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LIVES AND LIVELIHOODS? PERCEIVED TRADEOFFS AND PUBLIC DEMAND FOR NON-PHARMACEUTICAL INTERVENTIONS

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Lives or Livelihoods? Perceived Tradeoffs and Public Demand for Non-Pharmaceutical Interventions*

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Abstract

We study the role of cost-benefit considerations in driving public acceptance of non-pharmaceutical interventions (NPIs) during the Covid-19 pandemic. In a large-scale online survey experiment with a representative sample of the US population, we introduce exogenous variation in the perceived economic costs and health benefits of shutdown measures by informing a random half of our sample about relevant research evidence. We find that a one standard deviation decrease in perceived economic costs (increase in perceived health benefits) of shutdown measures increases the preferred shutdown length by 13 (11) days. These effects are substantial, corresponding to two times the effect of having a Covid at-risk condition and to approximately half of the Democrat-Republican difference in the support of NPIs. Individuals with an acute and immediate personal exposure to the crisis, either in the form of health at-risk conditions or job loss, however, are less responsive to cost-benefit considerations. Our results provide insights into the mechanisms determining public acceptance of pandemic response measures.

JEL Classification: C91, D01, D9, H12
Keywords: COVID-19, non-pharmaceutical interventions, beliefs, tradeoffs

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1 Introduction

Governments around the world have implemented non-pharmaceutical interventions (NPIs), including mandatory social distancing and stay-at-home orders, in order to slow the spread of Covid-19. While the ultimate effects of these shutdown measures on public health and on long-run economic outcomes are still debated among economists (Barro; 2020; Eichenbaum et al.; 2020; Alvarez et al.; 2020; Andersen et al.; 2020b; Acemoglu et al.; 2020; Lee et al.; 2020; Lin and Meissner; 2020), a widespread view is emerging that, to some extent and at some duration of shutdown measures, a tradeoff exists between the benefits of NPIs to public health and their economic costs.[1] The public debate on how to weigh these costs and benefits is well underway,[2] challenging leaders in Western democracies to meet constituent expectations to save lives while at the same time protecting livelihoods and civil liberties in the coming months.

But do individuals actually weigh perceived economic costs against health benefits of social distancing measures when forming their demand for policy interventions? In the context of the morally charged policy discussion around Covid-19, individuals may form their views about the optimal intensity and duration of restrictions to economic activity based on principles that are unrelated to general cost-benefit tradeoffs.[3] Conversely, if cost-benefit considerations do indeed play a central role in the policy preferences of citizens, it follows that these considerations will determine the political feasibility and ultimate success of extended social distancing measures. Understanding the mechanisms behind public demand for NPIs should enable better design of policies and targeting of information to the public.

To identify the effect of cost-benefit considerations on demand for NPIs, we conduct an online survey experiment with a sample of 8,861 respondents that is representative of the US adult population. We generate exogenous variation in the perceived economic costs of shutdowns by randomly selecting half of the sample to receive recent research evidence by Correia et al. (2020), pointing to medium-run *positive net benefits* of longer shutdowns for US cities during the 1918 Influenza. We then elicit beliefs about the economic impact of lockdown orders during the 2020 pandemic on the US economy to test whether respondents extrapolate from the information treatment to the Covid-19

[1] See e.g. `https://fivethirtyeight.com/features/`

[2] See e.g. `https://www.nytimes.com/2020/04/10/magazine/coronavirus-economy-debate.html`.

[3] See e.g. `https://economictimes.indiatimes.com/news/international/world-news`.

context. In a second, orthogonal treatment condition, we generate exogenous variation in the perceived health benefits of shutdowns. Based on an established S.E.I.R. model, we present survey respondents with a table that maps projections of Covid-19 fatalities to shutdown lengths between zero and 6 months. Depending on the treatment condition, we vary the assumed infection fatality rate within a reasonable range, thereby generating a differential number of projected deaths for each length of shutdown.[4] Following exposure to these (explicitly assumption-based) projections, respondents choose their individually preferred length of shutdown. Subsequently, we also elicit preferences over the strictness of social distancing measures and views on how severely violations of rules should be punished. We contend that our between-subject design mitigates social desirability bias: each respondent is exposed to one set of treatment conditions and therefore does not explicitly report whether her preferred lockdown intensity or duration depends on the economic cost of saving a life.

We document that public support for NPIs is high in the United States as of mid-April 2020, especially among Democrats and those with health at-risk conditions, and less so among those with an immediate exposure to the financial impact of the crisis. Moreover, beliefs about the seriousness of the virus and the economic impact of lockdown measures play a strikingly important role in accounting for policy views.

Results from the causal analysis demonstrate that individuals indeed react to cost-benefit considerations, along both the economic cost and the health benefits dimension, when forming their policy views. The economic cost treatment increases the preferred lockdown length by 6 days. Similarly, individuals exposed to the high mortality scenarios prefer to remain in lockdown four days longer. Based on an IV-framework, we find that a one standard deviation higher perceived economic cost (health benefit) of lockdown measures increases the preferred shutdown length by 24 percent (21 percent) of a standard deviation. Similarly, we find that a one standard deviation higher perceived cost of lockdown measures increases the demand for stricter rules by 20 percent of a standard deviation. These magnitudes are comparable to the effect of having a pre-existing health condition that increases the risk of a severe Covid-19 illness.

Exploring heterogeneous treatment effects, we find that individuals with a Covid-19 at-risk condition or a higher anticipated need for hospital care demand high levels of NPIs

[4] We explicitly emphasize that all projections are assumption-based model outputs and make all parameter assumptions available to the respondents.

regardless of cost-benefit considerations. Similarly, those with a high short-run financial exposure to the crisis, as proxied by a recent job loss, do not significantly take medium-run cost-benefit considerations into account. Importantly, however, our estimated treatment effects are large and significant for individuals across the political spectrum. Thus, despite substantial partisan differences in the perceived costs and benefits of lockdowns as well as in demand for NPIs, targeted information has the potential to generate a convergence in policy views in the current context.

This study contributes to recent work exploring public attitudes towards NPIs during the pandemic (Fetzer et al.; 2020). Briscese et al. (2020) document that longer hypothetical lockdown durations are associated with a decrease in intentions to comply with social distancing. Allcott et al. (2020) document substantial partisan differences in beliefs about Covid-19 and compliance with social distancing measures between Democrats and Republicans. Our paper builds on this work and provides causal evidence on the role of perceived costs and benefits of NPIs in determining the demand for these policies, in a setting where perceptions are potentially endogenous to political orientation and demographic characteristics.

More generally, this paper contributes to a literature studying individual decision-making in settings with tradeoffs between economic and non-economic domains (Falk and Szech; 2013). Elias et al. (2015) use information treatments to show that individuals weigh costs and benefits when forming their opinions about organ transactions, but not about slavery or prostitution markets, suggesting that cost-benefit considerations are often not taken into account in highly morally charged domains. We add to this research by showing that cost-benefit considerations play an important role in determining people's acceptance of government measures aimed at saving lives but restricting economic and civic freedom.

Another closely related strand of literature uses information experiments to study the role of beliefs about potentially relevant facts for public policy views. Previous research has often found relatively low elasticities of policy views to information, either because these elasticities are moderated by political orientation (Alesina et al.; 2020; Haaland and Roth; 2019; Alesina et al.; 2018) or because differences in policy views across the political spectrum are altogether unrelated to differences in beliefs (Cappelen et al.; 2019; Kuziemko et al.; 2015). We find that, in contrast, individuals' demand for NPIs is highly elastic to cost-benefit concerns – despite large partisan differences at baseline.

Finally, this paper relates to a growing literature studying the (heterogeneous) impact of the Covid-19 crisis on household economic outcomes (Guerrieri et al.; 2020; Barrot et al.; 2020; Kahn et al.; 2020; Adams-Prassl et al.; 2020; Alon et al.; 2020; Hanspal et al.; 2020; Andersen et al.; 2020a; Baker et al.; 2020) and fairness views (Cappelen et al.; 2020), and on how information shapes social distancing behavior (Bursztyn et al.; 2020). Lastly, we build on a theoretical literature studying optimal shutdown lengths from a social planner's perspective (Alvarez et al.; 2020; Glover et al.; 2020; Hall et al.; 2020; Rampini; 2020).

The remainder of the paper is structured as follows. Section 2 presents our experimental design and data. Section 3 provides descriptive evidence on people's support of government-mandated social distancing measures. Section 4 presents causal evidence on how individually perceived benefits and costs in the health and the economic domains affect individual demand for NPIs. Section 5 concludes.

2 Experimental Design and Data

This section describes the survey administration, the content of our survey experiment and the data.[5]

2.1 Timeline and Overview

Data collection took place between April 9th and April 15th, 2020 in cooperation with the online data provider Lucid. Our survey, which is outlined in Figure 1, contains two randomized, orthogonal treatment conditions. First, an "economic cost treatment" provides a random half of the respondents with research evidence about the long-run economic costs of lockdown measures maintained in US cities during the 1918 influenza pandemic. Second, respondents are randomly assigned to differential Covid-19 fatality projections based on an established S.E.I.R. model. By showing differential hypothetical, but realistic scenarios in a "high mortality" compared to a "low mortality" condition, we vary the assumed health benefits of a lockdown.

2.2 Survey Design

Prior belief elicitation Prior to the first treatment, we elicit respondents' beliefs about the unemployment costs of lockdown measures implemented in US cities during the 1918 influenza. For this purpose, we describe the difference-in-difference approach used in a

[5]The interactive survey is available at `https://cebi.eu.qualtrics.com/jfe/form/SV_bNiQ9zcns8kbnBH`. See `https://www.dropbox.com/s/br21rgmchv5krv0/Shutdown_Duration_Instructions.pdf?dl=0` for the survey instructions.

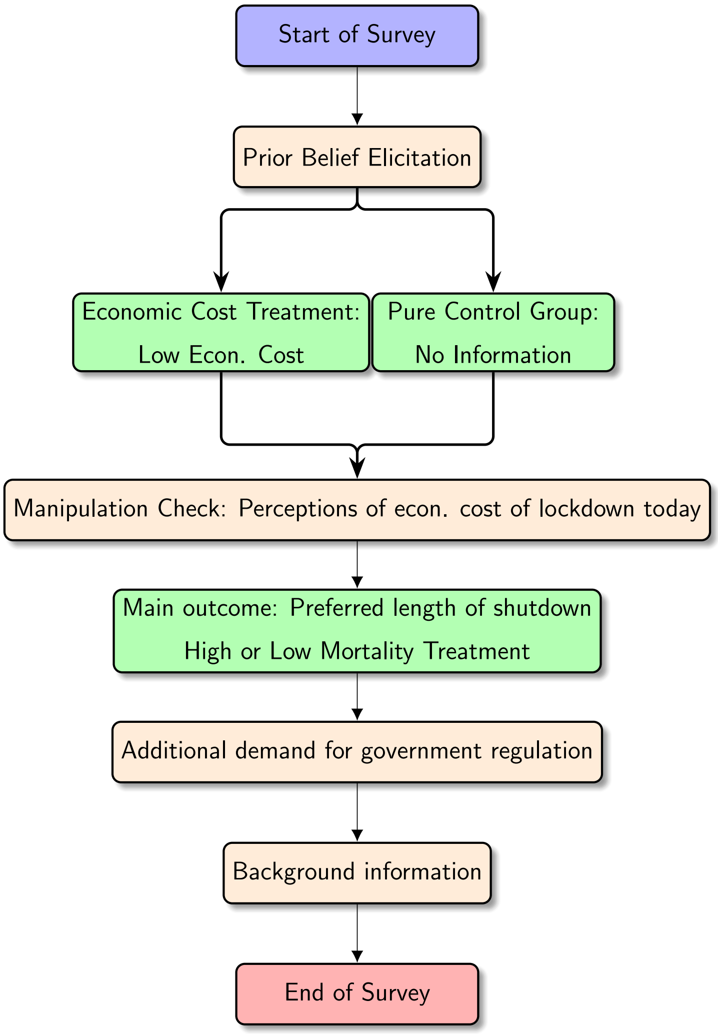


Figure 1: Outline of survey experiment

recent working paper by Correia et al. (2020) in simple words. Namely, we point out that the authors compare cities in the US that were similar in their initial exposure to the 1918 influenza virus and their pre-pandemic labor market situation, but differed in the length of their lockdown. We elicit prior beliefs asking respondents to think of the following scenario:

> (...) **City A** was shut down for **1 month during 1918**, and its unemployment rate was **7% by the end of the pandemic in 1919**.
>
> **City B** was shut down for **3 months, 60 days longer than City A**. What do you think was the **unemployment rate** in **City B** by the end of the pandemic in **1919**?

"Economic cost treatment" Subsequently, we provide a random half of the respondents with information on the "actual" unemployment rate in City B, corresponding to

6% based on the results of Correia et al. (2020). In Appendix Section A we derive the treatment value and briefly discuss the robustness of the findings in Correia et al. (2020). The remaining respondents form the economic cost control group and skip this step. Subsequently, we employ a series of manipulation checks to capture the extent to which respondents update their beliefs about the economic impact of Covid-19 lockdown measures today. For instance, we elicit all respondents' beliefs on how a lockdown extension of different lengths today would affect the US economy one year from now.

"Mortality Treatment" and preferred length of shutdown Our main outcome of interest is the preferred duration of shutdown measures, including the closure of non-essential businesses and restaurants. When eliciting these duration preferences, we present survey respondents with a table that maps projections of Covid-19 fatalities in 2020 to shutdown lengths between zero and 6 months in one month intervals. Based on the projected numbers, we ask respondents to choose their preferred shutdown length during this time frame, considering all aspects important to them.

The "mortality treatment" condition consists in randomly assigning participants to see either a "high mortality" or "low mortality" schedule of projected fatalities. The projections presented to respondents are based on an established S.E.I.R. (Susceptible, Exposed, Infected and Resistant) model, which allows for the effect of a lockdown to decrease contacts in the population. For ethical reasons, we do not attempt to shift beliefs about the actual fatality or seriousness of Covid-19. We therefore make explicit that the fatality projections are the result of model assumptions, which we make available. Moreover, we emphasize that the actual number of future Covid-19 fatalities is unknown. In the high mortality condition, we set the model's infection fatality rate to 2.4% and in the low mortality condition we set it to 0.4%. Both parameter values are well within the range of plausible values based on the state of the research as of April 2020.[6] By holding all other model parameters fixed across the two mortality conditions, the model projects that, in the complete absence of a lockdown, 3,253,000 (542,000) American citizens would die of Covid-19, and with a six months lockdown 100,000 (17,000) would die until the end of 2020 in the high (low) mortality condition.

Additional outcomes Subsequently, respondents answer questions about their preferred strictness of mandatory social distancing rules and of the financial punishment of

[6]See Appendix A for details on the S.E.I.R. model and the parameter values we use.

risky behaviors that might further spread the coronavirus.

Demographics, exposure to Covid-related risks and beliefs about Covid-19 Next, we collect demographic information and various measures of personal exposure to the coronavirus itself and to shutdown measures, such as health status and recent job loss. We also elicit beliefs and attitudes, such as beliefs about the infectiousness and mortality of Covid-19 in comparison to a regular flu, the perceived resurgence risk if mitigating measures were lifted and the perceived effectiveness of mitigating measures.

Debriefing At the end of the survey, we ask those respondents who were previously exposed to the economic cost treatment how trustworthy and how relevant they found the information. Finally, we provide a debriefing in which we first clarify that the Influenza of 1918 differed in important aspects from the Covid-19 pandemic. Second, we again emphasize that even though the infection fatality rate we used to calculate the predicted number of Covid-19 deaths was reasonable, the true rate is unknown. For both points we provide links to online background information.

2.3 Mitigating Social Desirability Bias

Social desirability bias is arguably a concern when eliciting individual preferences over the duration and intensity of NPIs to save lives. While our survey design is not immune to such bias, we undertake several mitigating steps. First, on the welcome page we ensure the anonymity of all survey participants. Second, when eliciting respondents' preferred shutdown length, we emphasize that "there are no right or wrong answers". Most importantly, we employ a between-subject experimental design. An alternative within-subject design would confront the same respondent with several combinations of costs and benefits of lockdown measures and therefore rather explicitly ask respondents to trade off lives against economic costs. By contrast, in our experimental design each respondent is unaware of alternative experimental conditions.

2.4 Data

Our sample is limited to respondents residing in a state with government-mandated social distancing measures as of April 9th, 2020.[7] After omitting respondents who completed the survey in less than 5 minutes[8], our final sample consists of 8,861 respondents.

[7]Residents of Arkansas, Iowa, North Dakota, Nebraska and South Dakota were screened out.

[8]Five minutes corresponds to the bottom percentile, while the median time for survey completion was 15 minutes.

The sample is close to representative of the adult US population in terms of gender, age group, Census region and household income group[9], with the most notable difference being a slightly higher share of highly educated individuals in our sample (see Appendix Table F.1) – a typical feature of online samples (Grewenig et al.; 2018).

The sample is globally balanced across observables i) between respondents who receive the economic cost treatment and those who don't and ii) between those assigned to the "high mortality" versus the "low mortality" condition (see Appendix Table F.2). We standardize qualitative outcome measures based on the mean and standard deviation in the economic cost control group, pooling the mortality conditions.

3 Descriptive Evidence

High acceptance of mandatory social distancing Throughout this section, we pool respondents in both mortality conditions but restrict the sample to those who have not received the economic cost treatment. We find that, as of mid-April 2020, support of lockdown measures is high in the US, confirming recent evidence by Fetzer et al. (2020). The average preferred lockdown duration corresponds to four months and the majority of respondents would like to see stricter regulations and stricter rule enforcement in the form of higher fines for risky behavior (see Appendix Figure E.1).

Demographics and political orientation How does individual support of social distancing measures vary with personal characteristics? We find political orientation to be the strongest determinant of policy preferences (Columns 1, 4 and 7 of Table 1): Democrats prefer a 24 days longer shutdown than Republicans and are a 0.5 (0.2) standard deviation more in favor of stricter measures (stricter enforcement of measures), conditional on an extensive set of demographic characteristics. Moreover, females favor longer and stricter interventions than males. In contrast, individuals age 65 or older are – perhaps surprisingly – in favor of lifting the shutdown six days earlier than the youngest age group of 18-34 year olds.

Personal exposure Next, we explore the role of a personal exposure to the health risks as well as to the financial impact of the crisis (Columns 2,5 and 8 of Table 1). As expected, having at least one risk factor for a severe Covid-19 illness in the family or having

[9]While the mean household income in our sample ($78,188) is lower than that of the US population ($91,673), the median household income in the sample ($62,500) is close to the median household income in the population ($65,700).

a high anticipated need for hospital care is associated with a longer preferred lockdown duration, a demand for stricter measures and stricter enforcement of existing rules. The estimated coefficients, however, are considerably smaller than the Democrat-Republican difference. Those with a high exposure to the economic consequences of the crisis, as measured by stock holdings and a drop in household income, prefer an earlier lifting of the shutdown, but do not differ in their demand for stricter rules or rule enforcement. A recently experienced pandemic-related job loss does not have additional explanatory power for individual acceptance of NPIs.

Perceived costs and benefits of NPIs In addition to one's own personal exposure to the crisis, beliefs about the costs and benefits of shutdown measures for the population may determine related policy views. As a proxy for the perceived health benefits of a lockdown, we focus on beliefs about the mortality of Covid-19. Two thirds of respondents believe that Covid-19 is more fatal than a regular flu and close to 30 percent believe in a similar fatality. Interestingly, partisan differences in beliefs mirror those in demand for NPIs strikingly well: while Republicans, on average, do believe Covid-19 to be more fatal than the seasonal flu, this belief is 0.4 standard deviations higher among Democrats (Appendix Figure E.2). Likewise, Republicans believe that a shutdown extension of six weeks would negatively impact the economy whereas Democrats believe the net economic effect to be zero, on average.[10] We observe a similar consistency between beliefs and support of NPIs along the gender dimension and along most measures of individual health-related and financial exposure to the crisis. Age constitutes an exception, as older individuals prefer a shorter lockdown *despite* a high perceived mortality of Covid-19.

Table 1 shows that beliefs are strong predictors of individuals' support of NPIs (columns 3, 6 and 9). A one standard deviation lower belief about the economic cost of a lockdown is associated with a nine days longer preferred shutdown length, a 0.2 standard deviation higher demand for stricter regulations and a somewhat higher support of strict rule enforcement. Beliefs about the mortality and infectiousness of Covid-19 and about the risk of resurgence have a similarly large predictive power. Moreover, the Democrat-Republican difference shrinks by one half once we condition on beliefs and the R^2 increases

[10]We also explore beliefs about the effectiveness of shutdown measures in mitigating the spread of Covid-19. While this effectiveness is generally perceived as high, Democrats rank it a 0.12 standard deviation higher than Republicans (see Appendix Figure E.3). Similarly, while 80% of respondents rank the infectiousness of Covid-19 as higher than that of the flu, Democrats rate it a 0.2 standard deviation higher than Republicans.

by at least a factor of three once we add beliefs to the set of controls. Taken together, beliefs seem to be central to people's preferences for NPIs. In Section 4, we test whether they play a causal role in shaping individual policy demand. Alternatively, beliefs could be an outcome of policy views or correlated due to other, unobserved factors.

4 Causal Evidence

4.1 Average Treatment Effects

The randomized survey experiment introduces exogenous variation in the perceived economic costs and health benefits of government-mandated NPIs during the coronavirus pandemic. It therefore sheds light on whether tradeoffs between perceived benefits and economic costs causally shape individual demand for these measures.

Throughout the experimental analysis we employ the following specification:

$$Y_i = \beta_0 + \beta_1 T_i^{Cost} + \beta_2 T_i^{HighMort.} + \Theta' X_i + u_i \quad (1)$$

where the outcome variable of interest Y_i, in a set of "first stage" regressions, stands for respondent i's perceived economic costs or the health benefits, respectively, of lockdown measures. In corresponding reduced form regressions, Y_i denotes respondent i's preferred level of government intervention. T_i^{Cost} is a dummy that takes the value one if respondent i is randomly assigned to the economic cost treatment group. $T_i^{HighMort.}$ is a dummy that takes value one (zero) if respondent i is randomly assigned to the high (low) mortality condition when choosing her individually preferred length of shutdown. We include a set of control variables X_i, which increases our effective power and controls for minor imbalances across treatment arms.[11]

First-stage effect of the economic cost treatment Pre-treatment, almost all respondents over-estimate the negative effect of 1918 shutdown measures found in Correia et al. (2020) on the US economy in 1919 (see Appendix Figure E.4). The economic cost treatment, therefore, constitutes an information shock in the direction of *lower* expected costs of shutdown measures in 1918 for nearly the entire sample. In order to ensure monotonicity of the treatment effect, we restrict our working sample for the causal analysis to

[11] The vector X_i includes controls for the high mortality treatment, gender, prior belief about the costs of an extended lockdown in 1918, census region of residence, six age groups, the presence of children in the household, log household income, educational attainment, employment status in January 2020, and political orientation (Democrat, Republican, Independent or "other"). Our results are not sensitive to these control variables.

Table 1: Predictors of Demand for Mandatory Social Distancing

	Length of shutdown in months			Strengthen existing measures (z-scored)			Stricter enforcement (z-scored)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Democrat	0.823***	0.804***	0.366***	0.526***	0.519***	0.236***	0.210***	0.210***	0.020
	(0.063)	(0.063)	(0.061)	(0.036)	(0.036)	(0.033)	(0.036)	(0.036)	(0.035)
Female	0.259***	0.250***	0.118**	0.175***	0.171***	0.082***	0.052*	0.047	-0.025
	(0.053)	(0.054)	(0.049)	(0.029)	(0.030)	(0.026)	(0.030)	(0.031)	(0.029)
Age 35-64	-0.075	-0.088	-0.254***	-0.003	0.012	-0.081***	0.083**	0.085**	-0.022
	(0.062)	(0.063)	(0.058)	(0.034)	(0.035)	(0.031)	(0.035)	(0.036)	(0.034)
Age 65+	-0.209**	-0.216**	-0.442***	-0.010	0.007	-0.114***	0.094**	0.084*	-0.059
	(0.083)	(0.085)	(0.079)	(0.047)	(0.048)	(0.042)	(0.048)	(0.048)	(0.047)
COVID At-Risk		0.195***	0.055		0.150***	0.061**		0.157***	0.092***
		(0.056)	(0.051)		(0.031)	(0.027)		(0.032)	(0.029)
Other hospital needs		0.115***	0.012		0.064***	-0.002		0.044**	-0.002
		(0.037)	(0.034)		(0.021)	(0.018)		(0.022)	(0.020)
Stocks		-0.149**	-0.186***		-0.046	-0.065**		0.054*	0.037
		(0.058)	(0.052)		(0.032)	(0.028)		(0.033)	(0.031)
Inc. loss		-0.179***	-0.145***		-0.012	0.005		-0.065*	-0.058*
		(0.059)	(0.053)		(0.033)	(0.028)		(0.034)	(0.031)
Job loss		-0.009	0.066		0.007	0.059		0.041	0.079*
		(0.080)	(0.073)		(0.045)	(0.040)		(0.046)	(0.044)
Belief econ impact			0.310***			0.203***			0.061***
(z-scored)			(0.025)			(0.014)			(0.015)
Belief mortality			0.228***			0.159***			0.138***
(z-scored)			(0.031)			(0.017)			(0.019)
Belief infectiousness			0.193***			0.109***			0.127***
(z-scored)			(0.032)			(0.017)			(0.019)
Belief resurgence			0.366***			0.257***			0.167***
(z-scored)			(0.030)			(0.016)			(0.017)
Belief effective measures			0.149***			0.049***			0.076***
(z-scored)			(0.028)			(0.015)			(0.017)
R^2	.06	.07	.25	.07	.08	.32	.03	.04	.17
Observations	4,475	4,475	4,475	4,475	4,475	4,475	4,475	4,475	4,475

Notes: Sample based on the economic cost control group. Outcomes in columns 3 to 9 are standardized based on the economic cost control group. In addition to the reported coefficients, all regressions include regional dummies, a dummy for rural zip code, log household income in 2019, educational attainment (less than high school degree, high school or equivalent, some college, Associate's degree, Bachelor's degree, post-graduate degree), three broad age groups, Independent and "other" political orientation, i.e. the omitted group is Republican. Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10 percent, 5 percent and 1 percent level, respectively.

those 94% of respondents for whom the treatment information does *not* constitute a negative signal about the economic impact of a lockdown. All results are qualitatively and quantitatively similar using the full sample.[12]

Panel A of Table 2 (column 1) confirms a strong first stage effect of the economic cost treatment: treated respondents, on average, hold 40 percent of a standard deviation more optimistic beliefs about the effect of a lockdown extension until the end of June (compared to mid-April) on the US economy. The treatment has the strongest impact on beliefs about the economic cost of a shutdown extension by three months, while perceived economic costs of a two-week shutdown extension are affected only by half as much (see Appendix Table F.4).[13] Finally, those exposed to the economic cost treatment expect an extension of the shutdown beyond mid-April by six more weeks to have 0.08 - 0.1 standard deviation less negative effect on their labor income, their total household income and their wealth (see Appendix Table F.5).[14] Overall, results confirm that i) respondents update their beliefs about the effect of economic lockdowns in 1918 and ii) extrapolate to their perceived costs of a lockdown in 2020 for the US economy and for their own household. There are no spillover effects, however, on the perceived health effects of shutdown measures, i.e. respondents' beliefs about the mortality and infectiousness of Covid-19, about the risk of resurgence if restrictions were to be lifted and about the effectiveness of NPIs are inelastic to the treatment (see Table F.3).

First-stage effect of the mortality treatment Next, we test whether respondents who are exposed to the high mortality condition perceive the projected number of deaths as higher than those exposed to the low mortality condition. Our outcome variable of interest is based on a survey question in which we ask whether the projected number of fatalities is higher or lower than the number of Covid-19 fatalities the respondent had expected prior to taking the survey.[15] We find that respondents exposed to the "high mortality" projections perceive the order of magnitude of these projections as 0.4 of a

[12] Appendix Table F.6 replicates our main findings based on the full sample and Appendix Figure E.7 shows them separately for split samples based on prior beliefs.

[13] This difference may be attributed to the fact that the information treatment focuses on the effect of a two-month difference in shutdown length or simply to less variation in respondents' views on the effects of a shutdown extension by two weeks, which most participants view as not very costly.

[14] The pass-through from beliefs about the aggregate economy to beliefs about one's own household is naturally smaller than one, corresponding to one fifth in our context, as individuals have relevant private information about the economic situation of their own household (Roth and Wohlfart; 2019).

[15] Respondents rank the fatality estimation from "much lower than expected" to " much higher than expected" on a 7-point scale.

standard deviation higher compared to those exposed to the "low mortality" projections (Panel A of Table 2, column 2). This result addresses the potential concern that respondents may be unable to distinguish high orders of magnitude in projected fatalities. Reassuringly, the first-stage effect is also independent of whether the respondent was previously exposed to the economic cost treatment (results available upon request).

Treatment effects on the demand for mandatory social distancing If individuals weigh economic costs of NPIs against the potential number of lives saved when forming their policy views, we would expect the economic cost treatment to increase support for longer lockdown durations, more stringent social distancing rules and possibly also stricter enforcement. Similarly, we would expect respondents exposed to the high mortality condition to favor a longer lockdown period. Note that we do not expect the mortality treatment to impact preferences for strengthening measures or enhancing enforcement because the differential model-based fatality projections do not shift beliefs about the actual mortality of Covid-19.[16]

In line with utilitarian concerns, respondents previously exposed to the economic cost treatment (the high mortality condition) prefer, on average, shutdown measures that last six (four) days longer (Table 2, Panel B, column 1). The economic cost treatment also increases support for strengthening current shutdown measures by 0.15 of a standard deviation. However, views on how severely violations of rules should be fined seem to be unrelated to cost-benefit considerations (column 3).

To gain a better understanding of the extent to which cost-benefit considerations affect the preferred duration and intensity of lockdown interventions, we scale the reduced form effects of our two treatments by the first-stage effects on respondents' perceived costs and benefits of a lockdown.

We apply the following IV regression framework:

$$1^{st} Stage : \text{Perceived Costs}_i = \pi_0 + \pi_1 T_i^{Cost} + \pi_2 T_i^{HighMort.} + \Theta' X_i + u_i \quad (2)$$

$$\text{Perceived Mort.}_i = \gamma_0 + \gamma_1 T_i^{Cost} + \gamma_2 T_i^{HighMort.} + \Gamma' X_i + u_i \quad (3)$$

$$2^{nd} Stage : Y_i = \beta_0 + \beta_1^{IV} \widehat{\text{Perceived Costs}}_i + \beta_2^{IV} \widehat{\text{Perceived Mort.}}_i + \delta' X_i + \varepsilon_i \quad (4)$$

[16]In Appendix Table F.3, we show that the mortality treatment, as expected, does not affect individual perceptions about the actual mortality nor about the infectiousness of Covid-19, confirming that respondents understood the differential scenarios as hypothetical.

Table 2: Experimental Results: First-Stage, Reduced Form and IV

	- Perceived Costs (z-scored)	Perceived mortality (z-scored)	
	(1)	(2)	
	Panel A: First Stage		
Cost Treatment	0.440***	0.020	
	(0.021)	(0.021)	
Mortality Treatment	-0.015	0.402***	
	(0.021)	(0.021)	
First-stage F-stat	29.27	18.88	
	Preferred length of shutdown (months)	Demand for stricter regulation (z-scored)	Demand for stricter punishment (z-scored)
	(1)	(2)	(3)
	Panel B: Reduced Form		
Cost Treatment	0.201***	0.095***	0.024
	(0.038)	(0.021)	(0.021)
Mortality Treatment	0.145***		
	(0.038)		
	Panel C: Second Stage (2SLS)		
$-\widehat{\text{Perceived Costs}}$	0.440***	0.213***	0.056
	(0.084)	(0.046)	(0.048)
$\widehat{\text{Perceived Mortality}}$	0.377***		
	(0.091)		
	8,309	8,309	8,305

Notes: Results based on the full sample less individuals with priors beliefs about the impact of 1918 shutdown measures corresponding to an unemployment rate of City B of 5 percent or lower (6% of observations). Outcomes in Panel A, columns 1 to 2 and Panel B, columns 2 and 3 are standardized based on the control group. In addition to the reported coefficients, all regressions include controls for Census region, age group, rural residence, log household income in 2019, educational attainment, political orientation, labor market status and prior beliefs about the economic impact of shutdown measures in 1918. The variable "- Perceived Costs" is a measure of perceived economic costs, standardized based on the economic cost control group and multiplied by -1 for ease of interpretation. Consequently, the IV coefficient $-\widehat{\text{Perceived Cost}}$ can be interpreted as the impact of a one s.d. lower belief about the economic cost of a lockdown. Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10 percent, 5 percent and 1 percent level, respectively.

Having documented a strong first stage (Table 2, Panel A), we now focus on the second stage, in which we estimate the causal effect of perceived costs and benefits of a lockdown on individual demand for NPIs, Y_i. We emphasize that the IV approach in this context should be carefully interpreted as scaling exercise to facilitate the interpretation of magnitudes.[17] That said, a one standard deviation more optimistic belief about the economic impact of a lockdown increases the preferred lockdown length by 13 days and the demand for stricter regulation by a 0.2 standard deviation (Panel C of Table 2, columns 1 and 2). Similarly, a one standard deviation higher perception of the number of deaths projected in the survey increases the preferred lockdown length by 11 days.[18] These effects correspond to between 140% and 225% of the effect of being at risk of a severe Covid-19 illness. Lastly, a back-of-the-envelope calculation underlines the large causal role of cost-benefit considerations in driving the Democrat-Republican difference in policy views. It shows that a substantial 25% (20%) of the partisan difference in the preferred lockdown duration (strictness) can be accounted for by the causal effect of partisan differences in beliefs about the economic impact of a lockdown (see Appendix C).

Robustness In Appendix Section D, we demonstrate that our main results are unlikely to be driven by experimenter demand or priming effects.

4.2 The Role of Cost-Benefit Tradeoffs across Subgroups

Are cost-benefit considerations equally important across groups? In this section, we examine whether elasticities of policy demand for NPIs differ across the political spectrum and across groups with different exposure to the crisis.

Personal exposure to health risks We split our sample by two measures of exposure to the health risk of the pandemic: the presence of chronic at-risk conditions in the respondent's close family (Panel A of Figure 2) and the respondent's anticipated likelihood that someone in the family (including the respondent) will need hospital care in the coming months (Panel B of Figure 2). Respondents in different health exposure groups update their perceptions of the costs and benefits of a lockdown to a similar extent in response to both treatments, i.e. different reduced form effects across groups are evidence of a differential elasticity of policy demand to perceived costs and benefits.

[17] Appendix Section B contains a more detailed discussion of IV assumptions.

[18] Consistent with our estimated ITT effects (Panel B, column 3), our IV estimates confirm that individual preferences for the demand of more or less severe punishment of rule violations is *not* causally affected by cost-benefit considerations (Panel C, column 3).

The effect of the mortality treatment on preferred shutdown length is strong for individuals in the bottom two terciles in terms of anticipated demand for hospital care, and zero for those in the highest tercile ($p = 0.014$). There is no strong pattern according to the presence of a chronic at-risk condition in the family (Panel A of Figure 2). The estimated effects of the economic cost treatment on preferred shutdown length are larger in size for less exposed groups, although not significantly so. Moreover, the economic cost treatment has a stronger effect on the demand for strengthening existing measures among those in the bottom two terciles of exposure compared to the top terciles ($p = 0.061$ for chronic at risk-condition and $p = 0.133$ for anticipated need for hospital care). Taken together, although the differences are sometimes insignificant, the high average estimated elasticity of demand for NPIs to cost-benefit considerations seems to be driven by individuals without a high immediate personal exposure to the health risks of the pandemic.

Exploring the role of age, we find that the effects of both treatments are driven by those age 35 and older, whereas the policy demand of 18-34 year-olds is high at baseline and inelastic to cost-benefit concerns (see Appendix Figure E.5). These findings suggest that age does not primarily capture health exposure to the pandemic. Rather, it seems that older individuals are more "pragmatic" and take cost-benefit considerations into account whereas the young are possibly more "idealistic" and accept longer shutdown lengths, no matter the price.

Personal financial exposure to the crisis Next, we examine whether cost-benefit considerations play a differential role depending on individual economic exposure to the Covid-19 crisis. We split our sample according to whether each individual has been laid off "on account of the corona virus outbreak" (33 percent of the sample), as the most acute measure of economic exposure (see Figure 3, Panel A). The baseline demand for NPIs is similar across these groups. While the mortality treatment does not have a significantly different reduced form effect on preferred shutdown length across the two groups, the effect of the economic cost treatment on individual demand for strengthening measures and on the preferred shutdown length are driven by those who have not been laid off. Given the correlation between labor market exposure and education, one should interpret this heterogeneity cautiously. Individuals with different cognitive skills or numeracy will find it easier or more difficult to interpret information, which might be one reason behind the smaller first stage effects for those laid off. With these caveats in mind, we find that the described patterns of heterogeneity are robust to scaling the reduced form effects by the first stage effects in a 2SLS framework, although the differences in second-stage effects across groups are noisily measured.[19]

Exploring measures of less acute financial exposure to the crisis, we find no strong systematic patterns with respect to household income loss or to being invested in the stock market. One interpretation of these patterns is that cost-benefit considerations matter regardless of personal financial exposure, with the exception of those who face the most immediate and acute exposure to the crisis in the form of a job loss. The information treatment refers to the medium-run effects of shutdowns, which may receive a smaller weight in the considerations of those most affected by the short-run consequences.[20] Overall, it seems that those who take cost-benefit considerations into account are those "who can afford it". Individuals who are constrained by health-related needs or by the severe financial event of a job loss, have rather inelastic attitudes towards NPIs and generally favor intensities and durations of lockdown measures that are in line with their immediate personal constraints.

Political orientation Given partisan gaps in views on the pandemic (Allcott et al.; 2020), one might expect differences in elasticities of policy demand across the political spectrum. We find, however, that the estimated treatment effects are of similar magnitude across the political spectrum (Figure 3, Panel B). If anything, Democrats are slightly more responsive to the mortality treatment whereas Republicans react somewhat more strongly to the economic cost treatment. These differences are noisily measured, however, and become smaller once we account for differences in the first stage updating of perceived costs and benefits across the political spectrum.[21]

Coupled with the baseline partisan differences in support for NPIs documented in Section 3, our results indicate that Democrats and Republicans likely hold different policy views *because* of disparate beliefs about relevant facts and not because they draw different conclusions from the same information. Partisan differences in beliefs, in turn, may be the result of exposure to different sources of information (Allcott et al.; 2020; Bursztyn et al.; 2020). Deeply held views and "ideologies", which are inelastic to information, might play a relatively smaller role in the Covid-19 context compared to other, more politically charged issues.

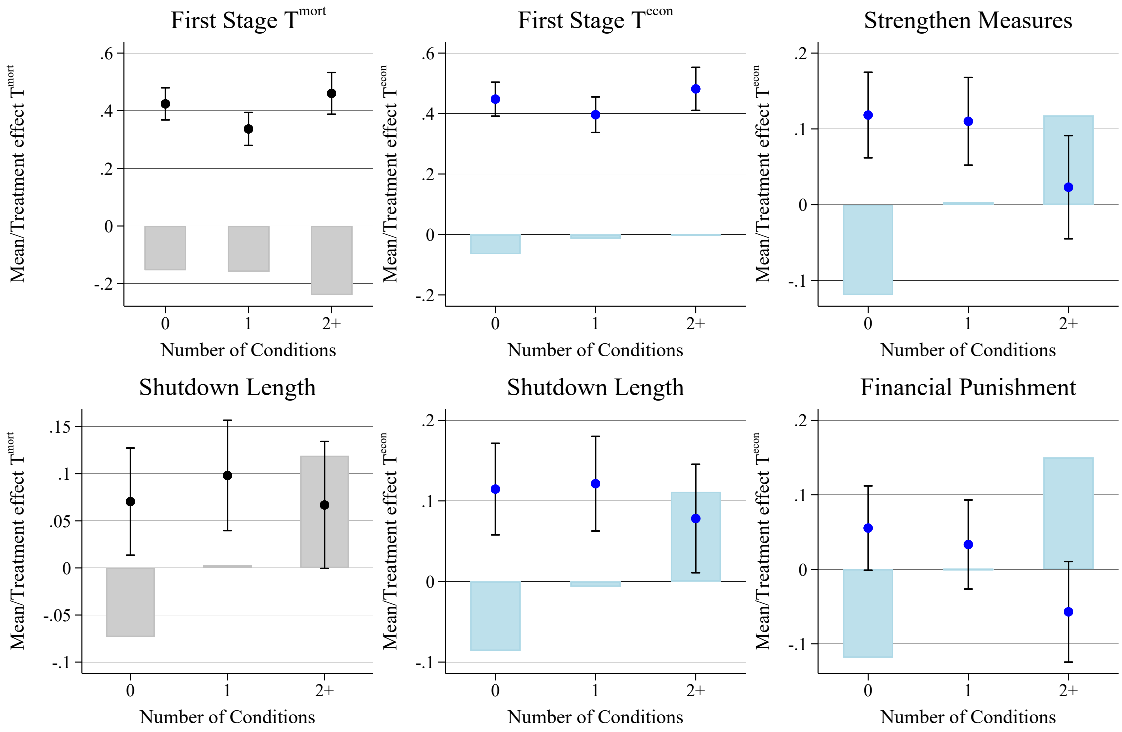
[19]Results available upon request.

[20]By contrast, stockholders may be following long-term investment strategies in which such beliefs receive higher weight.

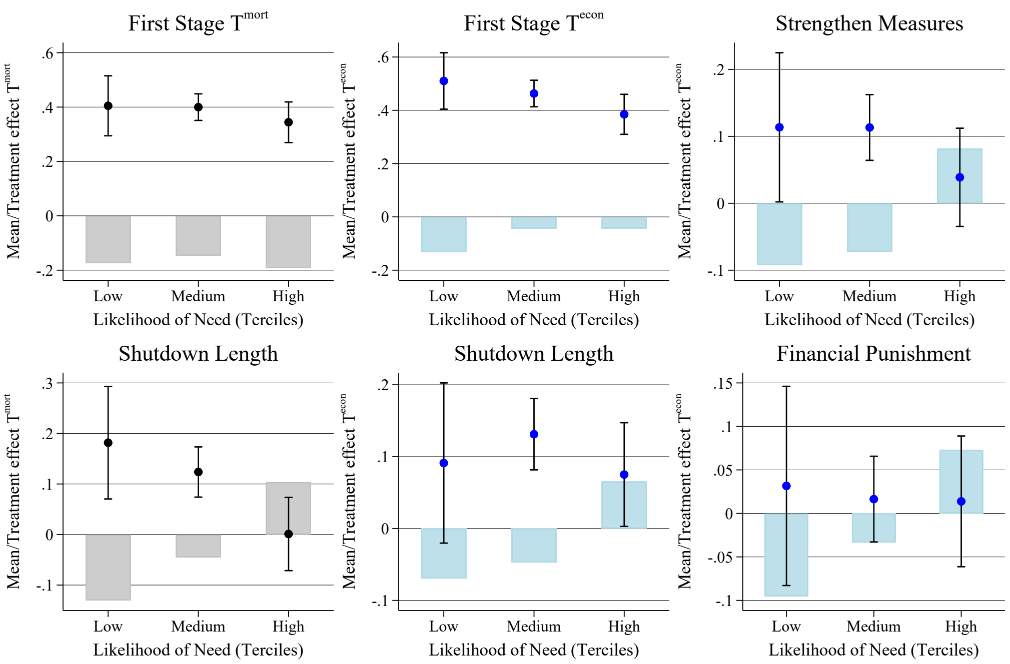
[21]Results from 2SLS regressions are available upon request.

Figure 2: Heterogeneity by personal health exposure to the pandemic

(a) Presence of chronic at-risk conditions in the family



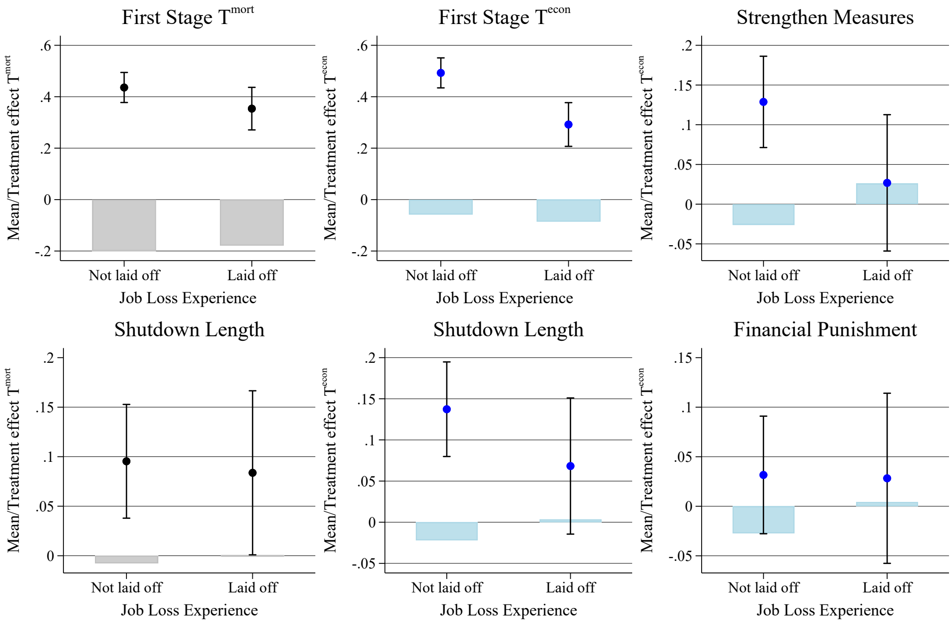
(b) Anticipated need for non-covid hospital care in the family



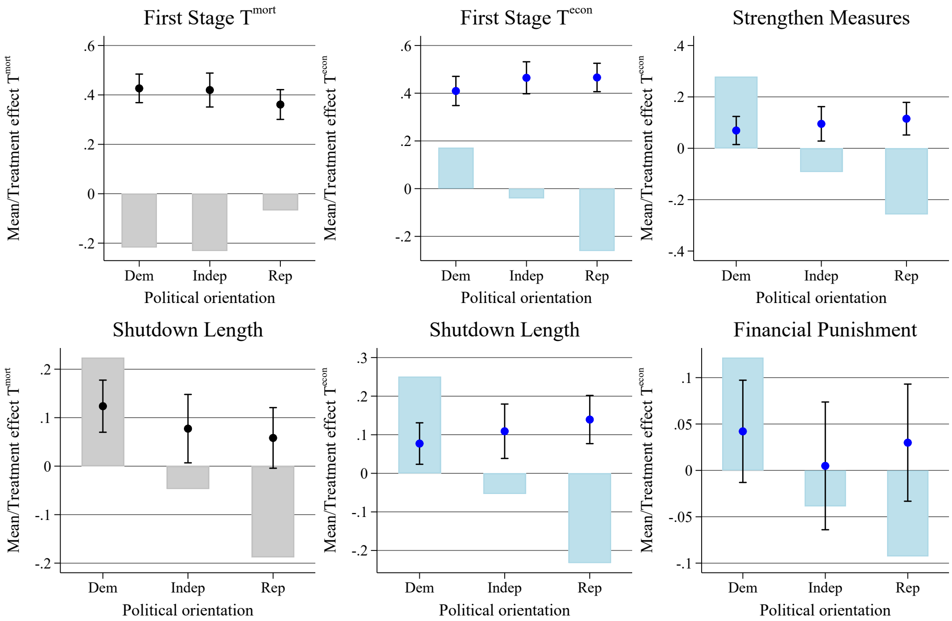
Notes: All outcomes are standardized based on the economic cost control group. The sample for all subfigures is identical to that in main results table (Table 2). For the grey (blue) bars, the sample is, in addition, restricted to respondents in the low mortality condition (economic cost control group). Bars show sample means, without additional controls. The point estimates including 90 percent confidence intervals show treatment effects for the economic cost treatment in blue and for the high mortality compared to the low mortality condition in grey. For all causal regressions we control for gender, census region, age group, rural residence, log household income in 2019, educational attainment, political orientation, labor market status in January 2020 and prior beliefs about the economic impact of shutdown measures in 1918. We also control for the treatment for which we are not explicitly reporting effects.

Figure 3: Control Group Means and Treatment Effects by Political Orientation

(a) Job loss due to crisis



(b) Political Orientation



Notes: All outcomes are standardized based on the economic cost control group. The sample for all subfigures is identical to that in main results table (Table 2). For the grey (blue) bars, the sample is, in addition, restricted to respondents in the low mortality condition (economic cost control group). Bars show sample means, without additional controls. The point estimates including 90 percent confidence intervals show treatment effects for the economic cost treatment in blue and for the high mortality compared to the low mortality condition in grey. For all causal regressions we control for gender, Census region, age group, rural residence, log household income in 2019, educational attainment, political orientation, labor market status in January 2020 and prior beliefs about the economic impact of shutdown measures in 1918. We also control for the treatment for which we are not explicitly reporting effects. Panel B restricts the sample to those who report to have been employed before the outbreak of the crisis. The patterns look very similar if we add those who were unemployed or out of the labor force before the crisis to the group who did not experience job loss.

5 Conclusion and Implications

Based on a survey experiment conducted with a representative online sample in the US, we provide causal evidence that cost-benefit calculations shape public demand for non-pharmaceutical interventions (NPI) during the Covid-19 pandemic. We document broad public support for mandatory social distancing measures during the initial period of the Covid-19 response, despite differences according to disease vulnerability, financial exposure to shutdown measures and political affiliation. Moreover, even though the current debate may appear morally and emotionally charged, individual demand for NPIs is elastic to perceived tradeoffs between lives and livelihoods. Our findings suggest a powerful role for an evidence-based public debate about the costs and benefits of NPIs to mitigate the spread of Covid-19. Understanding how citizens account for these tradeoffs in their policy views will be essential for the success of the pandemic response going forward.

The results of this paper speak to a more general question regarding the determinants of individuals' elasticity of policy demand to information (Alesina et al.; 2020). Even when beliefs about the underlying state of the world are elastic, previous studies have found policy preferences difficult to move (Kuziemko et al.; 2015; Haaland and Roth; 2019; Settele; 2019) or unrelated to beliefs about relevant facts (Cappelen et al.; 2019). Moreover, patterns of motivated information processing (Thaler; 2019; Fryer et al.; 2019; Taber and Lodge; 2006) have been documented in a broad range of domains, i.e. individuals tend to place more weight on information that supports their prior (political) convictions and are more willing to adjust their policy views to information that supports their underlying political preferences (Alesina et al.; 2018; Haaland and Roth; 2019). Our observation that public demand for NPIs during the first stage of the pandemic appears responsive to information, irrespective of political affiliation, is quite striking against the background of this literature. Two factors may explain the difference in our findings. First, Covid-19 has emerged as a new topic that is associated with a high degree of uncertainty. Second, political narratives with respect to the pandemic are only starting to emerge and this factor may potentially mitigate the role of ideology and partisan thinking in shaping views about the optimal pandemic response.

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Appendix to "Lives or Livelihoods? Perceived Tradeoffs and Public Demand for Non-Pharmaceutical Interventions"

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A Technical Details on the Treatment Values

Economic cost treatment For the economic cost treatment, we rely on Correia et al. (2020) (Working Paper version from March 26th, 2020). Our goal was to translate the research findings on the relationship between city-level lockdown measures in 1918 and economic outcomes in 1919 into a meaningful statistic that is easy to interpret for respondents. Correia et al. (2020) report that a one day longer city-level lockdown in 1918 was associated with an increase of employment in manufacturing by 0.133 log points in 1919, controlling for time and city dummies as well as for a set of control variables interacted with time dummies in a difference-in-differences framework.

Presenting these results in their raw form to laypersons would have arguably presented two challenges: First, the idea of a difference-in-difference (DD) approach may potentially be difficult to grasp, unless explained in simple words. Second, respondents might find the the log change in employment in manufacturing difficult to interpret, given that the commonly used statistic people are exposed to in the news is the overall unemployment rate. Related to the second point, Ansolabehere et al. (2013) demonstrate that individuals are able to meaningfully express beliefs and to interpret information on quantitative scales when they are familiar with the order of magnitude in which the object it measures commonly ranges. In order to mitigate both concerns, and to communicate the research findings in a simple and meaningful way, we use the following approach in our survey: First, we describe the idea of a DD approach in a way that preserves the underlying idea but abstracts from technicalities. Second, we convert the quantitative findings of Correia et al. (2020) under a few assumptions such that they correspond to the effect of a 60 days longer lockdown on the *unemployment rate* in 1919.

To communicate the idea of a DD approach in simple words, we explain that Correia et al. (2020) compare similar US cities that differed in their approach to mitigate the 1918

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influenza pandemic. We ask respondents to think of two hypothetical cities, "City A" and "City B", which are comparable previous to the onset of the pandemic, including in terms of their exposure to the virus and their pre-pandemic unemployment rate. We then state that City A was under lockdown for 30 days in 1918 and had an unemployment rate of 7% by the end of the pandemic in 1919. City B, in comparison, was under lockdown for 60 days longer and respondents are asked to estimate City B's unemployment rate in 1919.

For the information treatment, we convert the findings of Correia et al. (2020) to correspond to City B's unemployment rate in 1919. Based on the summary statistics reported in Table A2, the average share of manufacturing employment over the population was 8.33 percent in the sampling period.[3] The result of a 0.133 log points higher employment in manufacturing in 1919 for each additional day of lockdown in 1918 (see Table to of the paper) corresponds to a 7.98 percent higher employment in manufacturing for the 60 days longer lockdown of City B in 1918 ($60 * 0.133 = 0.0798$). From a baseline value of 8.33 percent for the manufacturing employment to population ratio, an 7.98 percent increase would mean a manufacturing employment to population ratio of 8.99 percent in City B. The increase compared to City A corresponds to 0.66 percentage points. To convert this value into an effect on the overall unemployment rate, we make two simplifying assumptions: First, we assume that the labor force participation rate was unaffected by city-level lockdowns and second, we assume that employment in other sectors of the economy was constant. Under a constant labor force participation rate between 50 and 70 percent, the 0.66 percentage points effect on the manufacturing employment to population ratio corresponds to an 0.94 to 1.32 percentage points decrease in the overall unemployment rate of City B compared to City A. With the unemployment rate of City A being 7 percent by the end of the pandemic, this corresponds to a 6 percent unemployment rate of City B.

Due to the assumptions we make, the treatment value of 6 percent constitutes a conservative estimate at the lower bound of the estimated positive effect of lockdowns on the economy in 1918. The qualitative message of the research findings we aim to

[3]This number is based on the "Statistical Abstract" reports of the US Census Bureau of 1914, 1919, 1921 and 1923. Given that the DD framework pools data from the pre- and the post-period and controls for period effects, we decided to rely on this number. Alternatively, we could have used the share of manufacturing employment in 1914 to the population in 1910 based on city level data, which is also reported in Table A2 of the paper. This share corresponds to a slightly higher 14.13 percent and would ultimately have lead to a qualitatively similar treatment value, corresponding to an unemployment rate in City B of 5% instead of 6%.

communicate, however, is robust to a wide range of assumptions on the development of the labor force participation rate and of the unemployment rates in sectors other than manufacturing between cities with different lockdown durations.

More recently, Lilley et al. (2020) have raised concerns that the findings of Correia et al. (2020) could be driven by a differential population growth previous to the pandemic across cities with differential policy responses in 1918. The authors of the original paper, in turn, have addressed this concern in a response to the critique (see `https://drive.google.com/file/d/1y9j5kDr6nxx3LSOLNP38s2rrxQhtD1PM/view`). While the discussion about the robustness of the research findings we rely on is important for our understanding of the effect of NPIs implemented in 1918, it is not a concern for our study. In our information treatment, we are transparent about the empirical nature of the findings of Correia et al. (2020) and we also provide the reference to the paper during the information treatment. Interested survey participants therefore have the option to look up the findings and to come to a judgement of their own.

Mortality treatment The model we apply in the mortality treatment is the S.E.I.R. model developed by Gabriel Goh, Ashleigh Tuite and David N. Fisman for the New York Times (2020).[4] Respondents have access to the parameter assumptions underlying the projections by clicking on a button that says "click here for methodological details". The information that appears when a respondent in the high mortality treatment clicks on the button reads as follows: "Methodological details: Projections are based on a S.E.I.R. (Susceptible, Exposed, Infected and Resistant) model designed by Gabriel Goh, Steven De Keninck, Ashleigh Tuite and David N. Fisman using the current state of the research with regards to the R0 (2.4), virus incubation period (5.2 days), infectious period (2.9 days), recovery time of 11.1 days for mild and 28.6 days for severe cases. The infection fatality rate, i.e. the percentage of people who contract the disease who eventually die of it, is assumed to be 2.4%. The first day of intervention is set to March 22nd. The level of intervention corresponds to a reduction in interactions across the US by 50%." In the low mortality treatment, the text is the same, except for the infection fatality rate which is set to 0.4% rather than 2.4%. We chose to provide this information not by default but upon request in order to be transparent about the inputs while at the same time avoiding to over-burden respondents with technical details.

[4]The code was made available by the authors under the following link: `https://static01.nyt.com/newsgraphics/2020/03/16/opinion-coronavirus-model-2/d268775237c095931fe2fae6015c568c0011fd76/build/js/main.js`.

Both IFR parameter values, 0.4% and 2.4% , are well within the range of values considered plausible based on the state of the research as of April 2020. The WHO, as of the time of our data collection proclaimed a case fatality rate (share of officially diagnosed cases who die) of 3.8%, which may be seen as an upper bound for the infection fatality rate (i.e. the share of those infected with Covid-19 who die). Randomized testing of a sample of 500 inhabitants of the most highly infected region of Germany in April 2020 yielded an estimated infection fatality rate of 0.37%, which is below the 0.4% we use as our model parameter in the low mortality condition.

B 2SLS Regressions: Specification Details

To gain a better understanding of the order of magnitude in which individually perceived economic costs and health benefits of shutdown measures affect the demand for such interventions, we apply an instrumental variables approach. The idea is to scale the reduced form effect of our two treatments by the first-stage effect of the treatments on respondents' cost-benefit perceptions.

We apply the following IV regression framework:

$$1^{st}Stage : \text{Perceived Costs}_i = \pi_0 + \pi_1 T_i^{Cost} + \pi_2 T_i^{HighMort.} + \Theta' X_i + u_i \tag{B.1}$$

$$\text{Perceived Mort.}_i = \gamma_0 + \gamma_1 T_i^{Cost} + \gamma_2 T_i^{HighMort.} + \Gamma' X_i + u_i \tag{B.2}$$

$$2^{nd}Stage : Y_i = \beta_0 + \beta_1^{IV} \widehat{\text{Perceived Costs}}_i + \beta_2^{IV} \widehat{\text{Perceived Mort.}}_i + \delta' X_i + \varepsilon_i \tag{B.3}$$

In the first stage, we separately instrument i) respondents' beliefs about the economic impact of a longer shutdown and ii) respondents' perceived health benefits of a longer shutdown. We again proxy beliefs about the economic impact of a shutdown by our most general measure of perceived economic costs.[5] Similarly, we proxy perceived health benefits of a longer shutdown by the perceived order of magnitude of projected Covid-19 fatalities the respondent was exposed to.[6] Random assignment to the economic cost and the high mortality treatment condition, respectively, serve as exogenous instruments.[7] In the second stage, we then estimate the causal effect of beliefs about the costs and benefits of a longer lockdown on demand for NPIs based on the compliant subpopulation whose

[5] See the first-stage outcome variable in Panel A of Table 2, column 1.

[6] See the first-stage outcome variable in Panel A of Table 2, column 2.

[7] Note that we apply the same framework for all three outcomes for the sake of consistency, but only expect an effect of the perceived health benefits (as proxied by the perceived magnitude of the number of lives that may be saved through a lockdown) on the preferred length of lockdown, but not on the other two outcomes, as we do not intend to shift mortality beliefs due to ethical considerations.

beliefs are shifted.

Given that we have excluded the six percent of respondents who hold prior beliefs about the economic impact of lockdowns in 1918 that are more optimistic than the treatment signal, monotonicity should hold for the economic cost treatment. For the mortality treatment, monotonicity should hold as well because one would expect a given respondent assigned to the high mortality condition to perceive the projected number of fatalities as higher, or at least not lower, than she would in a hypothetical counterfactual scenario in which she had been assigned the low mortality condition. The first-stage F-statistic is well above 10 for both first stage regressions (see Table 2, Panel A, columns 1 and 2), lending credence to instrument relevance. Regarding the exclusion restriction, one should note that beliefs generally consist of several related aspects. For instance, in our context, shifting beliefs about the economic impact of a two-month lockdown extension will arguably have spillover effects on beliefs over the impact of a three-month lockdown extension. Therefore, our IV approach should be carefully interpreted as a scaling exercise that allows us to better understand the magnitude of estimated effects.[8] We present the IV results in Panel C of Table 2 (column 1).

C Back-of-the-Envelope Calculation

Democrats and Republicans in the economic cost control group differ by a 0.42 standard deviation in their prior beliefs about the economic cost of a lockdown (unreported regression result). This effect corresponds in size to the estimated first stage effect of the economic cost treatment on posterior beliefs (Table 2 in the main paper, Panel A, Column 1). We compare the Democrat-Republican difference in the preferred shutdown length (0.8 of a month, see Table 1) to the causal effect of the economic cost treatment on preferred shutdown length (0.2 of a month, see Table 2, Panel B, column 1). By doing so, we find that the causal effect of the different beliefs of Democrats and Republicans accounts for one fourth of the partisan difference in the preferred shutdown length. Similarly, we compare the Democrat-Republican difference in the preferred strictness of a lockdown (0.5 standard deviations, see Table 1) to the estimated effect of the economic cost treatment on preferred strictness (0.1 standard deviations, see Table 2, Panel B, column 2). We find that one fifth of the partisan difference in the preferred strictness of regulations can be accounted for by the causal effect of partisan differences in beliefs about the economic

[8]For another application of a 2SLS framework to interpret the order of magnitude of causal belief effects, see Haaland and Roth (2018) who study the effect of beliefs about the labor market impact of immigrants on preferences over immigration policy.

impact of a lockdown.

D Robustness

Experimenter Demand One commonly raised concern in survey experiments on political opinions are experimenter demand effects: if respondents believe the survey to be politically motivated, they may aim to express opinions that are in line with what they perceive to be the experimenter's political agenda. Even though experimenter demand effects have been shown to be of little empirical relevance (Mummolo and Peterson; 2019; De Quidt et al.; 2018), we provide supplementary evidence suggesting that experimenter demand effects are unlikely to act as a mechanism behind our main estimated treatment effect. First, when asked at the end of the survey, more than 80 percent of respondents state that they perceived the survey to be politically unbiased. More importantly, perceived political bias is generally highly similar across treatment arms (see Table F.7): the high mortality as compared to the low mortality condition has no effect on perceived political bias. Similarly, respondents exposed to the economic cost treatment are equally likely as the control group to perceive no political bias or a left-wing political bias. They are one percentage point less likely to perceive a right-wing bias, but this effect is economically very small and its statistical significance should be interpreted in light of our highly powered large sample.

In addition, more than 80 percent of those who received the economic cost treatment found the information trustworthy and more than 90 percent found it relevant for the decision on whether to keep interventions in place to mitigate the spread of Covid-19. These high percentages are reassuring because, together with the strong first-stage treatment effects, they suggest that the effect of the economic cost treatment on policy demand is driven by an information channel and respondents' updating of their beliefs about the economic costs of a lockdown, rather than by experimenter demand effects.

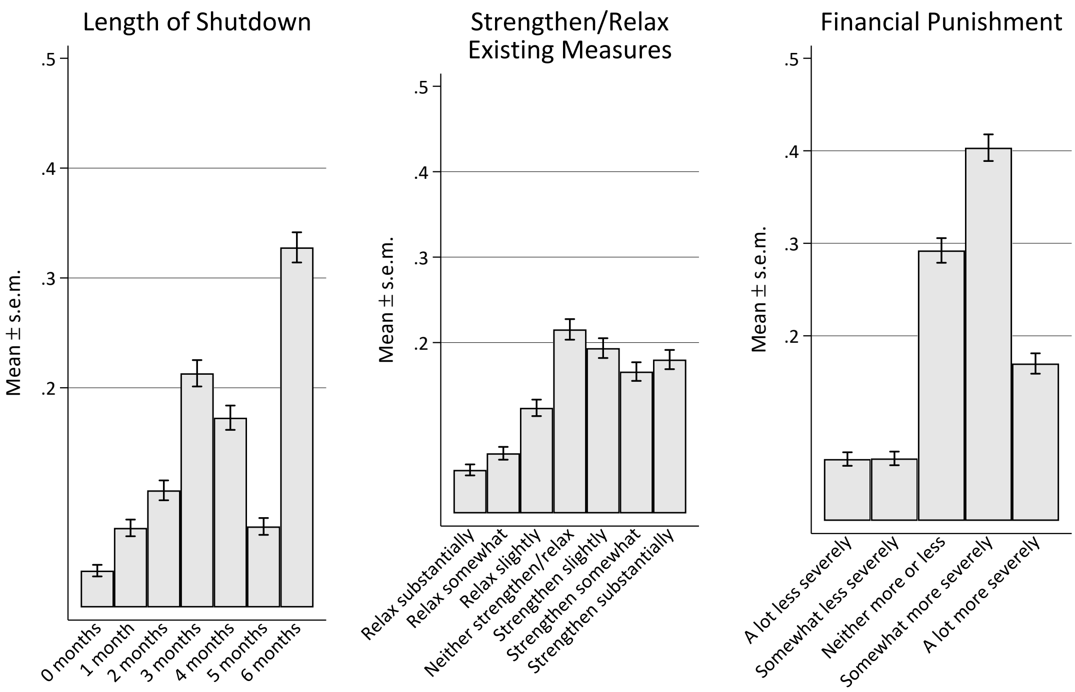
Heterogeneity by prior beliefs A further concern for the interpretation of our results may arise if respondents react to priming, rather than learning from the economic cost information treatment. To address this concern, Figure E.7 plots heterogeneous treatment effects according to prior beliefs about the unemployment impact of the 1918 Influenza shutdown measures. Reassuringly, we find that the updating of beliefs about the economic impact of lockdowns is larger, the larger the initial perception gap, i.e. the more prior beliefs deviate from the treatment signal. These patterns translate into similar patterns in the reduced form results on demand for NPIs. Note that we still find some updating towards a higher net economic benefit of lockdowns among those with initially positive beliefs about the historical effect of lockdowns. This type of pattern is not uncommon in experimental designs that compare a treatment group to a pure control group and may be driven, for instance, by a reduced uncertainty around the beliefs of treated respondents.

Lastly, note that prior beliefs are not randomly distributed in the population, which is generally a challenge for experimental designs that compare a treatment group that receives information to a control group that does not receive information. Arguably, respondents with very high beliefs about the post-pandemic unemployment rate in City B may have different characteristics, for instance in terms of numeracy and education, than those with more reasonable prior beliefs to start with. If we drop individuals with exceedingly pessimistic beliefs from the sample, the patterns of heterogeneity in Figure E.7 become more pronounced, i.e. those for whom the information shock should arguably be largest update most in response to the treatment. Overall, the patterns of heterogeneity in Figure E.7 suggest that changes in beliefs due to learning from information is an important driver of our treatment effects.

In the mortality treatment, where we compare individuals exposed to higher vs. lower projections of Covid-19 fatalities, priming is, by definition, constant across treatment arms.

E Additional Figures

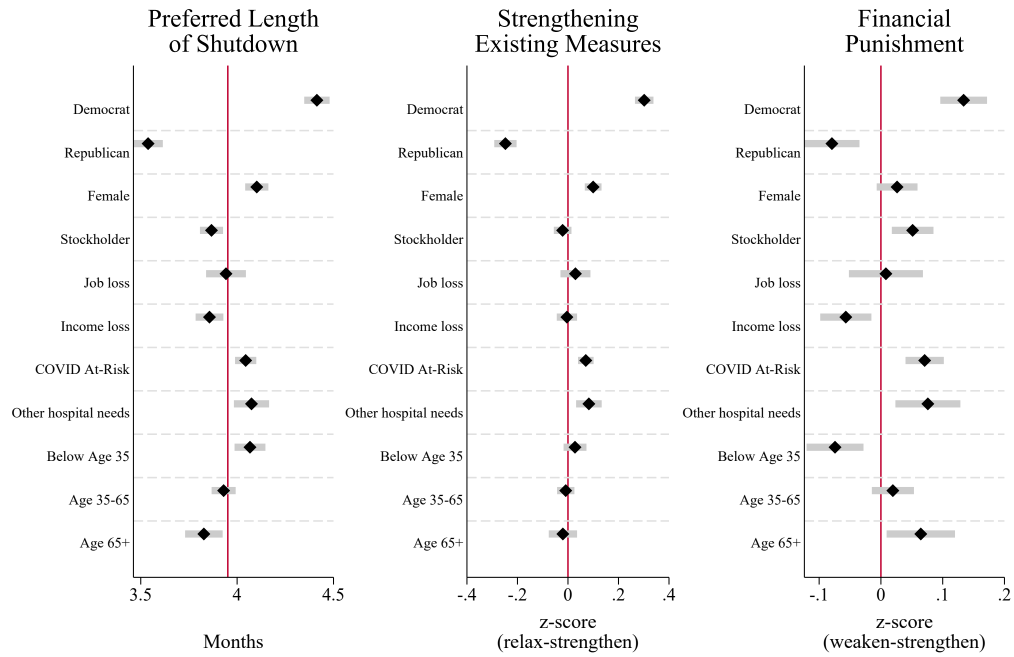
Figure E.1: Distribution of Preferences over Non-Pharmaceutical Interventions



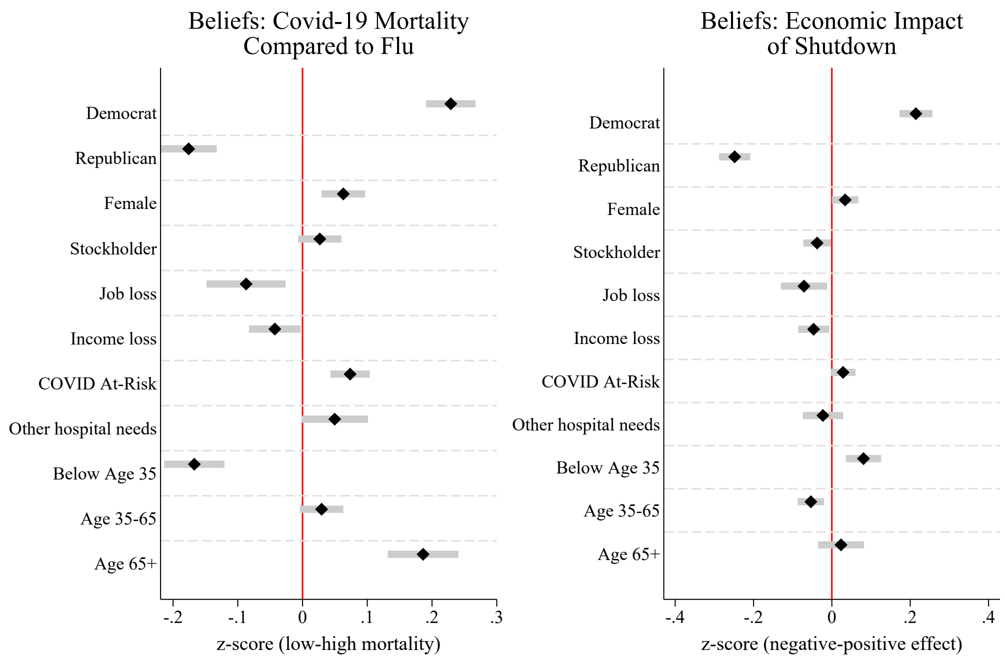
Notes: For this figure, the sample is restricted to the economic cost control group. We pool the high and the low mortality treatment.

Figure E.2: Descriptive Results by Subgroups

(a) Demand for Mandatory Social Distancing

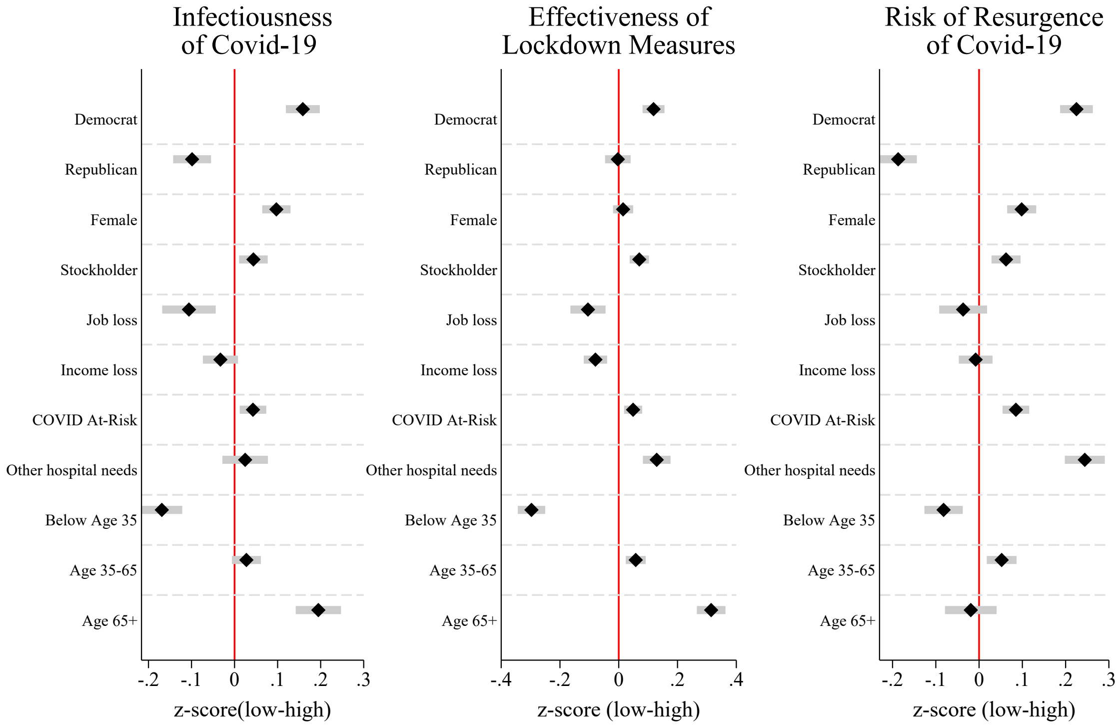


(b) Beliefs about Covid-19 Mortality and the Economic Impact of Shutdown Measures



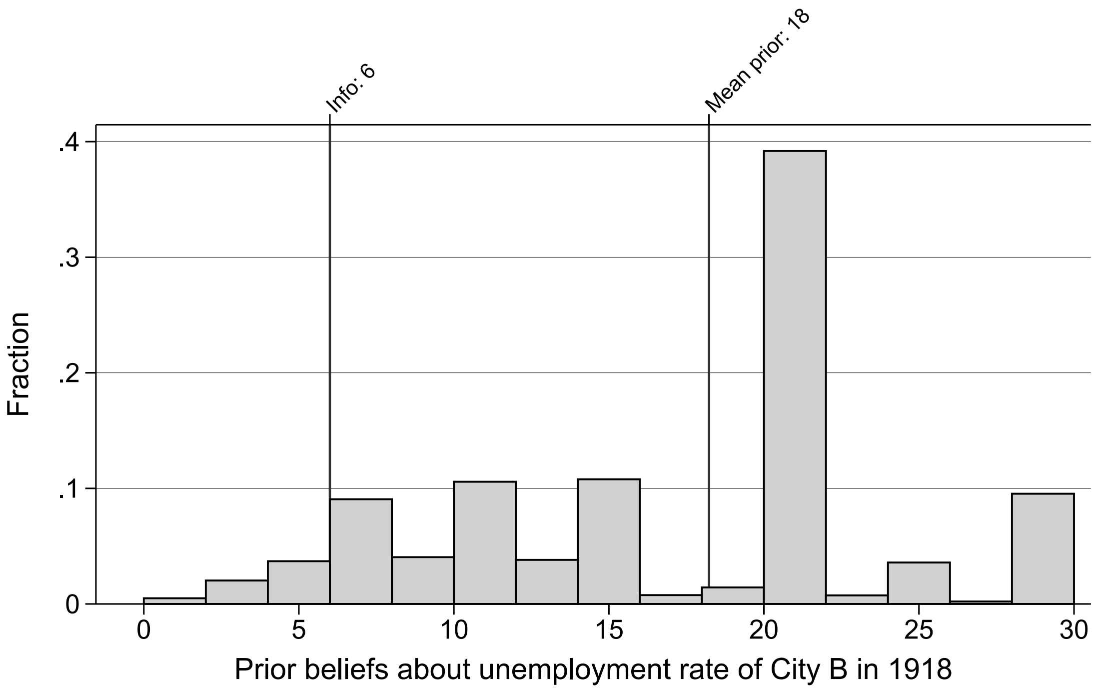
Notes: Figures show subsample means based on the economic cost control group. In panel (a), the left figure displays the average number of months respondents prefer lockdown measures to last during the upcoming 6 months. The center shows z-scored preferences for strengthening or relaxing existing shutdown measures, where zero corresponds to slightly strengthening existing measures. The right figure displays z-scored preferences for financial punishment of risky behavior that may foster the spread Covid-19, where zero corresponds to somewhat increasing financial punishment. In panel (b), the left figure shows z-scored beliefs about the mortality of Covid-19 in comparison to the seasonal flu, with zero corresponding to "more severe". The right figure shows beliefs about how an extension of lockdown measures will impact the US economy, with more negative values corresponding to more negative beliefs and zero corresponding to a perceived negative effect.

Figure E.3: Beliefs about Covid-19 Infectiousness, Risk of Resurgence and Efficacy of Shutdown Measures



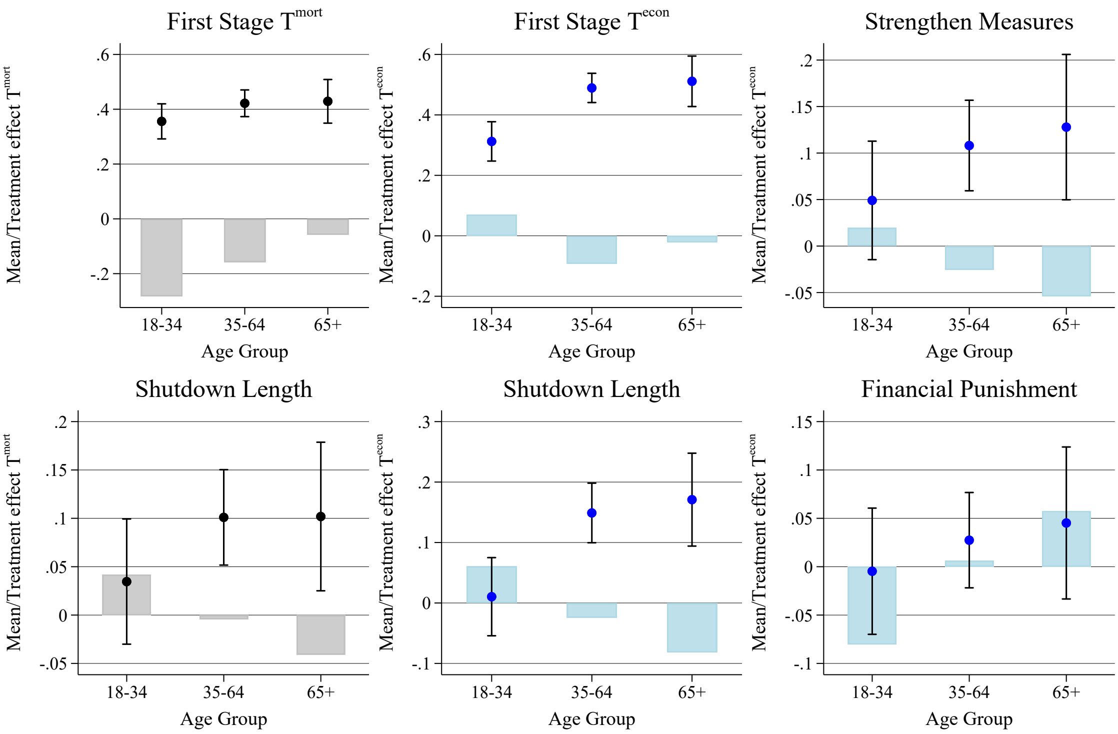
Notes: Standardized sample means based on the control group that does not receive the cost treatment. For the left panel, respondents are asked to rate the infectiousness of Covid-19 in comparison to the seasonal flu on a 5-point scale ranging from "much less severe" to "much more severe". The mean response, re-centered in this figure at zero, corresponds to the answer "more severe". For the center panel, respondent rate the effectiveness of social distancing measures in place across US cities in mid-April on a 10-point scale, from "not at all effective" to "highly effective". The average belief, centered at zero, corresponds to 7.3, or fairly effective. The right panel shows the perceived risk of a resurgence of a Covid-19 pandemic in the coming months in the case that current shutdown measures would be lifted. Rated on a scale from zero (negligible) to 10 (very high), the re-centered average corresponds to 7.0.

Figure E.4: Prior Beliefs about the Economic Impact of Shutdowns in 1918



Notes: Distribution of beliefs about unemployment rate of "City B" in 1918. City B was under lockdown in 1918 for 3 months. City A was under lockdown for 1 month and had an unemployment rate in the manufacturing sector of 7% by the end of the pandemic in 1919. For the histogram, we top-coded prior beliefs at 30. (6% of respondents had a prior belief between 31 and 100.) The mean prior of 18 is based on the full distribution of prior beliefs. The treatment value, i.e. the information about the true unemployment rate of City B in 1919 corresponds to 6%, implying a negative signal for more than 94% of our sample.

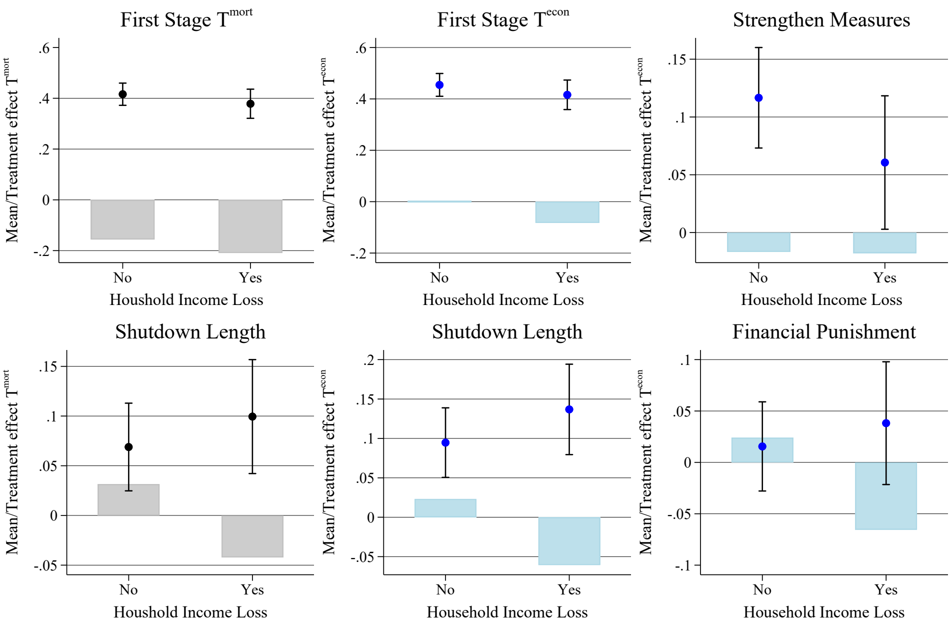
Figure E.5: Heterogeneity at Baseline and in Elasticities by Age



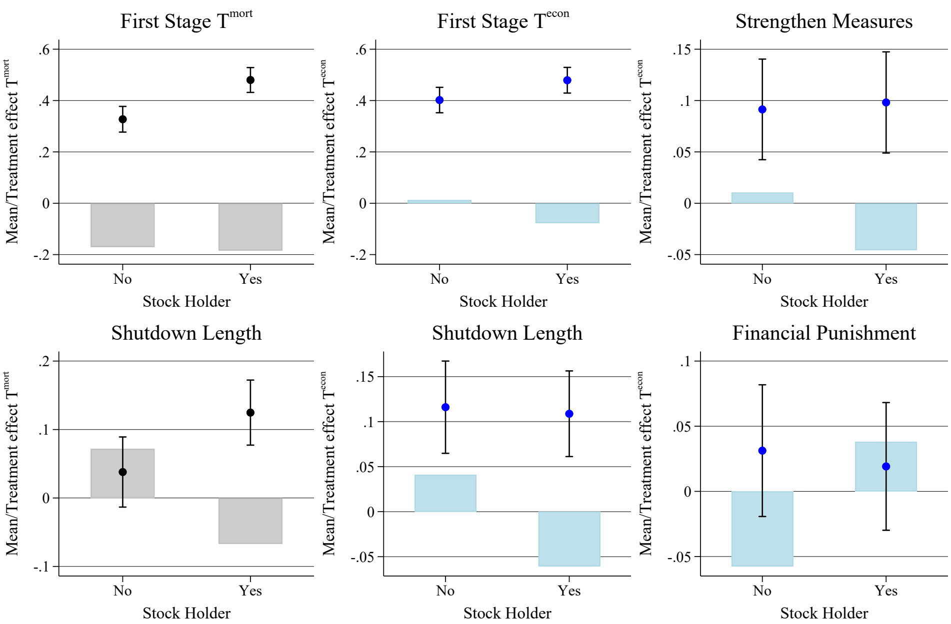
Notes: Outcomes are standardized based on the economic cost control group. All subfigures are based on those 94% of respondents for who, based on their prior beliefs, the economic cost treatment does not constitute a signal towards higher economic costs of a lockdown in 1918. For the grey (blue) bars, the sample is, in addition, restricted to respondents in the low mortality condition (economic cost control group). Bars show sample means, without additional controls. The point estimates including 90 percent confidence intervals show treatment effects for the economic cost treatment in blue and for the high mortality compared to the low mortality condition in grey. For all causal regressions we control for gender, census region, age group, rural residence, log household income in 2019, educational attainment, political orientation, labor market status in January 2020 and prior beliefs about the economic impact of shutdown measures in 1918. We also control for the treatment for which we are not explicitly reporting effects.

Figure E.6: Control Group Means and Treatment Effects by Measures of Financial Exposure

(a) Income Loss Due to Crisis

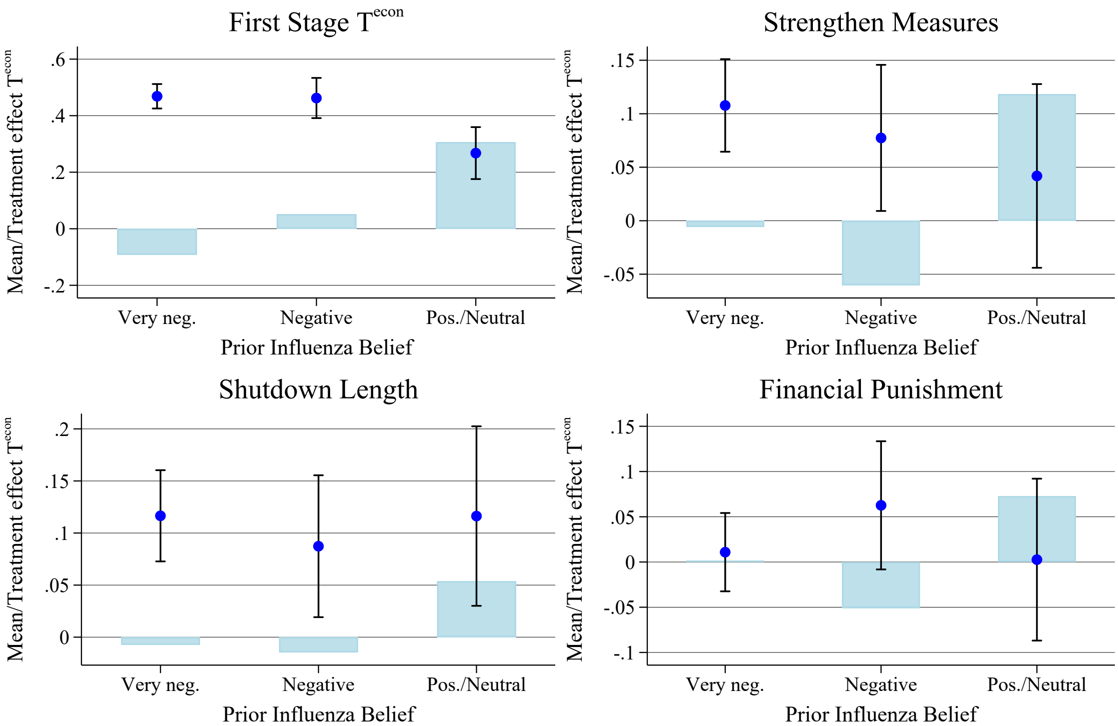


(b) Stock Holdings



Notes: All outcomes are standardized based on the economic cost control group. The sample is identical to that in main results table (Table 2). For the grey (blue) bars, the sample is, in addition, restricted to respondents in the low mortality condition (economic cost control group). Bars show sample means, without additional controls. The point estimates including 90 percent confidence intervals show treatment effects for the economic cost treatment in blue and for the high mortality compared to the low mortality condition in grey. For all causal regressions we control for gender, census region, age group, rural residence, log household income in 2019, educational attainment, political orientation, labor market status in January 2020 and prior beliefs about the economic impact of shutdown measures in 1918. We also control for the treatment for which we are not explicitly reporting effects.

Figure E.7: Heterogeneity by Prior Beliefs about the Economic Impact of a Lockdown



Notes: Outcomes are standardized based on the economic cost control group. All subfigures are based on the full sample, including respondents whose prior beliefs about the unemployment impact of the 1918 Influenza shutdown measures are more optimistic than the treatment signal. Respondents are divided into subgroups based on their beliefs about the unemployment effect of a longer shutdown (City B compared to City A) during the 1918 Influenza. "Pos./Neutral" refers to prior beliefs corresponding to a positive or neutral effect of shutdown measures in 1918 (unemp. in City B below 8%), "Negative" refers to prior beliefs between 8 and 14 percent, i.e. a perceived negative impact of lockdowns in 1918, corresponding up to double the unemployment level in City B as compared to City A. "Very neg." denotes priors amounting to more than double the expected unemployment rate in City B compared to City A (above 14%). Results are qualitatively similar with a median or mean cutoff for high and low priors. Bars depict the baseline mean of each outcome in the economic cost control group. Point estimates and a 90% confidence interval for each outcome stem from separate regressions by subgroup and show the economic cost treatment effect controlling for gender, Census region, age group, rural zip code, log household income in 2019, educational attainment, political orientation, labor market status in January 2020 and mortality treatment group status.

F Additional Tables

Table F.1: Sample Characteristics Compared to US Population

	Mean: Representative Sample	Mean: U.S. Adult Population
Northeast	0.18	0.17
Midwest	0.21	0.21
South	0.38	0.38
West	0.23	0.24
Age 18-24	0.12	0.12
Age 25-34	0.17	0.18
Age 35-44	0.19	0.16
Age 45-54	0.16	0.16
Age 55-64	0.18	0.18
Age 65+	0.18	0.19
Female	0.52	0.51
Male	0.48	0.49
Annual hh inc 2019 > $50,000	0.62	0.62
Annual hh inc 2019 <= $50,000	0.38	0.38
Employed in Jan 2020	0.61	0.71
Not employed in Jan 2020	0.39	0.29
4-year college degree+	0.45	0.23
Democrat	0.36	0.30
Republican	0.33	0.30
Independent	0.26	0.36

Notes: Sample size for the left-hand column: N = 8,861 (full sample). The right-hand column is based on the adult US population in the ACS 2018 except for political orientation which is based on Gallup Party & Affiliation Issues (2020).

Table F.2: Sample Characteristics in Treatment and Control Groups

	Full Sample	Cost Treatment	Cost Control	High Mortality Scenarios	Low Mortality Scenarios	p-value (2) = (3)	p-value (4) = (5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	0.52	0.52	0.52	0.52	0.51	0.884	0.736
Northeast	0.18	0.17	0.18	0.18	0.17	0.630	0.514
Midwest	0.21	0.20	0.22	0.20	0.22	0.121	0.168
South	0.38	0.39	0.37	0.38	0.38	0.054	0.547
West	0.23	0.23	0.23	0.23	0.23	0.778	0.963
Age 18-24	0.12	0.12	0.12	0.12	0.12	0.615	0.870
Age 25-34	0.17	0.17	0.17	0.18	0.17	0.987	0.258
Age 35-44	0.19	0.19	0.19	0.18	0.19	0.751	0.249
Age 45-54	0.16	0.16	0.17	0.16	0.16	0.145	0.976
Age 55-65	0.17	0.18	0.17	0.18	0.17	0.223	0.647
Age 65+	0.18	0.18	0.18	0.18	0.18	0.757	0.774
Democrat	0.36	0.36	0.37	0.36	0.36	0.617	0.793
Republican	0.33	0.33	0.33	0.33	0.34	0.660	0.447
Independent	0.26	0.27	0.26	0.27	0.26	0.540	0.172
Other pol. ident.	0.04	0.04	0.04	0.04	0.04	0.237	0.561
Log HH income	10.78	10.79	10.77	10.75	10.82	0.600	0.049
Bachelor degree +	0.45	0.44	0.45	0.44	0.45	0.302	0.656
Employee	0.54	0.53	0.55	0.54	0.54	0.250	0.840
Self-employed	0.07	0.07	0.06	0.06	0.07	0.149	0.017
Unemployed	0.05	0.05	0.05	0.06	0.05	0.895	0.118
Not in labor force	0.30	0.30	0.29	0.30	0.29	0.883	0.791
Observations	8,861	4,386	4,475	4,418	4,443		

Notes: Columns 1 to 5 show sample means across subgroups. Column 6 shows p-values from t-tests comparing the mean of each variable between subjects who received and who did not receive the economic cost treatment. Column 7 shows p-values to test for sample balance between the high and the low mortality condition. The p-value of a joint F-test when regressing the economic cost treatment dummy on the full set of covariates is 0.75. For the high mortality dummy the same exercise yields a p-value of 0.45.

Table F.3: Effect of Treatments on Beliefs Related to Covid-19

	Belief about infectiousness (z)	Belief about mortality(z)	Perceived risk of resurgence (z)	Belief about NPI effectiveness (z)
	(1)	(2)	(3)	(4)
Cost Treatment	-0.014	-0.006	0.001	0.029
	(0.022)	(0.021)	(0.022)	(0.021)
Mortality Treatment	-0.008	0.025	-0.034	-0.028
	(0.022)	(0.021)	(0.022)	(0.021)
Observations	8,309	8,309	8,206	8,225

Notes: Sample identical to that in main results table (Table 2). "Cost Treatment" is a dummy that takes value one for those exposed to the economic cost treatment. "High mortality" is a dummy that takes value one for those exposed to the high mortality scenarios when choosing their preferred length of shutdown. Outcomes in columns 1-4 are standardized based on the control group. In addition to the reported coefficients, all regressions include controls for age group, gender, education group, log household income, census region, employment status in January 2020 (employee, self-employed, unemployed, out of labor force), political orientation (Democrat, Republican, Independent, other) and prior beliefs about the economic impact of shutdown measures in 1918. Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10 percent, 5 percent and 1 percent level, respectively.

Table F.4: Economic Cost Treatment Effects

	Extension by two weeks better	Extension by one month better	Extension by three months better	Extension by six months better	Index (1) - (4)
	(1)	(2)	(3)	(4)	(5)
Cost Treatment	0.268***	0.417***	0.561***	0.492***	0.377***
	(0.022)	(0.022)	(0.023)	(0.023)	(0.018)
Observations	8,309	8,309	8,309	8,309	8,309

Notes: Sample identical to that in main results table (Table 2). "Cost Treatment" is a dummy that takes value one for those exposed to the economic cost treatment. "High mortality" is a dummy that takes value one for those exposed to the high mortality scenarios when choosing their preferred length of shutdown. Outcomes in columns 1-4 are standardized based on the control group. They correspond to the perceived cost of a lockdown extension of different lengths on the US economy in one year from the survey date. The outcome in column 5 is a summary index over the outcomes in columns 1-4, using the weighing method described in Anderson (2008). In addition to the reported coefficients, all regressions include controls for age group, gender, education group, log household income, census region, employment status in January 2020 (employee, self-employed, unemployed, out of labor force), political orientation (Democrat, Republican, Independent, other) and prior beliefs about the economic impact of shutdown measures in 1918. Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10 percent, 5 percent and 1 percent level, respectively.

Table F.5: Extrapolation from the Economic Cost Treatment to Personal Situation

	Perceived effect of shutdown extension on		
	(1)	(2)	(3)
	Lab. inc	Total hh inc.	Wealth
Cost Treatment	0.095***	0.081***	0.099***
	(0.023)	(0.022)	(0.022)
Observations	7,487	8,293	8,292

Notes: Sample identical to that in main results table (Table 2). Differing numbers of observations across columns are due to a survey coding error leading to missing observations for the respective outcome of interest. "Cost Treatment" is a dummy that takes value one for those exposed to the economic cost treatment. All outcomes are standardized based on the control group. In addition to the reported coefficients, all regressions include controls for age group, gender, education group, log household income, census region, employment status in January 2020 (employee, self-employed, unemployed, out of labor force), political orientation (Democrat, Republican, Independent, other) and prior beliefs about the economic impact of shutdown measures in 1918. Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10 percent, 5 percent and 1 percent level, respectively.

Table F.6: First-Stage and Reduced Form Treatment Effects (Full Sample)

	- Perceived Costs (z-scored)	Perceived mortality (z-scored)	
	(1)	(2)	
	Panel A: First Stage		
Cost Treatment	0.436***	0.035*	
	(0.021)	(0.021)	
Mortality Treatment	-0.016	0.410***	
	(0.021)	(0.021)	
	Preferred length of shutdown (months)	Demand for stricter regulation (z-scored)	Demand for stricter punishment (z-scored)
	(1)	(2)	(3)
	Panel B: Reduced Form		
Cost Treatment	0.195***	0.090***	0.019
	(0.037)	(0.020)	(0.021)
Mortality Treatment	0.146***		
	(0.037)		
Observations	8,861	8,861	8,857

Notes: This table replicates first stage and reduced form results from Table 2 using the full sample (including those with positive economic priors regarding the impact of the shutdown measures in 1918 on unemployment). Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10 percent, 5 percent and 1 percent level, respectively. All other notes from Table 2 apply.

Table F.7: No Role for Experimenter Demand Effects

	Left-wing bias	No political bias	Right-wing bias
	(1)	(2)	(3)
Cost Treatment	0.004	0.009	-0.014**
	(0.007)	(0.009)	(0.006)
Mortality Treatment	0.005	-0.007	-0.003
	(0.007)	(0.009)	(0.006)
Sample mean	0.11	0.81	0.08
Observations	8,309	8,309	8,309

Notes: Sample identical to that in main results table (Table 2). The outcome in column 1 (column 3) is a dummy that takes value one if the respondent perceives the survey to have a left-wing bias (right-wing bias). In column 2 the outcome is a dummy for no perceived political bias. In addition to the reported coefficients, all regressions include controls for age group, gender, education group, log household income, census region, employment status in January 2020 (employee, self-employed, unemployed, out of labor force), political orientation (Democrat, Republican, Independent, other) and prior beliefs about the economic impact of shutdown measures in 1918. Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10 percent, 5 percent and 1 percent level, respectively.