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IZA DP No. 14884

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NOVEMBER 2021

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NOVEMBER 2021

ISSN: 2365-9793

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ABSTRACT

COVID-19 and the Forces behind Social Unrest*

The unprecedented consequences of the Covid-19 pandemic have raised concerns about intensified social unrest, but evidence for such a link and the underlying channels is still lacking. We use a unique combination of nationally representative survey data, event data on social unrest, and data on Covid-19 fatalities and unemployment at a weekly resolution to investigate the forces behind social unrest in the context of the strains on public health and the economy due to the pandemic in the USA. The results show that pandemic-related unemployment and Covid-19 fatalities intensified negative emotional stress and led to a deterioration of economic confidence among individuals. The prevalence of negative emotional stress, particularly in economically strained and politically polarized environments, was, in turn, associated with intensified social unrest as measured by political protests. No such link is found for economic perceptions.

JEL Classification: H

Keywords: economic shocks, COVID-19, civil unrest, political polarization

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* M.L. and R.W.-E. gratefully acknowledge financial support by the Austrian Christian Doppler Society. U.S. gratefully acknowledges financial support by Deutsche Forschungsgemeinschaft through CRC TRR 190 (project number 280092119). Thanks to helpful comments by Katrin Auel and Antoinette Schoar.

1 Introduction

The Covid-19 pandemic had unprecedented effects on public health and the economy. The pandemic caused more fatalities in the U.S. than all wars during the past century. The lockdown led to severe restrictions of civil liberties, brought the economy to a standstill, and resulted in the highest unemployment since the Great Depression. This has raised concerns of an intensification of social instability and social unrest.[1] Recent evidence indeed documented a deterioration of mental health, increasing depression rates, and an increase in household violence as consequences of the pandemic. Evidence whether this was also associated with an increase in social unrest is still lacking, however.

In this note, we provide novel evidence for a link between the Covid-19 pandemic and outbreaks of social unrest, as well as for the forces underlying this link. Conceptually, the analysis is motivated by the observations that the disruptions related to the Covid-19 pandemic pertain to several established determinants of social unrest that comprise personal grievances related to economic hardship, for instance due to job loss, or to a negative economic outlook. Looming existential threats and intensifying socio-economic and political divides imply that the pandemic may trigger increasing social unrest by intensifying some of these root causes of social unrest. Our analysis is based on a unique combination of nationally representative weekly survey data collected during the pandemic with measures of the consequences of the pandemic such as daily data on Covid-19-related deaths on the state level, state-level statistics on unemployment, and geo-localized event-level data on protests and riots at a weekly resolution. The analysis covers the first Covid-19 phase (February through August, 2020) and accounts for the development of social unrest over the same months during 2018 and 2019.

The results establish several novel findings regarding the link between negative emotional stress, economic perceptions related to the pandemic, and social unrest. First, we find evidence that individual job loss in the context of the Covid-19 pandemic leads to an increased prevalence of negative emotional stress, anxiety, and aggression, as well as to increasingly negative perceptions of the state of the economy. These effects are largely unaffected by political polarization, as reflected by party affiliation or alignment of party preferences with the party of the state governor. Second, we document that similar effects emerge at the state-week-level when considering variation in deaths related to Covid-19 and in unemployment rates. In contrast to effects related to individual unemployment, here, we also find systematic effect heterogeneity for political

[1] See, e.g., a recent op-ed in *Foreign Policy* by Elise Labott.

polarization along party lines. Third, we find that an increase in negative emotional stress is associated with a significant increase in the incidence of social unrest at the state-week level. The estimates show that negative emotional stress and negative perceptions about the economy are intensified by the severity of the crisis. Greater negative emotional stress – but not more negative perceptions about the economy – was associated with more social unrest. This effect is strongest in environments with a more pronounced increase in unemployment and Covid-19 fatalities, and with high political polarization as proxied by narrow vote margins during the last gubernatorial election. This is consistent with collective dissent as a consequence of a perceived decline of governmental legitimacy or diminishing confidence in the administrative capabilities to combat the pandemic.

The results suggest that the social and psychological consequences of the Covid-19 pandemic were associated with increased social unrest, in line with recent concerns (see, e.g., Censolo & Morelli 2020, Galea & Abdalla 2020). Our results provide a link between increased aggression levels during the pandemic-related lockdown (Killgore et al. 2021, Lang & Lang 2021), increasing depression rates and a deterioration of mental health (Giuntella et al. 2021), and social unrest, and they provide evidence for the underlying psychological mechanism. The findings thereby also complement evidence about the effect of the pandemic on economic anxiety (Fetzer et al. 2021) and evidence for increasing household violence during the Covid-19 pandemic (Arenas-Arroyo et al. 2021, Bullinger et al. 2020). They also contribute to the rather unclear evidence on the link between the pandemic and large-scale armed conflict (Mehrl & Thurner 2020, Bloem & Salemi 2021) and to emerging evidence for increased social unrest related to Covid-19 in Africa, which was mainly due to the stringency of state reactions (Basedau & Deitch 2021). Complementing work on mass polarization of citizen's positions in the past decades (see, e.g., Fiorina & Abrams 2008, Callander & Carbajal 2021), our estimates show that the pandemic and political polarization interact in the context of social unrest, with significant consequences for the adherence to policies such as social distancing (Allcott et al. 2020, Grossman et al. 2020).

The finding that social unrest can be traced to the disruptions caused by the Covid-19 pandemic support the role of personal grievances as cause for collective dissent (Grasso & Giugni 2016), consistent with evidence for aggravated grievances as reflected by a negative perception of the economy (Coibion et al. 2020*b*,*a*), a further widening of socio-ethnic inequalities (Andrasfay & Goldman 2021), and health-related stress (Cervellati et al. 2021). In light of evidence that the economic consequences of the pandemic are more widespread across age and regional groups than initial mortality impacts (Polyakova et al. 2020), our results

potentially only capture the tip of the iceberg in terms of the social implications of the Covid-19 pandemic. Moreover, our findings contribute to recent evidence that suggests that political polarization can lead to different interpretations of the same facts and policies related to the pandemic in various domains (Hersh & Goldenberg 2016, Bisgaard 2019, Calvillo et al. 2020, Gollwitzer et al. 2020, Lockhart et al. 2020). Our findings document that comparable variation in unemployment or fatalities related to the pandemic entails very different consequences for social unrest depending on the political and economic context.

Our study also contributes to the literature on the link between epidemics and social unrest (see, e.g., Jedwab et al. 2021, for a survey of historical cases). Existing evidence in this literature has mainly focused on epidemics and social violence in Africa (e.g., Cervellati et al. 2021, Cordell et al. 2021). Likewise, our findings complement macro-level evidence that suggests a link between epidemics and civil disorder worldwide (Sedik & Xu 2020). Our empirical strategy contributes to this emerging literature by isolating the causal relation between Covid-19 and social unrest in the U.S. and by shedding light on the underlying psychological forces.

In the remainder of the paper, we briefly discuss the data and methodology, present the results, and provide a brief discussion.

2 Data

Data The analysis combines survey data collected by the Gallup Covid-Survey 2020 between March and August 2020 with data on reported deaths related to the Covid-19 pandemic (`https://github.com/datasets/covid-19`), data on unemployment from the US Bureau of Labor statistics and with data on events of social unrest from the Global Database of Events, Language, and Tone (GDELT). In particular, the analysis is based on protest events (event category 14). Despite potential deficiencies (Wang et al. 2016), these event data constitute the best available data source for the purpose of this analysis, which relies on high frequency (week-by-week-by-state) variation and an estimation strategy that flexibly accounts for potential confounders.

Empirical Methodology The empirical analysis proceeds in three steps. In a first step, we document on the individual level that a job loss during the Covid-19 pandemic affected respondents' overall sentiments. In the second step of the analysis, we use a similar approach to consider the socio-psychological effects of visible aggregate consequences of the Covid-19 pandemic on individual sentiments. The third step of the analysis

investigates whether sentiments affect social unrest. In all three steps of the analysis, identification relies on pre-determined variables of interest, which, on the second and third step of the analysis, are measured at the state level. This and the inclusion of a rich set of control variables that are predetermined at the time of measurement of the outcome, state and week fixed effects, as well as the explicit inclusion of potential correlation in the error at the state-week or state-month level, respectively, rules out concerns of endogeneity or reverse causality. The next section presents methods in detail and the corresponding results.

3 Results

Pandemic-related unemployment shocks and sentiments. We start by presenting evidence on whether personal unemployment experience affects respondents' sentiments at the individual level. The corresponding analysis is based on estimates of an empirical model

$$SENT_{i,s,t} = \alpha + \beta UE_{i,s,t-1} + \xi' \boldsymbol{X}_{i,s,t} + \pi_t + \lambda_s + \varepsilon_{i,s,t} \,, \tag{1}$$

with $SENT_{i,s,t}$ denoting a binary dependent variable that measures the prevalence of negative sentiments, in terms of i) negative emotional stress or ii) a negative perception of the economy, for respondent i in week t in state s. Negative emotional stress is coded in terms of a binary variable that equals 1 if the principal-component score of negative emotional stress – based on survey responses to questions about anger, stress, worries, sadness, boredom, and loneliness – in the GALLUP-2020 (GALLUP 2020) questionnaire by respondent i in state s and calendar week t is in the top quartile, 0 otherwise.[2] Negative perception of the economy is a binary variable that equals 1 if the respondent reported to perceive the US economy to be in a depression, 0 otherwise (GALLUP 2020, item C13). $UE_{i,s,t-1}$ is a pre-determined binary indicator whether the respondent reported a job loss during the previous week. $\boldsymbol{X}_{i,s,t}$ is a vector of controls at the respondent-level, including household income, family status, children, educational attainment, ethnicity, age, a dummy indicating republican affiliation, and a binary variable indicating political opposition to the state governor's party affiliation, where opposition is defined as being affiliated with the opposite party, or, for independents, when the governor is republican. The vector $\boldsymbol{X}_{i,s,t}$ also includes controls for aggregate variation, including pandemic-related stay-at-home orders and social unrest in the week before the interview. Week (π_t) and state (λ_s) fixed-effects control for unobserved heterogeneity across time and regions. The error term $\varepsilon_{i,s,t}$ allows for arbitrary correlation (clustering) at the state-week level.

[2] Detailed results for all components are presented in Table A.1 in the Appendix.

The experience of a job loss during the pandemic as reported in survey responses was associated with a significant intensification of negative emotional stress (Table 1 Panel A). A similar effect is found for responses regarding negative perceptions of the economy in terms of a depression (Table 1 Panel B). In both cases, this estimate is affected only weakly by respondents' political stance, in terms of considering an individual whose party affiliation does not align with the affiliation of the state governor (opposition) or party affiliation of the respondent (republican or other).

Exposure to Covid-19 and sentiments. In the second step of the analysis, we consider the effects of exposure to Covid-19, measured in terms of state-level fatalities and unemployment, on individual emotions and perceptions. The corresponding analysis is based on estimates of an empirical model

$$SENT_{i,s,t} = \alpha + \beta COVID_{s,t-1} + \xi' \boldsymbol{X}_{i,s,t} + \pi_t + \lambda_s + \varepsilon_{i,s,t} \,, \tag{2}$$

with $COVID_{s,t-1}$ as a measure of exposure to the Covid-19 epidemic in terms of its consequences for public health and the economy. Exposure to Covid-19 is based on two proxies, state level unemployment and the rate of Covid-19-related fatalities, measured in state s for the preceding week $t-1$. Both proxies are highly visible, being permanently featured in the media, and pre-determined. In particular, we consider a measure of the consequences of the pandemic on public health in terms of a binary variable indicating a relatively high increase in the Covid-19 death rate (an increase in the death rate > 9 per 1m from week $t-2$ to $t-1$, which corresponds to the median for the time period March through August), and the effect on the economy, as reflected by high unemployment (a monthly unemployment rate higher than 7%, which approximately corresponds to the sample median), at the state level.[3] The use of binary variables provides a useful source of variation without relying on a linear specification; the dynamics of the Covid-19 pandemic are clearly visible in the data (see Appendix Figure B.1).

The results suggest that individual reactions are more polarized when considering exposure proxied by aggregate variables than when considering individual unemployment experience as above. In particular, increases in Covid-19 deaths at the state level are associated with a significant surge in negative emotional stress, whereas state-level unemployment rates do not affect emotions on average (Figure 1(a), specification 1). At the same time, reactions to aggregate variation instead of individual experiences are more sensitive to partisanship. When considering heterogeneity by alignment of party affiliation with that of the state

[3] We update the monthly unemployment by using the previous month's unemployment rate for the first 3 weeks of a month and the contemporary rate for weeks 4 and 5.

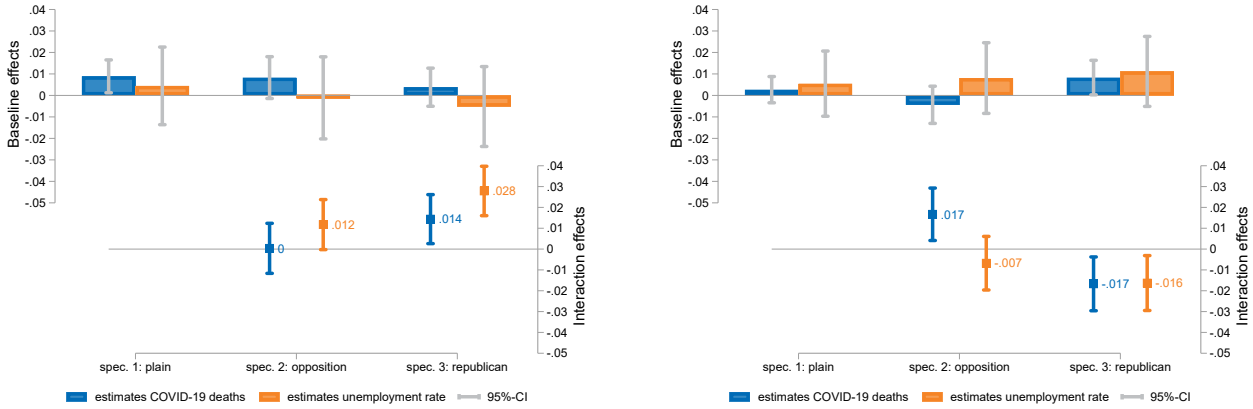
Table 1: Association of individual unemployment experience with negative emotional stress and perception of the economy

	(1)	(2)	(3)
Panel A. Negative emotions[a]			
unemployed in $t-1$[c]	0.121***	0.124***	0.114***
	(0.007)	(0.009)	(0.008)
unemployed in $t-1$		−0.008	
× opposition[d]		(0.013)	
unemployed in $t-1$			0.026*
× republican[e]			(0.015)
opposition	0.004	0.004	0.003
	(0.003)	(0.003)	(0.003)
republican	−0.086***	−0.086***	−0.087***
	(0.003)	(0.003)	(0.003)
stay-at-home	0.001	0.001	0.001
	(0.006)	(0.006)	(0.006)
social unrest in $t-1$	0.010	0.010	0.010*
	(0.006)	(0.006)	(0.006)
add. controls	*yes*	*yes*	*yes*
state, week FEs	*yes*	*yes*	*yes*
R^2	0.044	0.044	0.044
mean dep. var.	0.226	0.226	0.226
N	70,789	70,789	70,789
Panel B. Negative perception of economy[b]			
unemployed in $t-1$[c]	0.071***	0.080***	0.074***
	(0.007)	(0.009)	(0.008)
unemployed in $t-1$		−0.021	
× opposition[d]		(0.013)	
unemployed in $t-1$			−0.009
× republican[e]			(0.013)
opposition	−0.004	−0.002	−0.003
	(0.003)	(0.004)	(0.003)
republican	−0.173***	−0.172***	−0.172***
	(0.003)	(0.003)	(0.004)
stay-at-home	0.005	0.005	0.005
	(0.007)	(0.007)	(0.007)
social unrest in $t-1$	0.000	0.000	0.000
	(0.007)	(0.007)	(0.007)
add. controls	*yes*	*yes*	*yes*
state, week FEs	*yes*	*yes*	*yes*
R^2	0.072	0.072	0.072
mean dep. var.	0.266	0.266	0.266
N	72,285	72,285	72,285

Notes: Results of linear probability models. All specifications include state and week fixed effects and the full set of controls. Standard errors, clustered on the state-week level, in parentheses, *, ** and *** indicate statistical significance at the 10%, 5%, and 1% level. [a] binary dependent variable (mean 0.226). [b] binary dependent variable (mean 0.266). [c] Binary variable indicating individual unemployment status in $t-1$. Variable is equal to 1 if the respondent reported to be unemployed, 0 otherwise (GALLUP 2020, item E1_3). [d] Binary variable equal to 1 if the respondent reports party affiliation different than state governor's party (for non-affiliates, opposition is coded when being resident in state with republican governor). [e] Binary variable equal to 1 if the respondent reports affiliation with republican party.

governor, there is no significant interaction with Covid-19 deaths on negative emotional stress, whereas increases in state-level unemployment intensify negative emotional stress among individuals in opposition to the state governor (spec. 2). Party affiliation affects the emotional response to Covid-19 deaths and

Figure 1: Association of COVID-19 deaths and unemployment rate with negative emotional stress and economic perception



(a) Negative emotions (PCA)

(b) Negative perception of economy

Notes: Estimated coefficients and 95% confidence intervals. Estimation model for specification 1 (plain) as described in equation 2. Specifications 2 and 3 include interactions of $COVID_{s,t-1}$ and $UNEMP_{s,t-1}$ with a binary variable indicating opposition (spec. 2) or a republican affiliation indicator (spec. 3). Confidence intervals are based on standard errors that are clustered on the state-week level. Detailed estimates are reported in Table A.2 of the Supplementary Appendix.

unemployment, with republican-leaning respondents showing significantly stronger responses in terms of negative emotional stress to both types of events (spec. 3).[4]

The general association between Covid-19 casualties or unemployment and negative economic perceptions is weaker, but this conceals a considerable heterogeneity in the effects. The findings show that a high number of Covid-19-related deaths or high unemployment at the state level are not associated with a worse perception of the economy on average (Figure 1(b), spec. 1). Yet, a high number of Covid-19 deaths is associated with a more pessimistic economic outlook of respondents who are in opposition with the governor; the corresponding effect for unemployment is insignificant (spec. 2). Both a high level of Covid-19-related deaths and unemployment at the state level, induce less of a negative perception of the economy among respondents who report an affiliation with the republican party (spec. 3). This heterogeneity contrasts the heterogeneity found for negative emotional stress in Figure 1(a); the results suggest that the consequences of the pandemic in the economic and public health domain led to a greater prevalence of negative emotional stress and, to a lesser extent, of negative economic expectations, but the heterogeneity of these reactions reveals a widening of political divides and thus in the scope for social unrest.

[4]This corresponds to results by Meeuwis et al. (2020) who find that after the unexpected election of Donald Trump Democrats became more pessimistic (and Republicans became more optimistic) with respect to the economy; at the same time, there were no systematic differences in expectations about their own personal situations. See also Prior et al. (2015) on partisan beliefs about the economy.

Robustness checks using a binary dependent variable based on the PCA score of the second component yield no comparably systematic and significant results, suggesting that the psychological fall-out of the epidemic mainly pertains to anger-related negative emotional stress (angry, stressed, worried, sad) rather than introvertive negative emotions (boredom and loneliness).[5]

Sentiments and social unrest. The last step of the analysis investigates the link between sentiments and social unrest. In particular, we consider the association of protest events at the state-week-level with variation in negative emotional stress and perceptions expressed in the survey responses during the preceding week. The estimation analysis is based on weekly counts of social unrest as outcome variable and controls for stay-at-home orders that might have affected social unrest, as well as for nation-wide events unrelated to the Covid-19 pandemic, such as the Black Lives Matter movement (Dave et al. 2020), which gained momentum during the sample period. The corresponding analysis for this link between socio-psychological factors and unrest is based on the empirical model

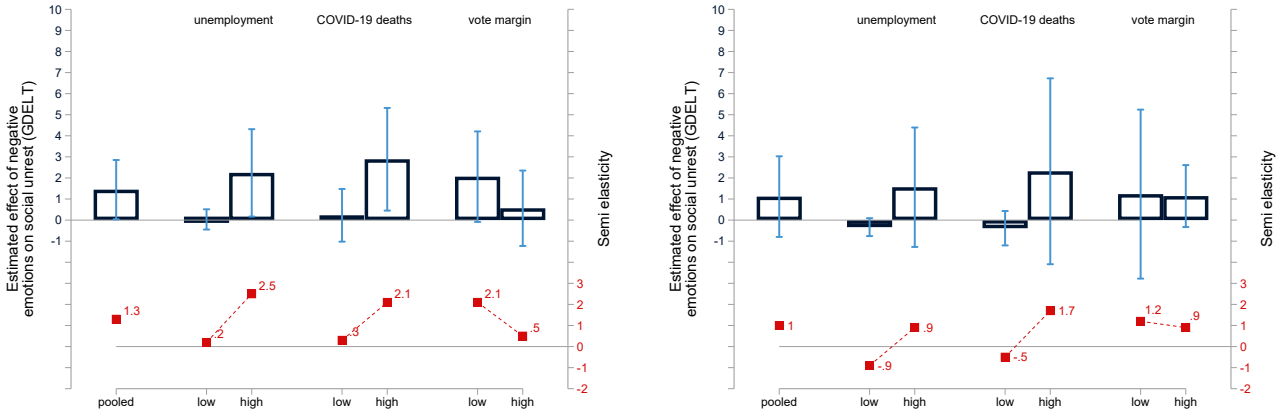
$$Unrest_{s,t} = \gamma_0 + \gamma_1 SENT_{s,t-1} + \phi' \boldsymbol{X}_{s,t} + \rho_t + \lambda_s + \epsilon_{s,t} \,, \tag{3}$$

with $Unrest_{s,t}$ denoting the total number of registered events of social unrest in week t and state s in the GDELT data, $SENT_{s,t-1}$ is a measure of sentiments in terms of negative emotional stress or economic perceptions as detailed in the figure notes. The vector $\boldsymbol{X}_{s,t}$ includes state-week specific controls: To account for long-term trends in social unrest, we use 2018 and 2019 events in the same category, state and time period as additional controls. In addition, as the main variable of interest is measured in $t-1$, we include the recorded number of protests in week $t-2$ as a control variable. We control for the unemployment rate and death rate in weeks t to account for the dynamics of the pandemic. Week (ρ_t) and state (λ_s) fixed-effects are also included. The error term $\epsilon_{s,m,t}$ allows for arbitrary correlation (clustering) at the state-month level.

The estimates document that, on average, the prevalence of negative emotional stress in a particular week and state exhibits a significant positive association with the occurrence of events of social unrest (Figure 2(a), pooled). With an increase in social unrest, measured by GDELT protest events, of 1.3 percent in response to an increase in the prevalence of negative emotional stress in the population by 1 percentage point, this effect is sizable. It is remarkable, that this effect does not arise in situations with low political polarization and in environments with a relatively low level of Covid-19-related fatalities. On the other hand,

[5] See Table A.1 in the Appendix for the details of the factor analysis and Table A.4 for the corresponding estimation results for the second component. Unreported results also suggest no systematic heterogeneity in the effects for African American respondents.

Figure 2: Negative emotions, economic perceptions, and social unrest



(a) Association of negative emotional stress (PCA) with social unrest

(b) Association of economic perception with social unrest

Notes: Estimated coefficients and 95% confidence intervals. Coefficient estimates are derived from weighted least squares regressions of equation 3, weighted by the standard deviation of the dependent variable on the state-week level. Only state-week combinations with more than 10 valid survey responses for both types of sentiments are considered. Washington D.C. is excluded. Semi-elasticity (calculated using the unweighted mean of the respective sample as the base) multiplied by 100 gives the percentage change in the specific rate (ratio) due to a one percentage point increase in the mean of the PCA and economic perception variables. Standard errors are clustered at the state-month level. Detailed estimates are reported in Table A.3 of the Supplementary Appendix.

the association between negative emotional stress and social unrest is systematically stronger in states and weeks in which unemployment rates exceed 7%, which approximately corresponds to the sample median, while there is no significant link between negative emotional stress and social unrest in a low unemployment context. A similar heterogeneity emerges for differences in (cumulative) Covid-19 deaths. In states and weeks in which the growth in the death rate was larger than 9 per 1m, which is about the median for the time period March through August, the link between average prevalence of negative emotional stress and social unrest is positive and significant, in contrast to environments with a low number of cumulated deaths. The effect heterogeneity in the link between negative emotional stress and social unrest also pertains to political polarization. In particular, in states with high polarization as reflected by a low vote margin between democrats and republicans during the most recent gubernatorial election, a higher average prevalence of negative emotional stress is associated with a significantly higher incidence of social unrest, whereas this link is insignificant in states with a high vote margin.

When considering economic perceptions, the results reveal no significant link between average economic perceptions and social unrest (Figure 2(b), pooled). While qualitatively similar, the patterns of heterogeneity in the association between economic perceptions and social unrest is quantitatively weaker and not statistically significant. This evidence suggests that social unrest is more closely associated with psychological

factors related to negative emotional stress, than with economic perceptions and expectations.[6]

4 Discussion

The evidence presented here suggests that the psychological fall-out of the Covid-19 pandemic in terms of an increased prevalence of negative emotional stress exhibits a significant association with increased social unrest. The corresponding association between perceptions of the state of the economy and social unrest is found to be insignificant. The effect heterogeneity indicates that political polarization acts as catalyst that contributes to increased economic and political tensions: the association between negative emotional stress and social unrest is primarily found in the context of high unemployment or high Covid-19 fatalities or in situations of high political polarization at the state level.

The finding of effect heterogeneity does not hinge on the particular specification of the thresholds for unemployment and Covid-19 fatalities used to partition the sample (see Appendix Figures B.2 and B.3). Likewise, the findings are not sensitive to dropping particular states (see Appendix Figure B.4 and B.5).

The simultaneous occurrences of social unrest related to police violence and the Black Lives Matter movement has been viewed as part of a broader process of deepening racial and socio-economic divides that has been accelerated and exposed by the Covid-19 pandemic (Galea & Abdalla, 2020). The estimation results are unlikely to be affected by outbreaks of violence at selective dates, such as in the aftermath of the killing of George Floyd, due to the inclusion of state and week fixed effects that account for the spatial and temporal concentration of such events. In addition, seasonal trends in social unrest are accounted for by controlling for events during the same periods in years 2018 and 2019. Nevertheless, we conducted several robustness checks to explore whether the main finding in fact masks the rise in social unrest related to the Black Lives Matter movement. Estimation results of extended specifications deliver no evidence for systematic heterogeneity in the effects of negative emotional stress on social violence across states with low or high population shares of Afro-Americans; if anything, the results are slightly weaker in states with higher population shares, pointing in the opposite direction (see Appendix Table A.6). Additional results document that the main findings are robust when using a more extensive specification of the empirical model (see Appendix Tables A.7 and A.8). Table A.7 shows that negative emotional stress is significantly correlated with social unrest whether or not fixed effects for states or weeks (Cols. (1) - (3)) are introduced. To control for the prevalence of Black Lives

[6] While the baseline analysis is based on a binary variable indicating negative emotional stress, we also estimated a model using the state-week average of the continuous measure for bad emotions (i.e., the PCA score) as the explanatory variable to explore the robustness of our findings. The corresponding estimates confirm all findings presented in Figure 2, see Table A.5 in the Appendix.

Matter protests, in Cols (4) and (5) we include specific state-level control variables, like population, density, the share of black population, crime and imprison rates as well as the poverty rate. The results also remain unchanged when including a dummy for states and weeks when the Black Lives Matter protests were most severe (Col. (6)). The same holds when excluding entire state-weeks (Col. (7)) or states (Col (8)) in which BLM protests have been severe.

In sum, the results suggest that an increasing discontent with existing socio-economic living conditions might have been spurred by the consequences of Covid-19, with the result of an increasing prevalence of negative emotional stress, which is associated with greater social unrest. Hence, while the evidence shown here does not necessarily reflect causal effects, the fine grained data structure and the use of predetermined within-state and -week variation provides novel insights into the link between the Covid-19 pandemic and outbreaks of social unrest that complement recent findings regarding the role of Covid-19 for affective polarization (see, e.g., Druckman et al. 2021).

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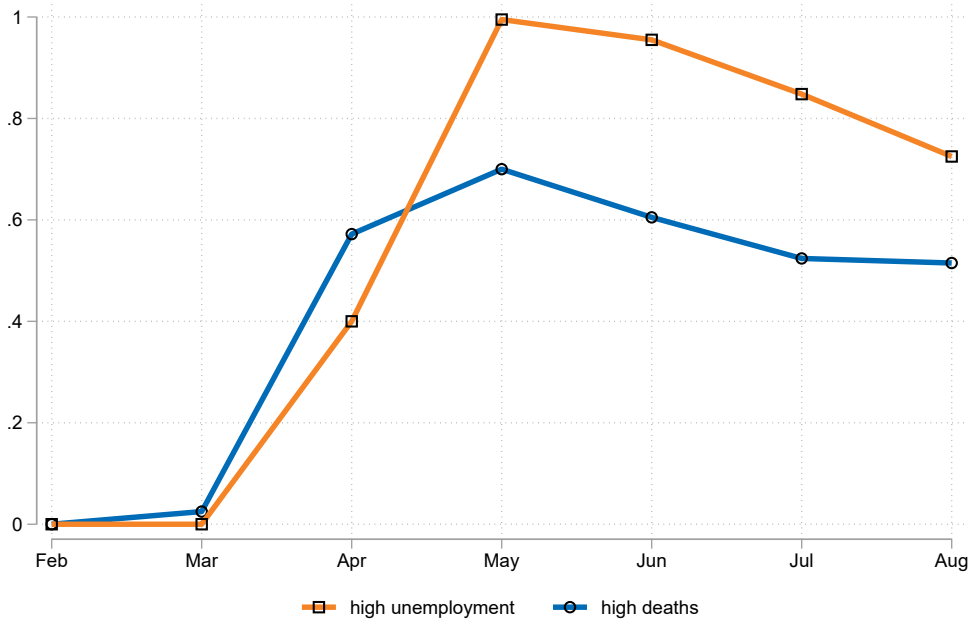
A Appendix: Additional Results

Figure B.1: Dynamics of indicators of high COVID-19-related deaths and high unemployment



Notes: The graph illustrates the mean of the binary variable indicating high COVID-19 deaths, as well as the unemployment rate for months February through August 2021.

Table A.1: Principle component analysis

Variable	**Comp. 1**	**Comp. 2**	**Comp. 3**	**Comp. 4**	**Comp. 5**	**Comp. 6**
angry	0.3882	−0.2545	0.6857	0.3972	0.3927	−0.0491
stressed	0.4562	−0.2694	−0.5176	0.0476	0.3046	0.5969
worried	0.4924	−0.2202	−0.3767	0.0835	−0.1478	−0.7337
sad	0.4765	−0.0351	0.3141	−0.2894	−0.7147	0.2801
bored	0.2184	0.7254	−0.1161	0.6167	−0.1555	0.0900
lonely	0.3520	0.5354	0.0885	−0.6074	0.4430	−0.1283
Eigenvalues	2.3988	1.1255	0.7842	0.6990	0.5553	0.4373

Notes: $N = 101,302$, all variables are binary and taken from the GALLUP (2020) survey.

Table A.2: Association of unemployment and COVID-19 shocks on negative emotional stress and perception of the economy - full estimation results for Figure 1 in manuscript

	negative emotional stress[a]			*economic perception*[b]		
	(1)	(2)	(3)	(4)	(5)	(6)
high deaths in $t-1$[c]	0.009**	0.008*	0.004	0.003	−0.004	0.008**
	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)	(0.004)
high unemp. in $t-1$[d]	0.004	−0.001	−0.005	0.005	0.008	0.011
	(0.009)	(0.010)	(0.009)	(0.008)	(0.008)	(0.008)
high deaths in $t-1$		0.000			0.017***	
× opposition		(0.006)			(0.006)	
high unemp. in $t-1$		0.012*			−0.007	
× opposition		(0.006)			(0.007)	
high deaths in $t-1$			0.014**			−0.017**
× republican			(0.006)			(0.007)
high unemp. in $t-1$			0.028***			−0.016**
× republican			(0.006)			(0.007)
opposition	0.003	−0.004	0.002	−0.006*	−0.012**	−0.005
	(0.003)	(0.006)	(0.003)	(0.003)	(0.006)	(0.003)
republican	−0.098***	−0.098***	−0.125***	−0.169***	−0.170***	−0.148***
	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.006)
stay-at-home[f]	−0.001	−0.001	−0.001	0.003	0.003	0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
social unrest in $t-1$[g]	0.008	0.009	0.009	0.002	0.002	0.002
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)
social unrest 2018/2019	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
add. controls	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
week FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
state FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
R^2	0.041	0.041	0.041	0.065	0.065	0.065
Mean dep. var.	0.234	0.234	0.234	0.263	0.263	0.263
N		90,396			92,277	

Notes: Robust standard errors, clustered on the state-week level, are presented in parentheses, stars indicate significance: *, ** and *** indicate statistical significance at the 10-percent level, 5-percent level, and 1-percent level. Estimation model is as described in equation 1. All result correspond to those illustrated in Figure 1.

[a] The dependent variable is equal to 1 if the PCA score of negative emotional stress according to the GALLUP-2020 survey is in the top quartile, 0 if in the lower 3 quartiles. [b] The dependent variable is equal to 1 the GALLUP-2020 survey respondent reported to perceive the US economy to be in a recession, 0 otherwise. [c] Binary variable equal to 1 if the change in the observed cumulative COVID-19 related death rate from $t-2$ to $t-1$ (deaths per 1m state population) is above 9, 0 otherwise. [d] Binary variable equal to 1 if the observed unemployment rate of a particular week in a particular state is above the median nation-wirde unemployment rate (~ 7) during weeks 4–35, 0 otherwise. [e] Binary variable indicating individual unemployment status. Variable is equal to 1 if the respondent reported to be unemployed, 0 otherwise. [f] Binary variable equal to 1 if observed week was affected by state-wide stay-at-home order in $t-1$, 0 otherwise. [g] social unrest as recorded by GDELT category 14, rescaled by 1000. States-week combinations with only selected counties affected by stay-at-home order are coded as 0. Additional controls on respondent-level include household income, family status, children, educational attainment, ethnicity, and age.

Table A.3: Association of negative emotion and negative perception of the economy and social unrest - full estimation output for Figure 2 in manuscript

		unemployment		*COVID-19 deaths*		*vote margin*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	pooled	low	high	low	high	low	high
Panel A. Negative emotions and political protest[a]							
avg. negative emotions (PCA)[a]	1.443**	0.033	2.241**	0.228	2.886**	2.061*	0.561
	(0.716)	(0.242)	(1.052)	(0.634)	(1.235)	(1.086)	(0.906)
semi elasticity[c]	[1.3]	[0.2]	[2.5]	[0.3]	[2.1]	[2.1]	[0.5]
unemployment rate $t-1$	−4.228	0.216	−10.593*	−0.123	−4.429	−4.842	−4.512
	(3.540)	(0.754)	(5.734)	(3.196)	(3.855)	(4.368)	(6.785)
death rate $t-1$	0.057	−0.009	0.040	−0.036	0.128	−0.043	0.093
	(0.054)	(0.022)	(0.179)	(0.023)	(0.100)	(0.047)	(0.078)
social unrest $t-2$	0.151**	0.166	0.083	0.293***	0.084	0.114	0.181**
	(0.060)	(0.141)	(0.070)	(0.107)	(0.078)	(0.078)	(0.070)
social unrest 2018 & 2019	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
week FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
state FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
R^2	0.497	0.829	0.507	0.531	0.553	0.393	0.581
Panel B. Negative perception of the economy and political protest[b]							
avg. economic perception (BAD ECON)[b]	1.114	−0.334	1.560	−0.385	2.317	1.233	1.140
	(0.972)	(0.214)	(1.438)	(0.414)	(2.236)	(2.029)	(0.744)
semi elasticity[c]	[1.0]	[−0.9]	[0.9]	[−0.5]	[1.7]	[1.2]	[0.9]
unemployment rate $t-1$	−2.397	0.099	−9.751*	2.990	−3.762	−5.501	0.057
	(3.516)	(0.673)	(5.624)	(3.236)	(3.815)	(5.756)	(4.769)
death rate $t-1$	0.062	0.000	0.009	−0.036	0.106	0.002	0.084
	(0.049)	(0.023)	(0.154)	(0.027)	(0.075)	(0.067)	(0.068)
social unrest $t-2$	0.168***	0.210	0.072	0.345***	0.101	0.135*	0.206***
	(0.060)	(0.145)	(0.073)	(0.114)	(0.080)	(0.080)	(0.063)
social unrest 2018 & 2019	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
week FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
state FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
R^2	0.454	0.840	0.477	0.520	0.514	0.359	0.565
Observations	1,052	343	709	440	612	539	513

Notes: Estimation results corresponding to Figure 2 in the manuscript. Heteroskedasticity robust standard errors are presented in parentheses, stars indicate significance: *, ** and *** indicate statistical significance at the 10-percent level, 5-percent level, and 1-percent level. All estimates are derived from weighted least squares regression, weighting by the standard deviation of the dependent variable at the state-week level. Estimation model is as described in equation 2. All result correspond to those illustrated in Figure 2. The same definitions of high/low Covid-19 deaths and unemployment rate are used as in Table A.2. The vote margin split is defined along the across-state median of the margin of the most recent gubernatorial elections. [a] Mean negative emotional stress reported on state-week level in percent. It measures the percentage of respondents in GALLUP-20 who registered a PCA score in the upper quartile. [b] The economic perception variable measures the percentage of GALLUP-2020 survey respondents who reported to perceive the US economy to be in a recession. [c] Semi-elasticity (calculated using the unweighted mean of the respective sample as the base) multiplied by 100 gives the percentage change in the specific rate (ratio) due to an one percentage point increase in the mean of the PCA and economic perception variables.

Table A.4: Association of unemployment and COVID-19 shocks on negative emotional stress - second component

	second component[a]		
	(1)	(2)	(3)
high deaths in $t-1$[c]	0.002	−0.002	0.001
	(0.004)	(0.005)	(0.005)
high unemp. in $t-1$[d]	0.000	−0.001	0.006
	(0.010)	(0.011)	(0.010)
high deaths in $t-1$		0.009	
× opposition		(0.008)	
high unemp. in $t-1$		0.001	
× opposition		(0.008)	
high deaths in $t-1$			0.005
× republican			(0.008)
high unemp. in $t-1$			−0.020**
× republican			(0.008)
opposition	0.004	−0.002	0.004
	(0.004)	(0.006)	(0.003)
republican	0.007**	0.007*	0.017**
	(0.004)	(0.004)	(0.006)
stay-at-home[f]	0.011*	0.011*	0.011*
	(0.006)	(0.006)	(0.006)
social unrest in $t-1$	0.008	0.008	0.008
	(0.006)	(0.006)	(0.006)
social unrest 2018/2019	*yes*	*yes*	*yes*
add. controls	*yes*	*yes*	*yes*
week FEs	*yes*	*yes*	*yes*
state FEs	*yes*	*yes*	*yes*
R^2	0.031	0.031	0.031
Mean dep. var.	0.234	0.234	0.234
N		90,396	

Notes: Robust standard errors, clustered on the state-week level, are presented in parentheses, stars indicate significance: *, ** and *** indicate statistical significance at the 10-percent level, 5-percent level, and 1-percent level. Estimation model is as described in equation 1. All result correspond to those illustrated in Figure 1.

[a] The dependent variable is equal to 1 if the PCA score of the second component of negative emotional stress according to the GALLUP-2020 survey is in the top quartile, 0 if in the lower 3 quartiles. [c] Binary variable equal to 1 if the observed cumulative COVID-19 related death rate (deaths per 1m state population) is above the median ($\sim$ 70), 0 otherwise. [d] Binary variable equal to 1 if the observed unemployment rate of a particular week in a particular state is above the median nation-wirde unemployment rate ($\sim$ 7.5) during weeks 4–35, 0 otherwise. [e] Binary variable indicating individual unemployment status. Variable is equal to 1 if the respondent reported to be unemployed, 0 otherwise. [f] Binary variable equal to 1 if observed week was affected by state-wide stay-at-home order, 0 otherwise. [g] political protest as recorded by GDELT category 14, rescaled by 1000. States-week combinations with only selected counties affected by stay-at-home order are coded as 0. Additional controls on respondent-level include household income, family status, children, educational attainment, ethnicity, and age.

Table A.5: Association of negative emotion and social unrest - continuous measure of negative emotional stress (PCA score)

		unemployment		*COVID-19 deaths*		*vote margin*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	pooled	low	high	low	high	low	high
avg. negative emotions (PCA)[a]	70.960**	−2.474	94.313**	18.807	115.409**	87.299*	41.772
	(30.231)	(5.741)	(43.363)	(18.504)	(52.487)	(50.161)	(31.408)
unemployment rate $t-1$	−4.296	0.218	−9.845*	−0.095	−4.503	−4.865	−4.287
	(3.547)	(0.725)	(5.548)	(3.123)	(3.779)	(4.539)	(6.578)
death rate $t-1$	0.061	−0.007	0.038	−0.037	0.137	−0.029	0.096
	(0.054)	(0.022)	(0.171)	(0.023)	(0.099)	(0.052)	(0.078)
social unrest $t-2$	0.143**	0.158	0.080	0.286***	0.079	0.109	0.175**
	(0.060)	(0.142)	(0.069)	(0.107)	(0.078)	(0.080)	(0.070)
social unrest 2018 & 2019	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
week FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
state FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
R^2	0.494	0.823	0.505	0.530	0.553	0.393	0.581
Observations	1,052	343	709	440	612	539	513

Notes: Estimation results corresponding to Figure 2 in the manuscript. Heteroskedasticity robust standard errors are presented in parentheses, stars indicate significance: *, ** and *** indicate statistical significance at the 10-percent level, 5-percent level, and 1-percent level. All estimates are derived from weighted least squares regression, weighting by the standard deviation of the dependent variable at the state-week level. Estimation model is as described in equation 2. All result correspond to those illustrated in Figure 2. The same definitions of high/low Covid-19 deaths and unemployment rate are used as in Table A.2. The vote margin split is defined along the across-state median of the margin of the most recent gubernatorial elections. [a] Mean score (by state-week) core calculated from component 1 of the principal component analysis for all 6 GALLUP-2020 items indicating negative emotional stress, mean −0.090 (st.dev. 0.306).

Table A.6: Association of negative emotion and social unrest - interaction Afro-American population

		unemployment		*COVID-19 deaths*		*vote margin*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	pooled	low	high	low	high	low	high
avg. negative emotions (PCA)[a]	1.791**	−0.223	2.969**	0.115	3.606**	2.169*	1.176
	(0.870)	(0.236)	(1.344)	(0.669)	(1.671)	(1.249)	(1.175)
avg. negative emotions	−1.387	1.481	−2.563	0.773	−2.086	−0.618	−1.791
× high Afro American pop.[b]	(1.508)	(0.978)	(2.129)	(1.426)	(2.372)	(1.745)	(2.350)
additional controls	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
week FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
state FEs	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
R^2	0.497	0.831	0.508	0.531	0.553	0.393	0.582
Observations	1,052	343	709	440	612	539	513

Notes: Estimation results corresponding to Figure 2 in the manuscript. Heteroskedasticity robust standard errors are presented in parentheses, stars indicate significance: *, ** and *** indicate statistical significance at the 10-percent level, 5-percent level, and 1-percent level. All estimates are derived from weighted least squares regression, weighting by the standard deviation of the dependent variable at the state-week level. Estimation model is as described in equation 2. All result correspond to those illustrated in Figure 2. The same definitions of high/low Covid-19 deaths and unemployment rate are used as in Table A.2. The vote margin split is defined along the across-state median of the margin of the most recent gubernatorial elections. [a] Mean score (by state-week) core calculated from component 1 of the principal component analysis for all 6 GALLUP-2020 items indicating negative emotional stress, mean −0.090 (st.dev. 0.306). [b] Interaction of PCA variable with a binary variable indicating a high share of Afro American population in the observed state. Threshold value is 14%, the mean of the Afro American population (according to the 2019 census) is 13.4%.

Table A.7: Association of negative emotional stress (PCA) and social unrest – alternative specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PCA	1.796**	1.443**	1.455*	2.149***	2.201***	1.972***	1.465**	2.028**
	(0.739)	(0.716)	(0.826)	(0.780)	(0.778)	(0.757)	(0.647)	(0.876)
social unrest $t-2$	0.246***	0.151**	0.150**	0.210***	0.205***	0.189***	0.268***	0.225***
	(0.047)	(0.060)	(0.061)	(0.048)	(0.049)	(0.052)	(0.049)	(0.073)
unemp. rate $t-1$		−4.228	−4.296	−4.033	−3.102	−3.153	−0.340	−2.385
		(3.540)	(3.612)	(3.193)	(2.940)	(2.658)	(1.278)	(2.282)
death. rate $t-1$		0.057	0.065	0.061	0.060	0.058	0.003	0.047
		(0.054)	(0.057)	(0.041)	(0.041)	(0.038)	(0.013)	(0.046)
state pop. (mio.)				10.272***	10.991***	9.868***	7.949**	10.604**
				(2.971)	(3.106)	(3.099)	(3.418)	(5.025)
pop. density				−0.083**	−0.119**	−0.077***	−0.039***	−0.073**
				(0.033)	(0.046)	(0.029)	(0.015)	(0.035)
black share				−95.150	1.944	−98.140	−53.985	−113.856
				(65.423)	(73.142)	(62.683)	(48.254)	(72.239)
republican				−42.472**	−38.633**	−45.492***	−30.291***	−15.798
				(17.044)	(15.443)	(17.101)	(10.745)	(11.560)
vote margin				0.707	0.691	0.659	0.585	0.404
				(0.535)	(0.524)	(0.561)	(0.514)	(0.673)
stay-at-home				−12.656	−13.951	−0.891	20.084	4.176
				(22.378)	(22.978)	(18.118)	(13.987)	(38.839)
crime rate					−0.051			
					(0.032)			
imprison rate					−0.061			
					(0.063)			
poverty rate					−1.000			
					(2.632)			
strong blm						192.322*		
						(113.303)		
week FEs	yes	yes	yes	yes	yes	yes	yes	yes
state FEs	no	yes	yes	no	no	no	no	no
week*black-share FEs	no	no	yes	no	no	no	no	no
N	1,052	1,052	1,052	1,052	1,052	1,052	993	678
R^2	0.423	0.497	0.498	0.458	0.460	0.476	0.490	0.488

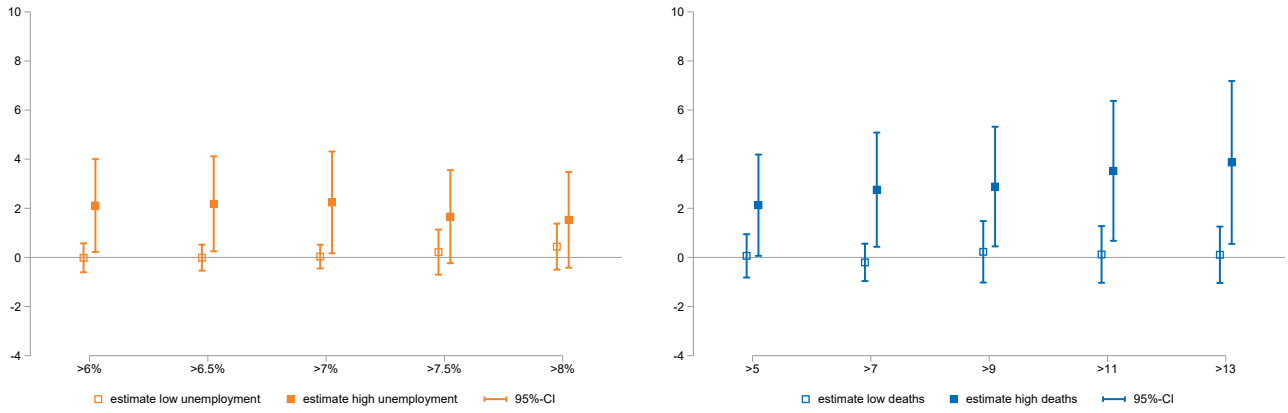
Notes: Robust standard errors, are presented in parentheses, stars indicate significance: *, ** and *** indicate statistical significance at the 10-percent level, 5-percent level, and 1-percent level. Specification (2) is our main specification as presented in equation 2.
Additional state-level control variables in specification (5) are derived from d the FBI Uniform Crime Reporting Program. Data are available at https://eu.usatoday.com/story/money/2020/01/13/most-dangerous-states-in-america-violent-crime-murder-rate/40968963/
The variable *strong BLM* is equal to 1 if the increase in registered political protest at the beginning of the Black Lives Matter protest was larger than 11, 0 otherwise.
Specification (7) is estimated using model (4) without state-weeks that are strongly affected by the Black Lives Matter protests.
Specification (8) is estimated using model (4) without states that are above-median affected by the Black Lives Matter protests.

Table A.8: Association of negative perception of the economy and social unrest – alternative specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PCA	1.121	1.040	1.134	1.334	1.360	1.226	0.153	0.754
	(0.758)	(0.935)	(1.015)	(0.878)	(0.827)	(0.821)	(0.517)	(0.826)
social unrest $t-2$	0.246***	0.152**	0.151**	0.211***	0.206***	0.190***	0.267***	0.224***
	(0.046)	(0.060)	(0.060)	(0.047)	(0.048)	(0.052)	(0.050)	(0.074)
unemp. rate $t-1$		−4.089	−4.103	−4.066	−3.110	−3.179	−0.195	−2.253
		(3.456)	(3.513)	(3.266)	(2.987)	(2.720)	(1.250)	(2.304)
death. rate $t-1$		0.053	0.060	0.062	0.061	0.059	0.002	0.046
		(0.053)	(0.056)	(0.042)	(0.042)	(0.039)	(0.013)	(0.047)
state pop. (mio.)				10.276***	10.945***	9.870***	7.844**	10.634**
				(2.985)	(3.113)	(3.113)	(3.437)	(5.070)
pop. density				−0.080**	−0.113**	−0.074**	−0.032**	−0.067*
				(0.034)	(0.046)	(0.030)	(0.014)	(0.035)
black share				−88.050	0.341	−91.608	−61.509	−111.747
				(63.256)	(72.667)	(60.806)	(48.638)	(70.421)
republican				−41.135**	−37.695**	−44.274***	−31.928***	−15.402
				(16.832)	(15.719)	(16.750)	(11.313)	(12.534)
vote margin				0.622	0.630	0.581	0.558	0.304
				(0.524)	(0.522)	(0.549)	(0.503)	(0.634)
stay-at-home				−13.455	−14.590	−1.563	21.153	4.685
				(23.052)	(23.500)	(18.745)	(14.353)	(39.240)
crime rate					−0.060*			
					(0.035)			
imprison rate					−0.051			
					(0.059)			
poverty rate					−0.819			
					(2.688)			
strong blm						193.394*		
						(113.083)		
week FEs	yes	yes	yes	yes	yes	yes	yes	yes
state FEs	no	yes	yes	no	no	no	no	no
week*black-share FEs	no	no	yes	no	no	no	no	no
N	1,052	1,052	1,052	1,052	1,052	1,052	993	678
R^2	0.422	0.496	0.498	0.456	0.459	0.475	0.488	0.486

Notes: Robust standard errors, are presented in parentheses, stars indicate significance: *, ** and *** indicate statistical significance at the 10-percent level, 5-percent level, and 1-percent level. Specification (2) is our main specification as presented in equation 2.
Additional state-level control variables in specification (5) are derived from d the FBI Uniform Crime Reporting Program. Data are available at https://eu.usatoday.com/story/money/2020/01/13/most-dangerous-states-in-america-violent-crime-murder-rate/40968963/
The variable *strong BLM* is equal to 1 if the increase in registered political protest at the beginning of the Black Lives Matter protest was larger than 11, 0 otherwise.
Specification (7) is estimated using model (4) without state-weeks that are strongly affected by the Black Lives Matter protests.
Specification (8) is estimated using model (4) without states that are above-median affected by the Black Lives Matter protests.

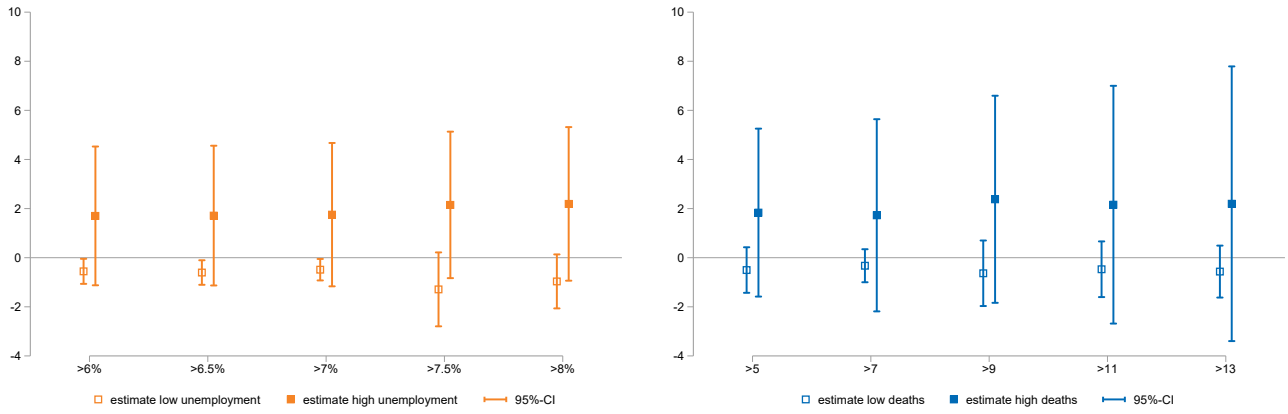
Figure B.2: Robustness: Effect of negative emotional stress (PCA) on social unrest for different thresholds of unemployment rate and COVID-19 deaths



(a) Unemployment (b) Covid-19 deaths

Notes: Estimated coefficients and 95% confidence intervals from estimating model 2 for different thresholds in high/low unemployment.

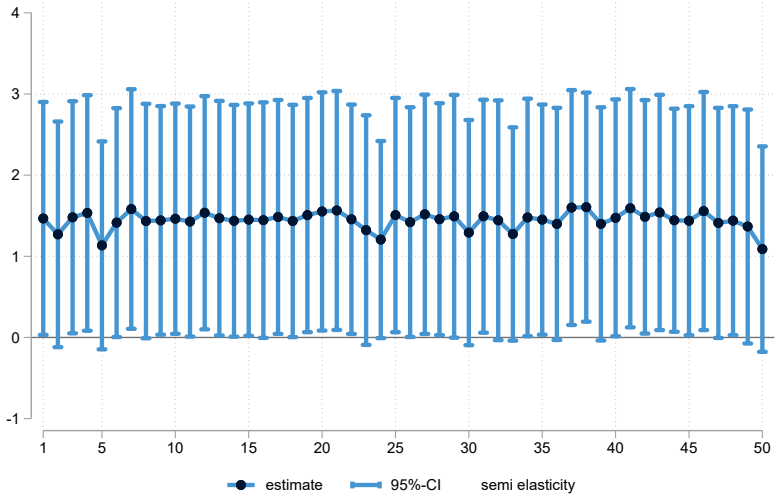
Figure B.3: Robustness: Effect of BAD ECON on social unrest for different thresholds of unemployment rate and COVID-19 deaths



(a) Unemployment (b) Covid-19 deaths

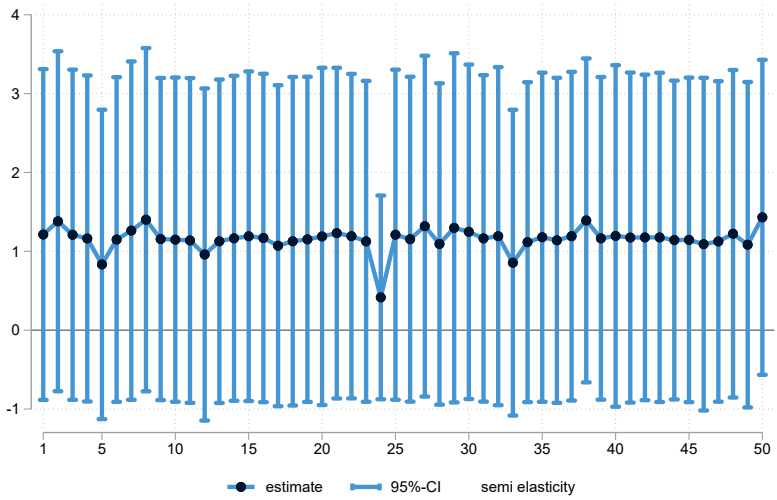
Notes: Estimated coefficients and 95% confidence intervals from estimating model 2 for different thresholds in high/low unemployment.

Figure B.4: Negative emotions (PCA) and social unrest (GDELT) - jackknife approach



Notes: Estimated coefficients and 95% confidence intervals from estimating model 2 with the sequential omission of 1 state out of 50 US states in our data.

Figure B.5: Perception of the economy (BAD ECON) and social unrest (GDELT) - jackknife approach



Notes: Estimated coefficients and 95% confidence intervals from estimating model 2 with the sequential omission of 1 state out of 50 US states in our data.