# Coronavirus Perceptions And Economic Anxiety

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**Abstract**

**We provide the first analysis of how the global spread of the novel coronavirus affects contemporaneous economic sentiment. First, we collect a global dataset on internet searches indicative of economic anxieties. We find that the arrival of coronavirus in a country led to a substantial increase in such internet searches of up to 58 percent. Second, leveraging two US representative survey experiments conducted in early and mid-March 2020, we document a rapid surge in economic anxieties after the arrival of the coronavirus in the US. Third, to understand how information about the coronavirus affects these anxieties, we measure perceptions about the coronavirus. We find substantial heterogeneity in participants' beliefs about the mortality from and contagiousness of the virus. Fourth, experimentally providing participants with information about mortality and contagiousness causally affects participants' worries regarding the aggregate economy and their personal economic situation. Finally, we document that participants' subjective mental models understate the non-linear nature of disease spread, and that these mental models shape the extent of economic worries. These results underscore the importance of public education about the virus for successful containment as well as the need for timely measures that decrease economic hardship and anxiety during a major global pandemic.**

The spread of the novel coronavirus has led to a substantial disruption of global economic activity through a reduction in international production, travel, and trade. This supply shock has led many economists to express concerns about an upcoming global recession. Global leaders have rightly prioritized efforts to prevent widespread contagion in order to reduce the burden on countries' health care systems and minimize the loss of human lives.

However, in order to alleviate the medium- to long-term economic fallout from the current crisis, a timely understanding of the effects of the pandemic on the consumer demand side of the economy is key to initiate the appropriate tools and stabilize the economy. In this regard, a major worry is that a rise in consumers' income and employment risk weakens their economic stability and economic sentiment. Canonical theories of economic demand and the psychology of markets [1–6] highlight the detrimental effect of dampened economic sentiment in depressing aggregate demand and worsening economic downturns. To shed light on this issue during the current global crisis, we draw from observational data on internet searches indicative of economic anxieties and two US representative survey experiments. We assess the impact of the global spread of the coronavirus on economic anxiety, investigate the role of information in driving these anxieties and document underlying psychological mechanisms.

First, we collected global data on the intensity of internet searches that are indicative of economic anxiety from Google Trends. As shown by prior studies, such internet searches serve as an accurate predictor of future economic demand and activity as they capture the sentiment on the consumer side of the economy [7,8]. We validated this claim by relating economic output as well as individual components of aggregate demand to the pre-quarter search intensity for the Google search topic 'Recession' in country-level regressions controlling for country and year-by-quarter fixed effects. Using quarterly data from 2015 to 2019 we find that real GDP growth and real growth in consumption and imports are significantly lower in the quarters following increases in Recession topic searches (Fig 1A and Supplementary Table 1). A 100% increase in search intensity for recession-related topics is associated with a 1.6 %-point lower consumption growth rate and a 1 %-point lower GDP growth rate in the following quarter. Hence, these search intensities are a leading indicator of subsequent aggregate demand contractions and economic downturn.

Using this data, we investigated the impact of the initial global spreading of the coronavirus until February 29 on search activity for the Google search topics 'Recession' and 'Stock Market Crash'. We also collected data on the search topics 'Survivalism' and 'Conspiracy Theory' which captures panic reactions among the public. Time series for global search intensity for the period between 02-05-2020 and 02-29-2020 are shown in Fig 1B. By exploiting the precise timing of the arrival of coronavirus in a given country, we investigated the impact on internet searches in these countries. Econometrically, we performed a difference-in-differences analysis of search intensity before and after the arrival of the novel coronavirus controlling for country and date fixed effects and clustering standard errors at the country level (for further information and regression evidence see Supplementary Material). Intuitively, this analysis captures the impact of the local arrival of the coronavirus conditional on the global trend.

The data indicate that the arrival of coronavirus in a country substantially increased search intensity for topics related to economic recessions by 17.8 ($p = 0.016$) percent relative to the pre-coronavirus search patterns (Fig. 1C and Supplementary Table 2). Similarly, search intensity for topics related to stock market crash rose by 58 ($p < 0.001$) percent. In addition, an increase of 20.4 ($p = 0.006$) and 44.7 ($p < 0.001$) percent was observed for topics related to survivalism and conspiracy theories respectively. Complementarily, the response of search intensity to the first human-to-human transmission of the coronavirus in a country corroborates our results (Fig. 1D and Supplementary Table 2). In sum, these results indicate that the arrival of the coronavirus in a country substantially increased economic anxiety and weakened economic sentiment even after controlling for the global trend.[1]

Second, to directly measure economic anxiety after arrival of the coronavirus, investigate the role of information and study the underlying psychological mechanisms, we conducted two surveys representative of the US population on March 5 ($n = 915$), when there were 176 confirmed cases of coronavirus reported in the US, and March 16 ($n = 1,006$), when the case numbers had increased to 4576 confirmed cases [9].

Our survey evidence highlights that economic anxieties and perceived severity of the crisis increased substantially after the coronavirus had arrived (Fig 2 and Supplementary

[1]In a placebo test, we found no impact of the arrival of the coronavirus on a series of unrelated Google searches (Supplementary Table 3).

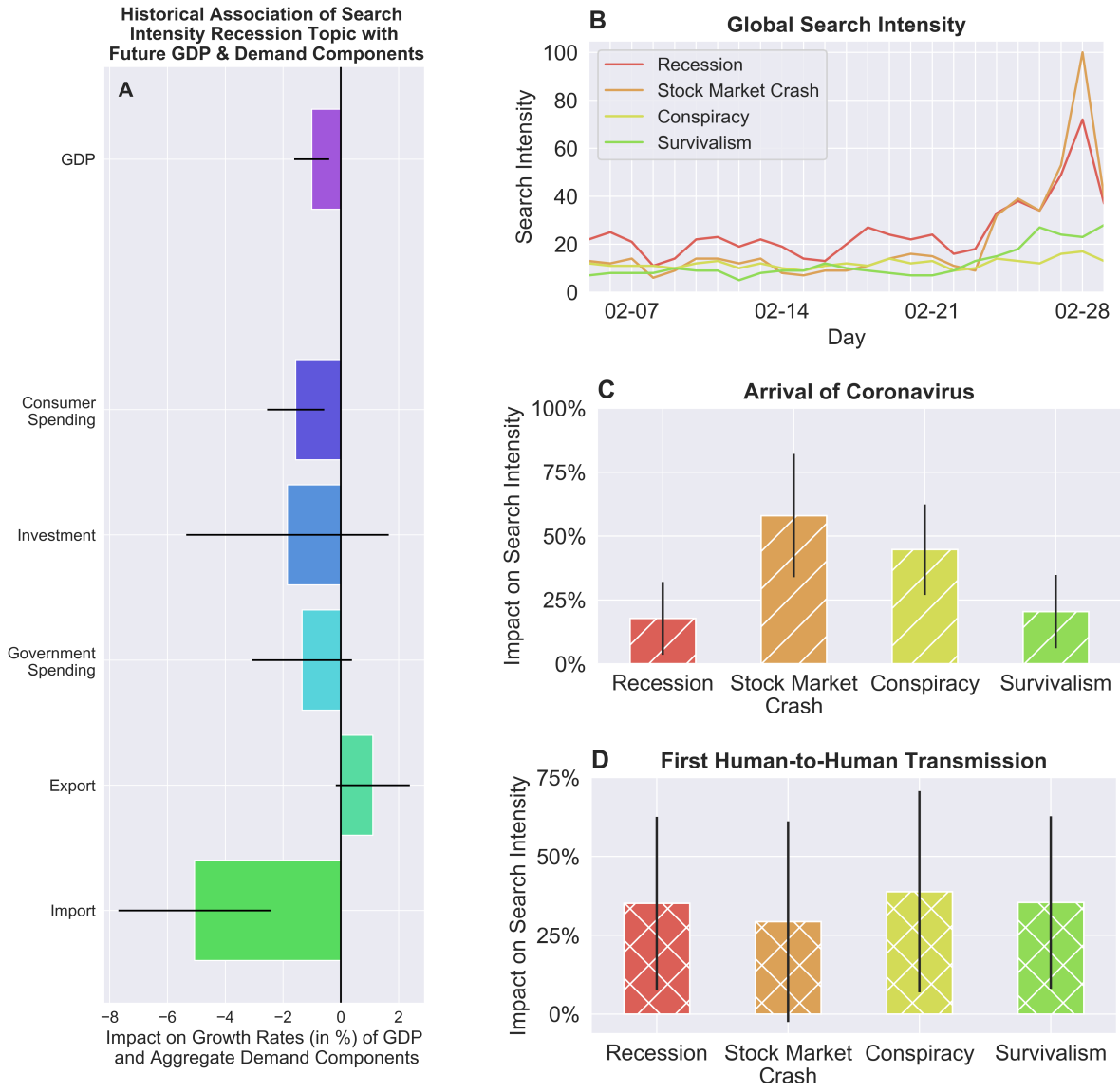


**Fig. 1 Impact of Coronavirus on Global Internet Searches. (A)** Historical association of lagged Google Search Intensity for 'Recession' topic and next-quarter real GDP and year-on-year growth of aggregate demand components. Coefficients indicate the change in growth rates (in %) due to a 100% increase in search intensity in the previous quarter and are obtained from difference-in-differences regressions conditional on country and quarter fixed effects. **(B)** Time series of Google topics 'Recession', 'Stock Market Crash', 'Conspiracy', and 'Survivalism' from 02-05-2020 to 02-29-2020. **(C)** and **(D)** Impact of arrival of coronavirus and first human-to-human transmission on Google topics 'Recession', 'Stock Market Crash', 'Conspiracy', and 'Survivalism' obtained from difference-in-differences regressions conditional on country and day fixed effects. The dependent variable measures Google search intensity by topic indicated in column header normalized by the average search intensity in a country prior to the coronavirus arrival. The Google searches are collected for the time span between January 1st and February 29th 2020. In all panels, error bands indicate 95% confidence intervals obtained from standard errors clustered at the country level.

Table 4). While on March 5, 55% of our respondents agreed that the US would be severely affected by the coronavirus, 78% of respondents agreed on March 16 ($p < 0.001$). Moreover, the fraction who indicated that they strongly agreed with this statement increased from 16% to 43% ($p < 0.001$).

Furthermore, economic worries due to the coronavirus also increased strongly. While on March 5 68% of respondents were worried or very worried about the effects of the coronavirus on the aggregate US economy, on March 16 the fraction of respondents who expressed this worry increased to 88% ($p < 0.001$) (Fig 2C). Similarly, the fraction of respondents who were worried about the impact on their personal economic situation increased from 47% to 74% ($p < 0.001$) (Fig 2D). Fig 2 shows that these increases were particularly driven by individuals who indicated that they are 'very worried' regarding the aggregate economy and their personal economic situation. In sum, the data indicates that over 11 days people's perception of the severity of the crisis strongly worsened, and moreover their economic worries substantially increased. Complementarily, within the same time frame, aggregate Google search intensity for the 'Recession' topic increased by a factor of 10 in the US and by a factor of 5.5 at the global level (Supplementary Figs 1A-B).[2]

Third, to understand the role of information and perceptions about the coronavirus and to shed light on the psychological mechanisms, we embedded an experiment in the first wave of our survey. Such experiments are widely used to study the formation of economic expectations and sentiment both among firms and consumers [10–13].

In the experiment, we measured participants' beliefs about two important characteristics of the coronavirus: mortality and contagiousness (R0) (for procedures and elicitation see Supplementary Material). There was substantial heterogeneity in participants' beliefs about these statistics (Fig. 3A and 3B). On average, participants' beliefs about both the mortality from the coronavirus as well as its contagiousness were higher relative to official and scientific estimates. The median participant estimated a mortality of 5% (mean of 14%) relative to an estimate of 3.4% provided by the WHO.[3] Similarly, the median participant estimated a contagiousness (R0) of 10 (mean of 43) relative to scientific estimates at the time of the survey in the range of R0 $\approx$ 2 [14, 15]. Consistent

[2]The evolution for search patterns for the topics 'Stock Market Crash', 'Conspiracy Theory', and 'Survivalism' was qualitatively similar (Supplementary Figs 1C-H).

[3]We note that previously the WHO estimated a mortality rate of 2%.

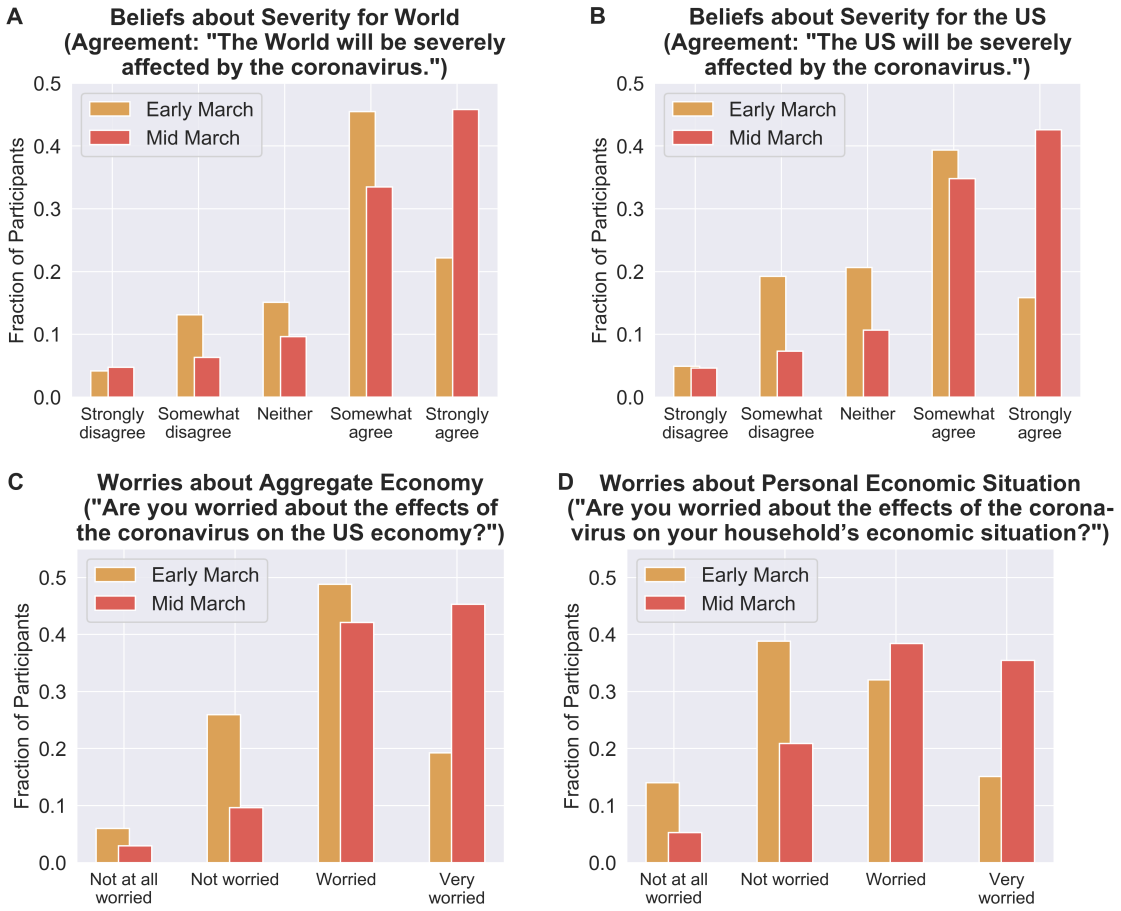


**Fig. 2 Dynamic Evolution of Beliefs about Severity of Crisis and Economic Worries between early and mid March. (A)** Beliefs about severity of crisis for the world. **(B)** Beliefs about severity of crisis for the US. **(C)** Worries about the US economy. **(D)** Worries about the personal economic situation.

with these beliefs, 68% of our respondents worried about the effects of the coronavirus on the US economy. Moreover, respondents who held beliefs about the mortality of the new coronavirus that were higher relative to official estimates displayed 0.19 ($p < 0.001$) standard deviations higher worries about the impact of the coronavirus on the US economy and 0.48 ($p < 0.001$) standard deviations higher worries about the impact on their personal economic situation (Fig 3C and Supplementary Table 5). Similarly, respondents who held beliefs about coronavirus contagiousness that were higher relative to scientific estimates showed 0.45 ($p < 0.001$) standard deviations higher worries about the impact of the coronavirus on the US economy and 0.41 ($p < 0.001$) standard deviations higher worries about the impact on their personal economic situation .

To understand whether beliefs about the mortality and contagiousness causally af-

fect economic sentiment, we administered two information treatments. First, we focus on the role of beliefs about mortality. In the experiment, participants were either truthfully informed, based on estimates at the time of the survey, that the death rate from the coronavirus is "20 times higher than for the flu" (high mortality treatment) or "5 times lower than for SARS" (low mortality treatment). The wording was chosen to mirror information provision as it is commonly communicated in the media.[4] We then studied how the information treatment affected participants' expectations about the severity of the effects of the coronavirus in general, and participants' worries about the effects on the aggregate economy and their personal economic situation.

Relative to the low mortality treatment, respondents in the high mortality treatment displayed 0.28 ($p < 0.001$) standard deviations higher belief about the crisis' severity for the world (Fig. 3D and Supplementary Table 6). The difference between treatments in terms of participants' beliefs about the crisis' severity for the US was found to be 0.23 ($p < 0.001$) standard deviations. Next, we assessed the impact on economic worries (Fig 3E and Supplementary Table 7). Respondents in the high mortality treatment increased their worries about the effects of the coronavirus on the US economy by 0.16 ($p = 0.018$) standard deviation and about their personal economic circumstances by 0.16 ($p = 0.018$) of a standard deviation. These findings highlight that information provision and the framing of information significantly affect people's economic sentiment during the coronavirus crisis.

To complement this analysis, we also studied the role of information about the contagiousness of the new coronavirus on economic sentiment. Specifically, based on scientific estimates [14, 15], a random subset of respondents was informed that "approximately 2 non-infected people will catch the coronavirus from a person who has the coronavirus" ("contagiousness information treatment"), while the remaining respondents received no information ("no information group"). Given that the majority of participants held higher beliefs relative to scientific estimates, the information treatment should decrease the perceived contagiousness of the virus.

To study the effect of this information on economic sentiment, we re-elicited participants' worries about the effects on the aggregate economy and their personal economic

[4]For example, the New York Times and The Telegraph compared COVID-19 to the flu and SARS (`https://www.nytimes.com/2020/02/29/health/coronavirus-flu.html`; `https://www.telegraph.co.uk/news/2020/03/06/coronavirus-vs-sars-flu-mers-death-toll/`, last accessed March $6^{th}$ 2020).

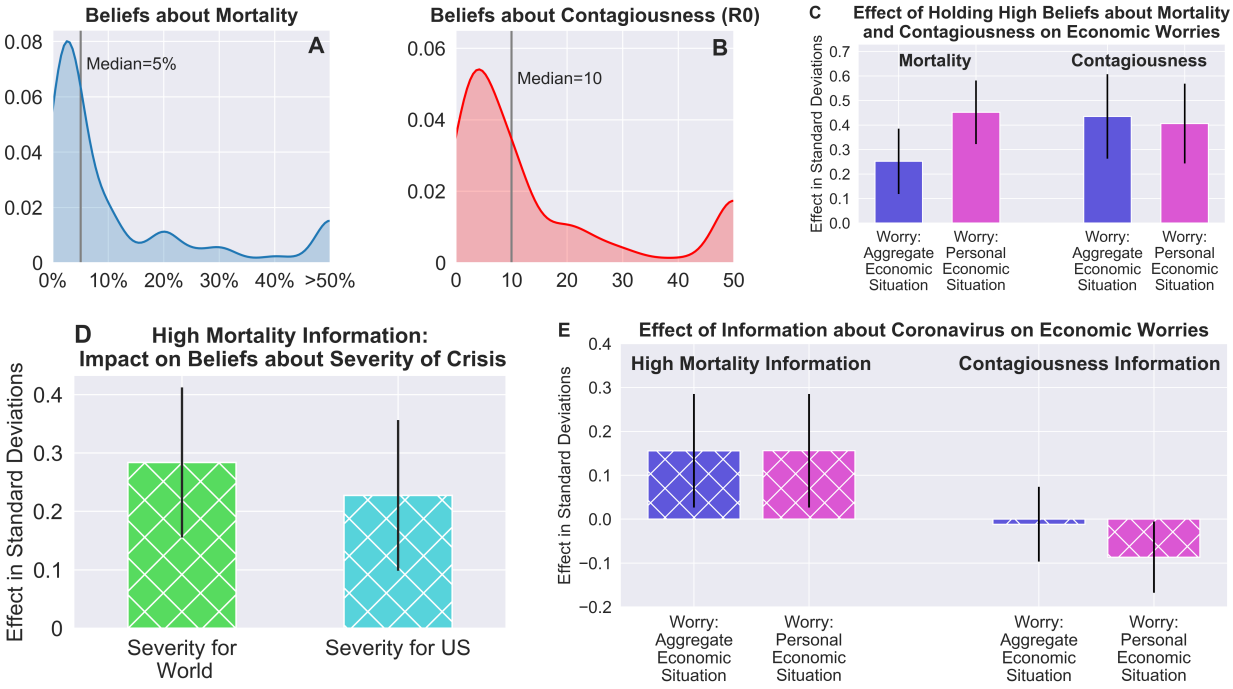


**Fig. 3 Beliefs About the Coronavirus and Effect of Information on Economic Worries. (A)** and **(B)** Distribution of beliefs about mortality and contagiousness (R0) of coronavirus. **(C)** Correlational effect of overestimating mortality and contagiousness relative to official numbers on worries about the aggregate US economy and personal economic situation. **(D)** Effect of information suggesting high mortality relative to low mortality on beliefs about severity of crisis in the world and US. **(E)** Effect of information suggesting high mortality relative to low mortality as well as information about contagiousness on worries about the aggregate US economy and personal economic situation. In all panels, error bars indicate 95% confidence intervals.

situation. Respondents in the contagiousness information treatment showed 0.09 standard deviations lower worries about the effects of the coronavirus on their own personal economic situation ($p = 0.037$) and a small decrease in their worries about the aggregate US economy (0.01 sd, $p = 0.790$) (Fig 3E and Supplementary Table 7). In sum, the experimental evidence indicates that perceptions about the mortality and the contagiousness of coronavirus are important causal mechanisms that shape people's expectations about the aggregate economy and their personal economic situation.

Finally, to study people's understanding of the evolution of pandemics, in the second wave of the survey we investigated individuals' mental models about the spread of diseases and their role in shaping individuals' economic worries. As humans are organized in networks, disease spread typically follows a non-linear (e.g. logistic or quasi-exponential) function, at least in the beginning of an outbreak [16, 17]. Hence, a small number of cases can rapidly evolve into a widespread pandemic if the contagiousness

of a disease is high. Such a trajectory can be vastly underestimated if individuals do not take into account the non-linear nature of disease spread but rather adopt a mental model of more moderate, e.g. linear, growth.

In the second wave of the survey, we asked participants to predict the spread of a fictitious disease over several days under simplifying assumptions. Specifically, participants were instructed to assume that on day 1, one person has the fictitious disease. Furthermore, they were told to assume that each day a newly infected person infects two healthy people and then stops being contagious. Participants were further told that on day 2, 3 people will be infected by the disease as the person who had the disease on day 1 spread it to two other people on day 2. Participants were then asked to predict the count of total people infected with the fictitious disease on day 5, 10, and 20.

Individuals were found to highly underestimate the spread of the fictitious disease. In contrast to correct prediction values of 31 on day 5, 1023 on day 10, and 1,048,575 on day 20, the median participant estimated a case number of 16 on day 5, 30 on day 10, and 60 on day 20 (Fig 4A). Inconsistent with non-linear growth, the predictions of the median participant could be well approximated by a linear mental model (as exemplified by the green line in Fig 4B for a linear growth rate of 2 per day). A linear mental model, however, was not uniformly present for the entire population. In particular, the 90th percentile prediction in our sample very well captured the correct quasi-exponential growth (Fig 4B).

To understand how current economic anxiety is associated with individuals' mental model about the spread of diseases, we again elicited participants' beliefs about the severity of the impact of the coronavirus on the world and the US as well as their worries about the aggregate economy and their personal economic situation. We then studied the association of these outcomes with participants' predicted number of people infected with the fictitious disease on day 5, 10, and 20 (Fig 4C and Supplementary Table 8). To address outliers in people's estimate of the spread of diseases, we used a z-scored transformation of the logarithm of the predicted number of infected people.

The data shows a large and statistically significant positive association between people's estimate of the number of infected individuals and participants' (i) beliefs about the coronavirus crisis' severity for the world ($p < 0.001$) and (ii) their beliefs about the coronavirus crisis' severity for the US ($p < 0.001$). Moreover, the data indicates a large

and significant positive association with participants' worries about the aggregate US economy ($p = 0.028$).

These results indicate that individuals who exhibit a more accurate mental model of non-linear growth in disease spread exhibit higher worries regarding the coronavirus pandemic, potentially as they foresee a greater potential for a widespread contagion of the global population. Interestingly, there was no significant correlation of participants' worries about their personal economic situation with the predicted number of infected people. This finding squares with previous evidence that individuals do not completely extrapolate their individual risk from aggregate societal risk as it has been documented for instance in the realm of climate change [18].

Combining data from internet searches and two online experiments, the results presented here show that the global spread of the coronavirus has spurred a substantial weakening of economic sentiment and an increase in economic anxiety. The evidence has two important implications for policy making. First, heterogeneity in beliefs about key characteristics of the novel coronavirus is large. Providing information about the coronavirus strongly shapes participants' perception of the crisis and their economic worries. Moreover, people underestimate the non-linear growth of diseases at their initial stages by several orders of magnitudes. These results highlight that public education surrounding the coronavirus is important to ensure that the public has an adequate understanding of the threat of the coronavirus and the nature of the spread of contagious diseases more generally. Ensuring that characteristics of the coronavirus are well known and that the nature of diseases spread is understood will be necessary to help contain the virus and protect the most vulnerable populations which is the first-order priority in this current global crisis.

Second, both the observational as well as experimental evidence indicates a rapid increase in economic anxieties. In particular, in two samples representative of the US population, the fraction of participants who indicated that they were very worried about the effect of the coronavirus on the aggregate economy increased from 19% to 45% over an 11-day period. Moreover, the fraction of participants reporting to be very worried about the effect on their personal economic situation increased from 15% to 36%. In light of the study of economic sentiment [1, 19, 20], these numbers are alarming with regards to their impact on the consumer side and general state of the economy. Common tools

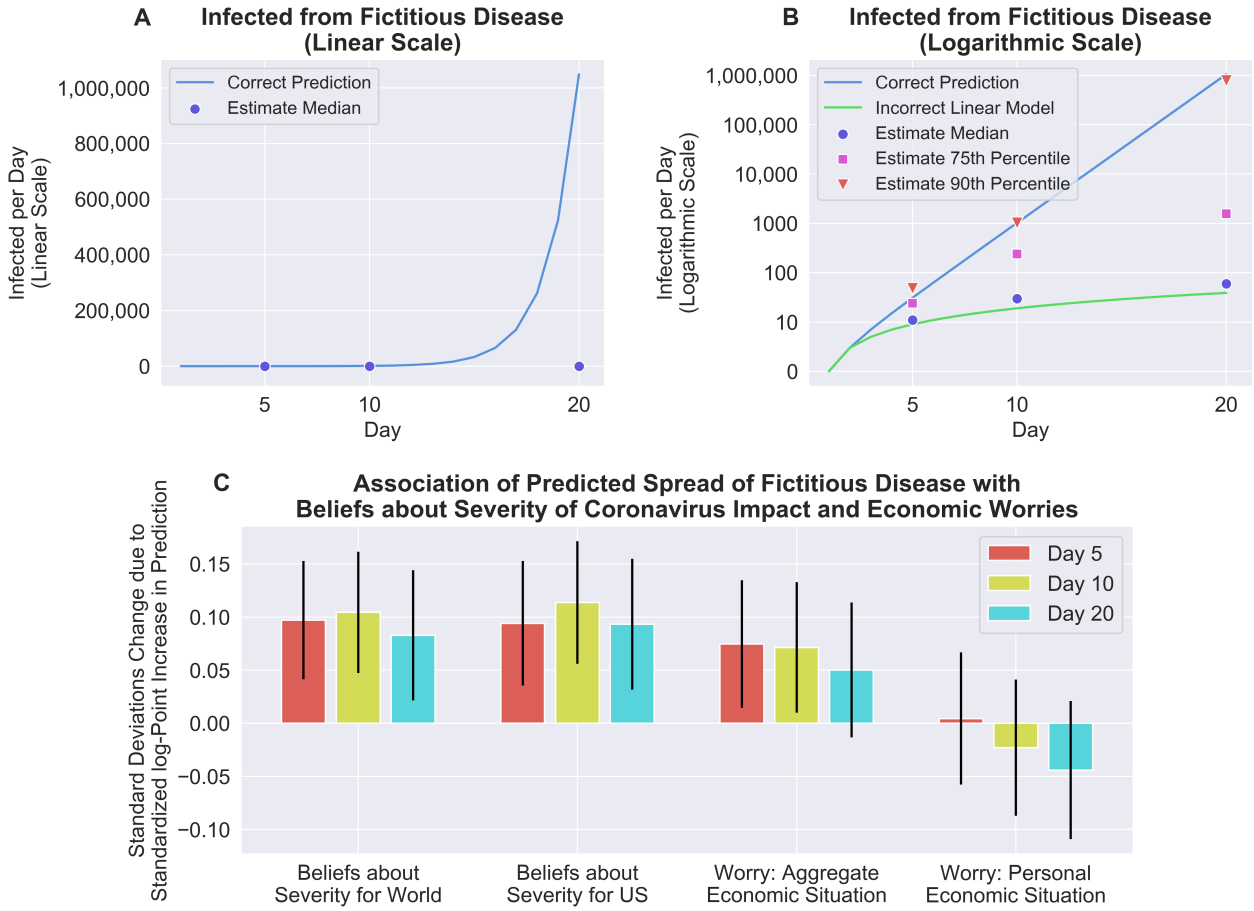


**Fig. 4 Mental Models about the Spread of Diseases and Economic Worries. (A)** Participants' median belief about the spread of a fictitious disease on a linear scale. **(B)** Participants' median, 75th percentile, and 90th percentile belief about the spread of a fictitious disease on a logarithmic scale. Participants were instructed to predict the number of cases of a fictitious disease on day 5, 10, and 20. Participants were informed that on day 1, one person has the disease and that each day a newly infected person infects two healthy people and then stops being contagious. In both panels, the blue line indicates the correct prediction, the green line an incorrect linear model with a growth rate of 2 per day. **(C)** Association of predicted spread of the fictitious disease with participants' beliefs about the severity of coronavirus impact on the world and the US as well as worries about the aggregate US economy and personal economic situation. In all panels, error bars indicate 95% confidence intervals.

to address the demand side in the medium-run involve counter-cyclical policies such as temporary tax cuts and, importantly, governmental spending which exhibits the largest multipliers in phases of economic downturn [21]. A more direct and short-term tool to prevent immediate economic instability involves cash transfers as currently initiated by several governments. Such cash transfers help economically vulnerable populations to cover expenses, alleviate economic hardship in the short term, and stabilize economic demand. Moreover, such cash transfers have been shown to reduce psychological distress

and anxieties [22,23].

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**Ethical Approval and Debriefing** Ethical approval was received by the Blavatnik School of Government's Departmental Research Ethics Committee (BSG_C1A-20-16) of the University of Oxford and the Humanities and Social Sciences Research Ethics Committee at the University of Warwick (protocol HSSREC 76/19-20). At the very end of the experiment, we provided all of our respondents with information about the coronavirus alongside with best practice recommendations from the WHO and informed them about the purpose of the study.

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# Supplementary Materials

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# Supplementary Methods

## Observational evidence

**Google trends data** We leveraged data from Google trends. This data has been used in the past to detect influenza epidemics [24] and to nowcast economic activity [8]. The underlying micro data is not publicly available. Yet, the Google trends platform provides an interface to query the search data. The platform provides for each query a measure of the search intensity scaled between 0 to 100 with 100 representing the highest proportion among the queried terms within the selected region and time frame. Up to five terms can be queried simultaneously. We collected data from January first up to February 29th and focus the analysis on the data from 2020.[5]

Google trends queries can be constructed based on individual search terms or topics. Topics combine a broad set of related search terms. We extracted Google search activity for four main topics of interest: Stock market crash, Recession, Conspiracy theory, Survivalism and a fifth generic topic to scale the time series. The topic identifiers are common across countries but account for the specific local languages. The inclusion of a generic topic is commonly used to provide a numeraire.

Empirically, we studied the evolution of search intensity by topic relative to the arrival of the first confirmed Corona case in a country. The underlying Corona case data is from [9]. Econometrically, the empirical design involves a difference-in-differences regression that controls for country-specific level differences in search activity (country fixed effects) and common time effects (day fixed effects). We clustered standard errors at the country level.

[5] We also queried weekly data for the last 5 years to study the historic relationship between recession topic search intensity and actual economic contractions.

## Experimental evidence

**Ethical Approval and Debriefing** Ethical approval was received by the Blavatnik School of Government's Departmental Research Ethics Committee (BSG_C1A-20-16) of the University of Oxford and the Humanities and Social Sciences Research Ethics Committee at the University of Warwick (protocol HSSREC 76/19-20). At the very end of the experiments we provided all of our respondents with information about the coronavirus alongside with best practice recommendations from the WHO and informed them about the purpose of the study.

### Experiment 1

**Recruitment** On March 5 2020, we collected a sample representative of the US population in terms of income, region, gender, age, and education. We collaborated with an online panel provider (Luc.id) which is widely used in the social sciences.

**Elicitation of characteristics** Before the experimental part of the survey, participants' socio-economic characteristics and political attitudes were elicited. In terms of socio-economic characteristics, participants were asked to indicate their age, gender, highest educational attainment, and information on their residence. In terms of political attitudes, respondents were asked to indicate whether they identify as Republicans, Democrats, Independents or with another political affiliation. Moreover, we measured people's trust in the media, trust in the government and trust in science.

**Information about relative mortality** In the first part of the experiment, participants were, based on estimates at the time of the survey, either informed that the death rate of the coronavirus is *"20 times higher than for the flu"* (high mortality treatment) or *"5 times lower than for SARS"* (low mortality treatment). We then studied how the information treatment affected participants' beliefs about the effects of the coronavirus.
We elicited people's perceptions of how severely the world and the US will be affected by the coronavirus by asking *"To what extent do you agree with the following statements?"*, (i) *"The World will be severely affected by the coronavirus.* (ii) *"The US will be severely affected by the coronavirus."* Respondents were able to indicate their agreement to both statements separately on the following 5-point scale *"Strongly disagree, Somewhat disagree, Neither*

*agree nor disagree, Somewhat agree, Strongly agree"*.

Subsequently, we measured people's worries about the effects of the coronavirus on the US economy and their household's economic situation by eliciting the following two items: (i) *"Are you worried about the effects of the coronavirus on the US economy?"*, (ii) *"Are you worried about the effects of the coronavirus on your household's economic situation?"* Respondents were able to indicate their answers on the following 4-point scale *"Very worried, Worried, Not worried, Not at all worried"*.

**Information about contagion** In the second part of the experiment, we first elicited people's beliefs about the contagiousness of coronavirus using the following question: *"Think of a person who has the coronavirus. How many non-infected people do you think will catch the virus from this person?"*. Respondents were then randomly assigned to be in the "contagion information group" or the "control group". Based on scientific estimates [14, 15], respondents in the contagion information group were informed that *"approximately 2 non-infected people will catch the coronavirus from a person who has the coronavirus"*.

We then re-elicited people's worries about the effects of the coronavirus on the US economy and their household's economic situation as before.

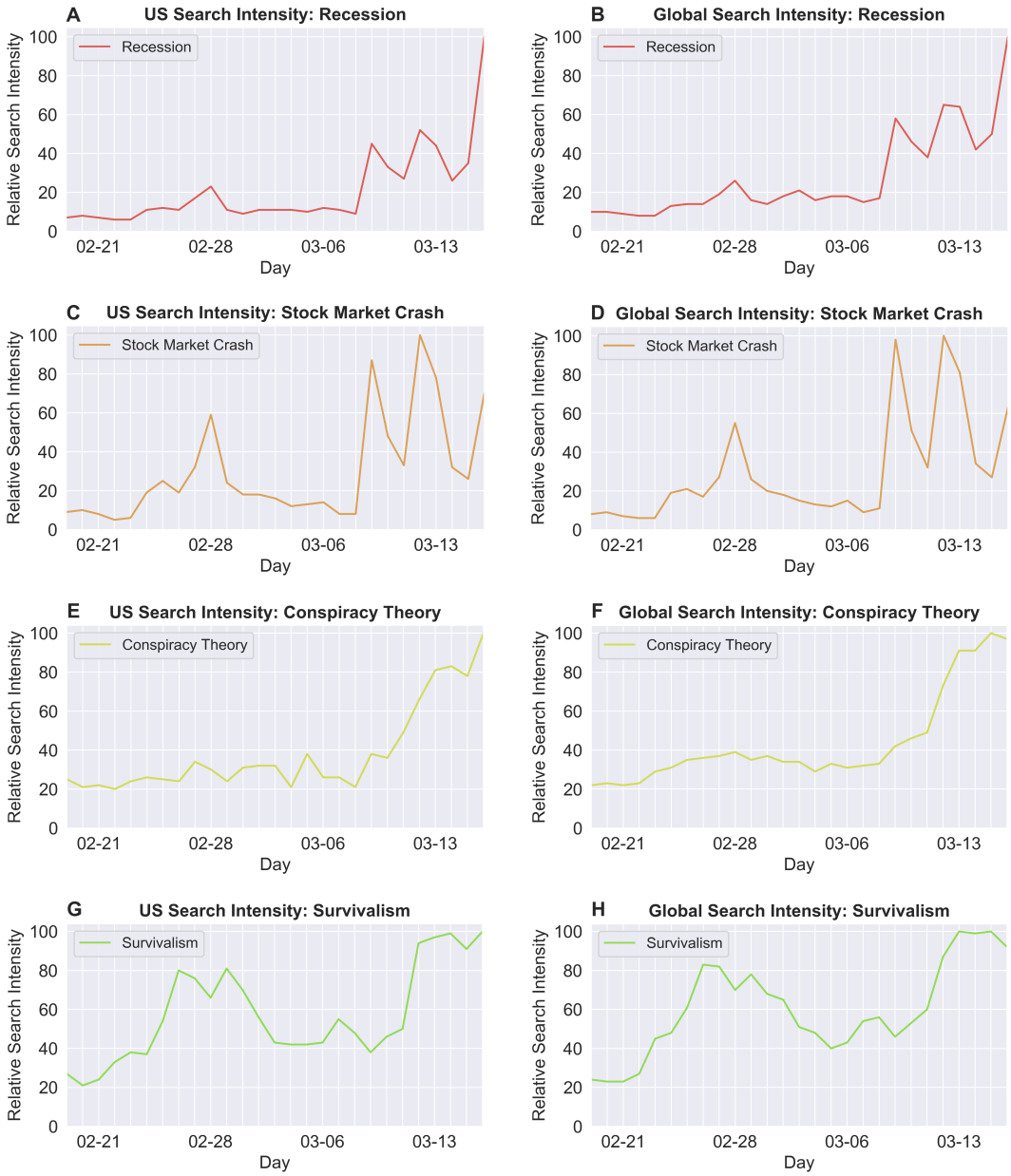
### Experiment 2

**Recruitment** On March 16 2020, we collected a sample representative of the US population in terms of income, region, gender, age, and education. We collaborated with an online panel provider (Luc.id) that is widely used in the social sciences.

**Measurement of mental models and economic anxieties** As in experiment 1, we first elicited a set of demographic characteristics. We then measured people's beliefs about the spread of a fictitious disease. Specifically, respondents were told the following simplifying instructions: *"Imagine the following: a person who just got the disease will infect two other healthy people on the next day and then stops being contagious. On day 1, one person has the disease. On day 2, 3 people are infected with the disease, as the person who had the disease on day 1 infected two additional people on day 2."* Participants were then asked to predict the total number of infected people on day 5, 10, and 20. Thereafter, we elicited

people's perceptions about how severely the world and the US will be affected by the coronavirus as in experiment 1. Finally, we measured people's worries about the effects of the coronavirus on the US economy and their household's economic situation as in experiment 1.

# Supplementary Figures




**Supplementary Fig. 1 Time Series Google Search Intensity for the United States and Worldwide from 02-19-2020 to 03-16-2020.** This Figure displays the most recent Google search data which has not yet been used in difference-in-differences estimates. **(A-B)** Recession topic. **(C-D)** Stock market crash topic. **(E-F)** Conspiracy theory topic. **(G-H)** Survivalism topic.

# Supplementary Tables

Table 1: Increases in 'Recession' topic Google searches are a leading indicator of subsequent aggregate demand contractions

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | | | Demand factors | | | | |
| | Real GDP | Industrial production | C | I | G | X | M |
| L.Recession topic Google searches | -1.009*** | -1.231* | -1.564*** | -1.847 | -1.345 | 1.109* | -5.063*** |
| | (0.311) | (0.661) | (0.506) | (1.798) | (0.888) | (0.657) | (1.352) |
| Countries | 70 | 72 | 58 | 58 | 58 | 58 | 58 |
| Observations | 1350 | 1218 | 1087 | 1087 | 1087 | 1087 | 1087 |
| Country FE | X | X | X | X | X | X | X |
| Year x Quarter FE | X | X | X | X | X | X | X |

*Notes:* Supplementary Table 1 displays the relationship between year-on-year growth rates in GDP, industrial production and demand components and recession topic Google searches. The results show that increases in Google search activity for recession-related topics are associated with lower growth rates in GDP, consumption spending and imports in the subsequent quarter. The level of analysis is country and quarter. Data was collected by the Economist Intelligence Unit from 2015 to 2019. The dependent variable in column (1) measures GDP growth. The dependent variable in column (2) measures growth of industrial production. Columns (3) to (6) measure different components of aggregate demand. Column (3) shows the association with aggregate consumption. Column (4) shows the association with investments. Column (5) shows the association with government spending. Column (6) shows the association with exports. Column (6) shows the association with imports. The independent variable measures Google search intensity for the topic "recession". All specifications include country and year-quarter fixed effects. Standard errors clustered at the country level are presented in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 2: The impact of coronavirus arrival on Google searches related to economic anxiety

| | Impact on Goolge search trends related to | | | |
|---|---|---|---|---|
| | (1) Recession | (2) Stock Market Crash | (3) Conspiracy Theory | (4) Survivalism |
| **Panel A: Any Covid-19 case** | | | | |
| Post any Covid-19 case | 0.178** | 0.580*** | 0.447*** | 0.204*** |
| | (0.073) | (0.124) | (0.091) | (0.073) |
| **Panel B: Any human-to-human transmission** | | | | |
| Post any human-to-human transmission | 0.351** | 0.293* | 0.388** | 0.354** |
| | (0.141) | (0.163) | (0.164) | (0.140) |
| Number of Observations | 11640 | 11640 | 11640 | 11640 |
| Country FE | X | X | X | X |
| Day FE | X | X | X | X |

*Notes:* Supplementary Table 2 displays the impact of coronavirus arrival on Google searches for search terms related to economic anxiety. The results show that coronavirus arrival is a predictor of Google searches related to economic anxiety. Column 1 shows results for Google searches related to recessions. Column 2 shows results for Google searches related to stock market crashes. Column 3 shows results for Google searches related to conspiracy topics. Column 4 shows results for Google searches related to survivalism. The dependent variable measures Google search intensity for the indicated topics normalized by the average search intensity in a country prior to the coronavirus arrival. The data on Google searches were downloaded from the Google API on March $3^{rd}$. In panel A, we show the impact of a dummy variable indicating at least one COVID-19 case. In Panel B, we show the impact of having at least one human-to-human transmission of coronavirus. The data on first cases was compiled using the data compiled by [9]. The data on human-to-human transmissions is based on official reports by the WHO and national authorities. The level of analysis is country-day. Dates included range from January $1^{st}$ 2020 to February $29^{th}$ 2020. The table displays coefficients that are estimated using a linear regression model with country fixed effects and day fixed effects. Standard errors clustered at the country level are presented in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 3: The impact of coronavirus arrival on placebo Google searches

| | Impact on google searches for | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Dog | (2) Horse | (3) Insect | (4) DaVinci | (5) Nelson Mandela | (6) Rain | (7) Rainbow | (8) Stars | (9) Mars (planet) | (10) Menstrual Cycle |
| **Panel A: First confirmed case** | | | | | | | | | | |
| First confirmed case | -0.018 | -0.036 | -0.007 | -0.044 | -0.033 | 0.044 | -0.042 | -0.012 | -0.001 | 0.033 |
| | (0.018) | (0.027) | (0.042) | (0.038) | (0.058) | (0.048) | (0.045) | (0.033) | (0.103) | (0.033) |
| **Panel B: First human-to-human transmission** | | | | | | | | | | |
| First human-to-human transmission | -0.021 | -0.085 | 0.035 | -0.030 | 0.027 | -0.041 | -0.047 | -0.024 | 0.102 | 0.039 |
| | (0.038) | (0.064) | (0.040) | (0.039) | (0.059) | (0.078) | (0.055) | (0.048) | (0.324) | (0.028) |
| Number of countries | 194 | 194 | 194 | 193 | 194 | 194 | 194 | 194 | 194 | 193 |
| Number of observations | 11640 | 11640 | 11639 | 11249 | 11483 | 11640 | 11640 | 11640 | 11507 | 11477 |
| Country FE | X | X | X | X | X | X | X | X | X | X |
| Day FE | X | X | X | X | X | X | X | X | X | X |

*Notes:* Supplementary Table 3 displays the impact of coronavirus arrival on placebo Google searches that should not be affected by the arrival of the coronavirus. The results document that coronavirus arrival does not systematically predict Google searches unrelated to economic anxiety. The dependent variable measures Google search intensity for the indicated topics normalized by the average search intensity in a country prior to the coronavirus arrival. The data on Google searches were downloaded from the Google API on March $3^{rd}$. In panel A, we show the impact of a dummy variable indicating at least one Covid-19 case. In Panel B, we show the impact of having at least one human-to-human transmission of coronavirus. The data on first cases was compiled using the data compiled by [9]. The data on human-to-human transmissions is based on official reports by the WHO and national authorities. The level of analysis is country-day. Dates included range from January $1^{st}$ 2020 to February $29^{th}$ 2020. The table displays coefficients that are estimated using a linear regression model with country fixed effects and day fixed effects. Standard errors clustered at the country level are presented in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

Table 4: Coronavirus perceptions and economic anxieties over time

| | March 5 | | | | March 16 | | | | Comparison of means | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Mean | (2) SD | (3) Median | (4) Obs. | (5) Mean | (6) SD | (7) Median | (8) Obs. | (9) Δ | (10) p(early = late) |
| **Panel A: Economic Anxieties** | | | | | | | | | | |
| % agree: world severely affected by coronavirus | 67.65 | 46.81 | | 915 | 80.12 | 39.93 | | 1006 | 12.47 | 0.000 |
| % agree: US severely affected by coronavirus | 55.19 | 49.76 | | 915 | 77.83 | 41.56 | | 1006 | 22.64 | 0.000 |
| % worried about US economy | 67.98 | 46.68 | | 915 | 87.57 | 33.00 | | 1006 | 19.60 | 0.000 |
| % worried about personal econ. situation | 47.10 | 49.94 | | 915 | 73.76 | 44.02 | | 1006 | 26.65 | 0.000 |
| **Panel B: Coronavirus perceptions** | | | | | | | | | | |
| Infectiousness (R_0) | 43.18 | 146.10 | 10 | 915 | 49.81 | 175.13 | 5 | 1006 | 6.63 | 0.366 |
| Perceived mortality | 13.72 | 20.84 | 5 | 915 | 15.60 | 21.47 | 5 | 1006 | 1.88 | 0.052 |

*Notes:* Supplementary Table 4 displays summary statistics for economic anxieties (Panel A) and coronavirus perceptions (Panel B). Columns (1) - (4) display descriptives for Experiment 1 conducted on March 5, while Columns (5) to (8) display the descriptives for Experiment 2 conducted on March 16. Respondents are representative of the US population in terms of income, region, gender, age and education.

Table 5: The association of misperceptions and economic anxieties

| | Predicted impact on (standardized) | | Worry about (standardized) | |
|---|---|---|---|---|
| | (1) World | (2) US | (3) US Economy | (4) Pers. Economic Sit. |
| Overestimate mortality | 0.366*** | 0.453*** | 0.189*** | 0.478*** |
| | (0.065) | (0.064) | (0.066) | (0.063) |
| Overestimate contagiousness | 0.527*** | 0.573*** | 0.450*** | 0.410*** |
| | (0.090) | (0.084) | (0.088) | (0.082) |
| Number of Observations | 915 | 915 | 914 | 914 |

*Notes:* Supplementary Table 5 displays the raw effect of overestimating mortality and contagiousness of coronavirus (relative to official estimates) on the perceived severity of the effects of the coronavirus. The table shows coefficients estimated using linear regressions that compare (i) respondents whose beliefs about coronavirus mortality were higher relative to official estimates to those who have weakly lower beliefs and (ii) respondents whose beliefs about coronavirus contagiousness were higher relative to scientific estimates to those who have weakly lower beliefs. The dependent variables in columns (1) to (2) are agreement on a five-point Likert-scale (from "strongly disagree " to "strongly agree") with the statements "The world will be severely affected by the coronavirus." (column (1)), and "The US will be severely affected by the coronavirus." (column (2)). The dependent variables in columns (3) and (4) are answers on a four-point Likert-scale (from "not at all worried" to "very worried") to the questions "Are you worried about the effects of the coronavirus on the US economy?" (column (3)) and "Are you worried about the effects of the coronavirus on your household's economic situation?" (column (4)). Respondents are representative of the US population in terms of income, region, gender, age, and education. All outcomes are standardized to have mean 0 and standard deviation 1. Heteroskedasticity robust standard errors are presented in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 6: The impact of coronavirus related information on perceived severity of the crisis

| | Predicted impact on (standardized) | |
|---|---|---|
| | (1) World | (2) US |
| High relative mortality | 0.284*** | 0.227*** |
| | (0.066) | (0.066) |
| Number of Observations | 915 | 915 |

*Notes:* Supplementary Table 6 displays the impact of information about the coronavirus on the perceived severity of the effects of the coronavirus. The table shows coefficients estimated using linear regressions that compare respondents who were either truthfully informed that the death rate of the coronavirus is "20 times higher than for the flu" (high mortality treatment), "5 times lower than for SARS" (low mortality treatment). Regressions include only a high mortality treatment dummy and a constant. The dependent variables in columns (1) to (2) are agreement on a five-point Likert-scale (from "strongly disagree " to "strongly agree") with the statements "The world will be severely affected by the coronavirus." (column (1)), and "The US will be severely affected by the coronavirus." (column (2)). Respondents are representative of the US population in terms of income, region, gender, age, and education. All outcomes are standardized to have mean 0 and standard deviation 1. Heteroskedasticity robust standard errors are presented in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 7: The impact of information on economic worries

| | Worry about (standardized) | |
|---|---|---|
| | (1) US Economy | (2) Pers. Economic Sit. |
| **Panel A: Mortality information** | | |
| High relative mortality | 0.156** | 0.156** |
| | (0.066) | (0.066) |
| **Panel B: Contagion information** | | |
| Cotagion information | -0.012 | -0.087** |
| | (0.043) | (0.041) |
| Number of Observations | 914 | 914 |

*Notes:* Supplementary Table 7 displays the impact of information about the coronavirus on economic anxiety. The results show that information about coronavirus causally affects feelings of economic anxiety. Panel A shows coefficients estimated using linear regressions that compare respondents who were either truthfully informed that the death rate of the coronavirus is "20 times higher than for the flu" (high mortality treatment), "5 times lower than for SARS" (low mortality treatment). Regressions include only a high mortality treatment dummy and a constant. Panel B shows regression coefficients that compare respondents who were truthfully informed about the estimated contagiousness of COVID-19 (R0≈2) to respondents who were given no information. Estimates in panel B are obtained with an ANCOVA specification using baseline outcomes obtained in the same survey prior to the information treatment. The dependent variables in columns (1) and (2) are answers on a four-point Likert-scale (from "not at all worried" to "very worried") to the questions "Are you worried about the effects of the coronavirus on the US economy?" (column (1)) and "Are you worried about the effects of the coronavirus on your household's economic situation?" (column (2)). Respondents are representative of the US population in terms of income, region, gender, age, and education. All outcomes are standardized to have mean 0 and standard deviation 1. Heteroskedasticity robust standard errors are presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: The association of mental models of disease spread and economic anxieties

| | Predicted impact on (standardized) | | Worry about (standardized) | |
|---|---|---|---|---|
| | (1) World | (2) US | (3) US Economy | (4) Pers. Economic Sit. |
| Panel A | | | | |
| Log(estimate day 5)- z-score | 0.097*** | 0.094*** | 0.075** | 0.004 |
| | (0.028) | (0.030) | (0.031) | (0.032) |
| Panel B | | | | |
| Log(estimate day 10)- z-score | 0.104*** | 0.114*** | 0.071** | -0.023 |
| | (0.029) | (0.030) | (0.031) | (0.033) |
| Panel C | | | | |
| Log(estimate day 20)- z-score | 0.083*** | 0.093*** | 0.050 | -0.044 |
| | (0.031) | (0.031) | (0.032) | (0.033) |
| Number of Observations | 1006 | 1006 | 1006 | 1006 |

*Notes:* Supplementary Table 8 displays the beta coefficients of perceived severity of the effects of the coronavirus with people's standardized log estimate of the spread of a fictitious disease. The table shows coefficients estimated using linear regressions that regress perceived crisis severity and economic anxieties surrounding corona on the z-scored log of estimated infections from a fictitious disease. The dependent variables in columns (1) to (2) are agreement on a five-point Likert-scale (from "strongly disagree " to "strongly agree") with the statements "The world will be severely affected by the coronavirus." (column (1)), and "The US will be severely affected by the coronavirus." (column (2)). The dependent variables in columns (3) and (4) are answers on a four-point Likert-scale (from "not at all worried" to "very worried") to the questions "Are you worried about the effects of the coronavirus on the US economy?" (column (3)) and "Are you worried about the effects of the coronavirus on your household's economic situation?" (column (4)). The right-hand-side variables are the standardized log of people's estimate for the number of people infected with the fictitious disease on day 5, day 10 and day 20 respectively. Respondents are representative of the US population in terms of income, region, gender, age, and education. All outcomes are standardized to have mean 0 and standard deviation 1. Heteroskedasticity robust standard errors are presented in parentheses. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 9: Summary statistics: Experimental sample March 5

| | (1) Mean | (2) SD | (3) Median | (4) Obs. |
|---|---|---|---|---|
| **Panel A: Demographics** | | | | |
| % Male | 49.07 | 50.02 | | 915 |
| % Age < 35 | 24.26 | 42.89 | | 915 |
| % Highschool education | 17.60 | 38.10 | | 915 |
| % College eductation | 80.55 | 39.61 | | 915 |
| % Currently working | 55.08 | 49.77 | | 915 |
| % Democrat | 40.00 | 49.02 | | 915 |
| % Republican | 33.22 | 47.13 | | 915 |
| % high trust in science | 46.99 | 49.94 | | 915 |
| **Panel B: Economic Anxieties** | | | | |
| % agree: world severely affected by coronavirus | 67.65 | 46.81 | | 915 |
| % agree: US severely affected by coronavirus | 55.19 | 49.76 | | 915 |
| % worried about US economy | 67.98 | 46.68 | | 915 |
| % worried about personal econ. situation | 47.10 | 49.94 | | 915 |
| **Panel C: Coronavirus perceptions** | | | | |
| Infectiousness (R0) | 43.18 | 146.10 | 10 | 915 |
| Predicted mortality rate | 13.72 | 20.84 | 5 | 915 |

*Notes:* Supplementary Table 9 displays summary statistics for the experimental sample. Panel A shows shares of respondents with indicated characteristics. Panel B shows share of respondents with particular economic anxieties. Panel C shows variables measuring perceptions of coronavirus. Respondents are representative of the US population in terms of income, region, gender, age and education.

Table 10: Experimental integrity: balance table

| | Mortality information experiment | | | Contagion information experiment | | |
|---|---|---|---|---|---|---|
| | (1) Mean low rel. mortality | (2) Mean highrel. mortality | (3) p(low rel. mort. = high rel. mort) | (4) Mean no contagion info | (5) Mean contagion info | (6) p(no info = info) |
| % Male | 50.55 | 47.61 | 0.37 | 50.11 | 48.04 | 0.53 |
| % Age < 35 | 23.74 | 24.78 | 0.71 | 23.96 | 24.57 | 0.83 |
| % Highschool education | 18.90 | 16.30 | 0.30 | 16.70 | 18.48 | 0.48 |
| % College eductation | 78.90 | 82.17 | 0.21 | 81.98 | 79.13 | 0.28 |
| % Currently working | 58.46 | 51.74 | 0.04 | 55.38 | 54.78 | 0.85 |
| % Democrat | 38.90 | 41.09 | 0.50 | 37.58 | 42.39 | 0.14 |
| % Republican | 33.41 | 33.04 | 0.91 | 34.95 | 31.52 | 0.27 |
| % high trust in science | 44.62 | 49.35 | 0.15 | 45.05 | 48.91 | 0.24 |
| p-value of joint significance | | | 0.26 | | | 0.64 |

*Notes:* Supplementary Table 10 displays balance tests for the experimental sample. Data was collected on March 5. Columns (1) to (3) show means for both experimental groups in the mortality information experiment and the p-value for a test of equality of means across samples. Columns (4) to (6) show means for both experimental groups in the contagiousness experiment and the p-value for a test of equality of means across samples. p-values are obtained using heteroskedasticity robust standard errors. p-values for the test of joint significance are based on the F-statistic obtained by regressing all observables on the treatment indicators. Respondents are representative of the US population in terms of income, region, gender, age, and education.

Table 11: Summary statistics: Exponential growth survey March 16

| | (1) Mean | (2) SD | (3) Median | (4) Obs. |
|---|---|---|---|---|
| **Panel A: Demographics** | | | | |
| % Male | 52.09 | 49.98 | | 1006 |
| % Age < 35 | 22.66 | 41.89 | | 1006 |
| % Highschool education | 19.98 | 40.00 | | 1006 |
| % College eductation | 76.64 | 42.33 | | 1006 |
| % Currently working | 52.19 | 49.98 | | 1006 |
| % Democrat | 38.57 | 48.70 | | 1006 |
| % Republican | 32.11 | 46.71 | | 1006 |
| % high trust in science | 1.79 | 13.26 | | 1006 |
| **Panel B: Economic Anxieties** | | | | |
| % agree: world severely affected by coronavirus | 80.12 | 39.93 | | 1006 |
| % agree: US severely affected by coronavirus | 77.83 | 41.56 | | 1006 |
| % worried about US economy | 87.57 | 33.00 | | 1006 |
| % worried about personal econ. situation | 73.76 | 44.02 | | 1006 |
| **Panel C: Coronavirus perceptions** | | | | |
| Infectiousness (R0) | 49.81 | 175.13 | 5 | 1006 |
| Number of cases after 5 days (w) | 20.02 | 20.72 | 11 | 1006 |
| Number of cases after 10 days (w) | 340.29 | 678.64 | 30 | 1006 |
| Number of cases after 20 days (w) | 122218.17 | 311256.66 | 60 | 1006 |
| Predicted mortality rate | 15.60 | 21.47 | 5 | 1006 |

*Notes:* Supplementary Table 11 displays summary statistics for the experimental sample. Panel A shows shares of respondents with indicated characteristics. Panel B shows share of respondents with indicated perceptions of coronavirus. Panel C shows variables measuring knowledge about coronavirus. Respondents are representative of the US population in terms of income, region, gender, age and education.