0.32]
Executive constraints	[0.57]	[0.95]	[0.96]	[0.94]	[0.83]	[1.00]	[0.74]	[0.95]
Log GDP per capita > median	[0.93]	[0.63]	[0.96]	[0.56]	[0.99]	[0.90]	[0.95]	[0.82]
Education > median	[0.59]	[0.89]	[0.86]	[0.95]	[0.57]	[0.69]	[0.76]	[0.85]
Global Health Security index	[0.20]	[0.48]	[0.34]	[0.47]	[0.23]	[0.37]	[0.22]	[0.34]
Tax revenue > median	[0.29]	[0.37]	[0.57]	[0.46]	[0.98]	[0.71]	[0.38]	[0.60]
Access to handwashing facilities	[0.78]	[0.62]	[0.82]	[0.50]	[0.75]	[0.46]	[0.72]	[0.63]
Income inequality	[0.40]	[0.23]	[0.34]	[0.20]	[0.58]	[0.97]	[0.23]	[0.40]
Social protection	[0.57]	[0.60]	[0.50]	[0.72]	[0.56]	[0.52]	[0.68]	[0.57]

Notes: Each cell is the *p*-value from a separate IV regression based on Equation (2). The *p*-value tests the null hypothesis of equality of the responsiveness to death coefficient for two subsamples based on the category mentioned in the row. See Appendix Section F for definition of subsamples.

Table 7
COVID-19 deaths, online searches and media freedom.

	(1)	(2)	(3)	(4)
	Dependent Variable: COVID-19 Online Searches			
Media freedom	61.73***	54.25***	37.03**	
	(20.20)	(18.66)	(17.04)	
Log deaths	47.03***	40.40**	19.89	5.504
	(5.095)	(16.42)	(16.75)	(14.53)
Media Freedom × Log deaths			21.60**	17.85**
			(8.656)	(8.080)
Country fixed effect				X
Outbreak time fixed effect		X	X	X
Day fixed effect		X	X	X
Basic controls	X	X	X	
Observations	19,932	19,444	19,444	23,715
R^2	0.16	0.58	0.58	0.69

Notes: Clustered standard errors at the country-level in parentheses. Significance levels: * 10%, ** 5%, *** 1%. Columns 1–3 control for the share of internet users, years or education and log GDP per capita in a country (denoted basic controls). Covid search indicates the normalised share of Google searches including the word "COVID-19" or similar terms compared to the United States in January 30, 2020. Reported deaths are measured per million. Outbreak time indicates the days since a country reported its first 10 COVID-19 deaths. Simulated deaths represent simulated fatalities based on a SEIR model with several levels of infectious severity, age-specific transition rates, epidemiological parameters, and average mitigation measures and healthcare availability by income group.

of trust, the presence of social protection systems, economic conditions, age composition and income distribution.[25] Table 6 reports the *p*-value when we test the hypothesis that the responsiveness coefficients in each sub-sample created are equal. It is striking that we find no evidence of heterogeneity in responsiveness to deaths between countries other than that from media freedom documented above.[26] This is illustrated graphically in Fig. 3 for the case of high- and low-income countries. A notable finding is that responsiveness is very similar for high- and low-income countries, and that the confidence intervals for these coefficients largely overlap.

[25] See a full list of these characteristics and data construction in Appendix F.

[26] We find some evidence of differences in responsiveness based on the holding of elections in 2020, and whether a country enjoys free and fair elections, as discussed in Appendix C. These results are in line with several studies highlighting the role of electoral concerns in lockdown decisions by governments (Gonzalez-Eiras and Niepelt, 2022; Fernandez-Navia et al., 2021; Pulejo and Querubín, 2021).

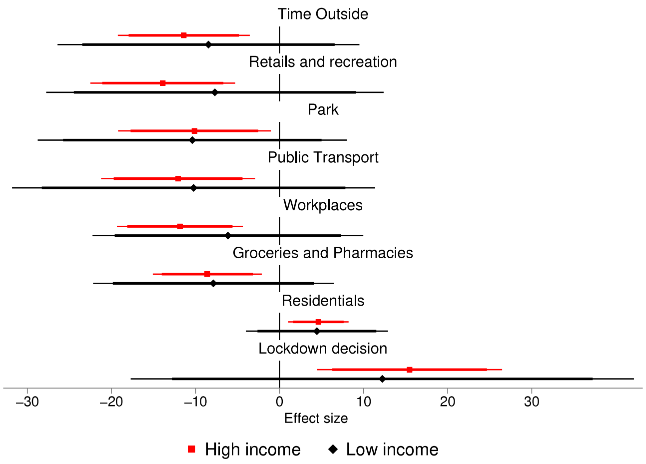

Fig. 3. Responsiveness of lockdown mobility by income.
Notes: This figure shows the coefficients of responsiveness on mobility from Eq. (2). High income indicates countries with GDP per capita above the median value. A thick line indicate a 90% confidence interval, a thin line indicates a 95% confidence interval. Each panel indicates percentage changes in visits and length of stay after lockdown at different places compared to a median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020.

Taken together, these results provide further evidence on the importance of media freedom for responsiveness. While free-media countries and censored-media countries differ in many ways in addition to media freedom,[27] we have taken several steps to account for these differences in estimating the impact of media freedom on responsiveness. First, we included country fixed-effects to control for fixed differences between countries on their average response to deaths (see Section 2.1). Second, we used an IV approach to simulate a death toll based on relevant country characteristics other than media freedom, such as healthcare capacity (see Section 2.3). Third, as shown above, we tested for the impact on responsiveness of other country characteristics, and found that the vast majority are not associated with more responsiveness. Notably, we showed that higher GDP per capita is not associated with more government responsiveness as we have defined it. That said, it should be stressed that this sensitivity analysis does not *prove* that differences in responsiveness are *caused* by differences in media freedom. However, it does allow us to reject some alternative hypotheses, such as these differences in responsiveness being explained (in a statistical sense) by differences in GDP levels.

It should also be noted that estimating the impact of lockdowns, or generally what caused a greater death toll during the pandemic, goes beyond the scope of this paper. While we provide some descriptive trends on the evolution of the pandemic during the first series of national lockdowns, measuring the causes of a greater death toll remains challenging.[28]

4. Concluding comments

This paper has explored the role of free media in the responsiveness of governments and the public to the COVID-19 pandemic. As the death toll from COVID-19 escalated, governments in free-media countries were more likely to impose a lockdown and their citizens were more responsive to the death toll when reducing their mobility. We find limited evidence of a similar pattern of responsiveness in countries with censored media. We interpret this as being due to free media serving to align beliefs by citizens and governments about the severity of the outbreak and hence coordinate actions.[29] We also show corroborating evidence that citizens in free-media countries are more aware of COVID-19 deaths.

We draw some general lessons from the evidence presented here. First, access to timely and trustworthy sources of information is likely to play a role during public health crises. Our results point to the potential importance of free media in ensuring early responses by governments and greater mobility restrictions in response to death spikes. This highlights the value of access to information, however imperfect, to respond to new and emerging threats.[30] Second, the correlation between free media and responsiveness suggests that trusted institutions can foster cooperation and increase compliance.[31] This has proved crucial for lockdown measures

[27] Descriptive statistics point to country differences across free- and censored-media countries, such as higher average GDP per capita in free-media countries, see Table A.1.

[28] Figure A.2 shows that free-media countries experienced a greater death toll after implementing lockdowns than censored-media countries. This could be due to either (i) more death under-reporting in censored-media countries (ii) lockdown measures being taken too late in free-media countries (iii) fixed differences in country characteristics between free-media and censored-media countries. Our results suggest that underreporting increased over time in censored-media countries (supporting hypothesis i), but that free-media countries appeared to have been (weakly) more responsive to the death toll when locking down than censored-media countries (contrary to hypothesis (ii). see Figure A.1 and Table 5, respectively).

[29] This argument is developed formally in Appendix B.

[30] Das et al. (2021) made a similar point.

[31] See Besley and Dray (2022b) for an analysis of the link between trust in government, policy-making and compliance.

in which widespread support is critical. Relatedly, the nature of behavioural change needed for social distancing underscores the voluntary nature of non-pharmaceutical interventions. Governments can act in conventional ways by imposing penalties and regulating, but there is an increasing role for public acceptance of costly measures that are taken in situations of emergencies. More generally, our results suggest that "quasi-voluntary compliance" (Levi, 1988), where compliance depends on both the enforcement regime and beliefs about the legitimacy of government interventions, are likely to be of first-order importance in public health crises.

Future work could look at how media freedom is related to other dimensions of policy responsiveness such as fiscal support to encourage staying at home and/or testing for infection. It would also be interesting to look at responsiveness in different phases of the pandemic following the initial lockdown period studied here. There was an interesting learning process as new variants and views about the efficacy of different mitigation responses have emerged. Another area which merits further investigation relates to interdependent policy making due to learning across countries/jurisdictions. This raises the possibility of that there was a process of yardstick competition as suggested, for example, in Besley and Case (1995), and Salmon (2019). By increasing information flows, free media can play a role in intensifying such competition.

This paper addresses long-standing themes in political economy, emphasising the role of media freedom in affecting policy and behaviour. While it is too early to provide a proper assessment of the costs and benefits of the wide-ranging responses taken across different phases of the pandemic, the early period when the pandemic was emerging constitutes an interesting period to investigate the role of free media on policy since communication was key in fashioning a response. Our findings reinforce the message that free media can be important in shaping how societies respond to emerging policy challenges.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.ejpoleco.2023.102361.

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