CESIFO WORKING PAPERS

8869 2021

January 2021

Trust in Government and Compliance With Stay at Home Orders in American States

Oguzhan C. Dincer



Impressum:

CESifo Working Papers

ISSN 2364-1428 (electronic version)

Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo

GmbH

The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute

Poschingerstr. 5, 81679 Munich, Germany

Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de

Editor: Clemens Fuest

https://www.cesifo.org/en/wp

An electronic version of the paper may be downloaded

from the SSRN website: www.SSRN.comfrom the RePEc website: www.RePEc.org

· from the CESifo website: https://www.cesifo.org/en/wp

Trust in Government and Compliance With Stay at Home Orders in American States

Abstract

Trust in government is particularly important in implementing public health policies especially during crises such as the COVID-19 pandemic. This study investigates the effects of trust in government and compliance with stay at home orders using data from American states during the first wave of the pandemic. A system of four seemingly unrelated regression (SUR) equations covering four consecutive Saturdays starting with April 25 is estimated with maximum likelihood. The regression results indicate that people are more likely to comply with stay at home orders in more trusting states.

JEL-Codes: I180, D700, D730.

Keywords: trust in government, Covid-19, social distancing.

Oguzhan C. Dincer
Department of Economics
Illinois State University
Campus Box 4200
USA - 61790-4200, Normal, IL
odincer@ilstu.edu

During the first wave of the COVID-19 pandemic most of the states issued *stay at home* orders as part of their social distancing policies to prevent the spread of the virus. Schools, restaurants, and bars were closed, and all nonessential businesses were ordered to keep workers home and let them work remotely. The order was mandatory in some states and advisory in others. People were asked not to leave their homes unless necessary. Americans' compliance with the *stay at home* orders varied significantly across the states. In some states such as Michigan, protesters armed with assault rifles rallied in the state capitol building not once but three times in May.

In their study published in *Public Administration Review* in *COVID-19 Viewpoint Symposium*, Christensen and Lægreid (2020) hypothesized that Norway's success of handling the pandemic was mostly due to its government's legitimacy. According to a recent survey conducted by Helsingen et al. (2020), almost 99% of Norwegians complied with the preventive measures taken by the government in March including the draconian ones such as curfews. Although the measures were not enforced, people responded to the government's appeal to trust in their government and their willingness to help out in a national emergency positively (Christensen and Lægreid 2020, 777).

Christensen and Lægreid (2016) define government legitimacy as the belief that government does what is desirable, appropriate, and fair. It increases compliance with government policies (Marien and Hooghe 2011). Legitimacy of a government depends on how trustworthy it is (Christensen and Lægreid 2005). Trust in government is particularly important in implementing public health policies especially during crises such as the COVID-19 pandemic. Several studies find that trust in government explains people's behavior towards public health policies such as social distancing. Helsingen et al. (2020),

using individual survey data from Norway and Sweden, and Robinson et al. (2020) from America, both find that people who trust in their governments are more likely to comply with social distancing policies. Empirical evidence from earlier public health crises such as the Ebola epidemic support their findings. Blair et al. (2017) and Vinck et al. (2019) both find that low trust in government explains lower compliance with social distancing and lower acceptance of a vaccine in Liberia and Democratic Republic of Congo, respectively.¹

In this study, Christensen and Lægreid's (2020) hypothesis regarding the relationship between trust in government and compliance with social distancing policies is tested using data from American states during the first wave of the COVID-19 pandemic. The study is organized as follows. In the next section, data and estimation method are described. The results are presented and discussed in the following two section. The last section concludes the study.

Estimation Method and Data

The following system of four seemingly unrelated regression (SUR) equations is estimated with maximum likelihood:

Shelter in Place Index_{i,April 18} =
$$\beta_0 + \beta_1 \cdot Trust$$
 in Government_i
 $+\beta_2 \cdot COVID$ -19 Positive_{i,April 16} + $X_i^{'}\beta_j + u_{i,April 18}$
Shelter in Place Index_{i,April 18} = $\alpha_0 + \alpha_1 \cdot Trust$ in Government_i
 $+\alpha_2 \cdot COVID$ -19 Positive_{i,April 23} + $X_i^{'}\alpha_j + \varepsilon_{i,April 25}$
Shelter in Place Index_{i,April 18} = $\gamma_0 + \gamma_1 \cdot Trust$ in Government_i
 $+\gamma_2 \cdot COVID$ -19 Positive_{i,April 30} + $X_i^{'}\gamma_j + \mu_{i,May 02}$
Shelter in Place Index_{i,April 18} = $\delta_0 + \delta_1 \cdot Trust$ in Government_i
 $+\delta_2 \cdot COVID$ -19 Positive_{i,May 07} + $X_i^{'}\delta_i + v_{i,May 09}$

where Shelter in Place Index represents an index constructed by SafeGraph. It measures people's compliance with stay at home orders which very is challenging. Previous studies using individual surveys such as Helsingen et al. (2020) and Robinson et al. (2020) construct indices based on self-reported data. The Shelter in Place Index is constructed based on observed data. Using anonymized data representing 45 million smartphones, Shelter in Place Index represents the change (as a difference) in the percentage of people staying home compared to baseline. The index ranges from -100 to 100, where 0 (zero) is no change from baseline. Home refers to the most common nighttime location in recent months identified to a precision of about 100 square meters. Baseline is defined as the average percent of people staying home each day across the seven days ending February 12, 2020. If, for example, the baseline percentage of people staying home for a state is 20 and 30 percent of the population is staying home on March 27th, then the index for March 27th is 30 - 20 = 10. Observed data are more reliable than self-reported data due to possible social desirability bias when it comes to compliance with preventive health measures. Social desirability is major source response bias in survey research. It refers to the survey respondents' tendency to draw a favorable picture of themselves, i.e., the tendency to underreport socially undesirable behavior and overreport the socially desirable ones (DeMaio 1985). Henry et al. (1992), for example, find that emergency department doctors and nurses significantly overreport their use of gloves, gowns, masks, and goggles.

The data cover four consecutive Saturdays starting from April 18. Between mid-April and mid-May, stay at home orders were in place in all states but 5 (Arkansas, Connecticut, Nebraska, North Dakota, and Wyoming). Compliance with the *stay at*

home orders varies significantly across states and over time. Between April 18 and May 9, when COVID-19 related deaths peaked in both states, while the *Shelter in Place Index* in California ranged between 17.64 and 20.86 it ranged between 9.61 and 14.92 in Georgia.

Measuring legitimacy at the state level is as challenging as measuring compliance with *stay at home* orders. *Trust in Government* is a crucial determinant of legitimacy and it is widely used in the literature as a measure (see Gilley 2006, 2012, Levi et al. 2009). Sampling in American National Election Study (ANES) and General Social Survey (GSS), the two frequently used surveys in the literature which ask questions regarding trust in government is done at the national level, not at the state level. The COVID-19 Consortium for Understanding the Public's Policy Preferences Across States (COVID States Project) which is a joint project of The Network Science Institute of Northeastern University, The Shorenstein Center on Media, Politics, and Public Policy of Harvard University, and School of Communication and Information, Rutgers University conducted 50 state survey weighted for race/ethnicity, age, and gender in each state at the end of April measuring trust in several people and organizations ranging from state governments to pharmaceutical companies to Joe Biden in handling the COVID-19 pandemic. The following question was asked to each participant:

How much do you trust the following people and organizations to do the right thing to best handle the current coronavirus (COVID-19) outbreak?

The four-point response scale ranges from "a lot" to "not at all". Percentage of respondents who trust their state government "a lot" is used as the measure of

government legitimacy in this study. There is a significant variation across the states in terms of the level of trust in government as well. While in Massachusetts more than 50 percent of the respondents trust their state government "a lot", it is only 20 percent of respondents in Idaho. Figure 1 shows the relationship between *Trust in Government* and *Shelter in Place Index* in the states which issued a *stay at home* order during the time period investigated in this study.

COVID-19 Positive represents the percentage of people tested positive for COVID-19 in each state on four consecutive Thursdays starting from April 16. Since higher positivity rate indicates a higher infection risk, people are expected to comply with social distancing orders more.

X represents the set of economic and demographic control variables used in ML estimation. The economic control variables are median income (*Income*) and unionization rate (*Union*). Social distancing is costlier for lower income people who are mostly essential workers with little to no savings making it more difficult to comply with *stay at home* orders. But unionized workers had various health and safety and financial protections due to their collective bargaining agreements. General Motors, Ford, and Fiat Chrysler, for example, paused operations for two weeks in late March to slow the spread of the virus after negotiating with the United Auto Workers. The Communications Workers of America successfully negotiated additional paid sick and family leave for unionized Verizon workers (McNicholas et al. 2020).

The demographic control variables are population (*Population*), urbanization (*Urban*), and the percentage of people whore older than 64 (*Old*). According to several surveys conducted by Gallup in March, Americans who live in more populated and more

urbanized states are likely to comply with social distancing orders.⁴ The same applies for the states with oldest population since older people are more vulnerable to *COVID-19*. Variable definitions, data sources, and summary statistics are given in Table 1.

Each Saturday from April 18 to May 9 forms one fourth of the system. Because it allows errors to be correlated across the equations, estimating a SUR system with ML is more efficient than estimating each equation individually with Ordinary Least Squares (OLS).

Results

The ML estimates with robust standard errors clustered at the state level are presented in Table 2. First, a parsimonious model with only *COVID-19 Positive* and *Trust in Government* is estimated, followed by the full model including all economic and demographic control variables. The estimated coefficient of *Trust in Government* is positive and statistically significant in all four equations indicating that people are more likely to comply with *stay at home* orders in more trusting states. The coefficient estimates of equation 4 indicates that a 1 standard deviation increase in *Trust in Government* causes *Shelter in Place Index* to increase by 0.2 deviations. This is not trivial. The estimated standardized coefficients of *COVID-19 Positive* and Log *Income* are 0.3. and 0.45, respectively. Estimated coefficients of the control variables are also statistically significant and they all have the expected signs. Positivity rate is certainly one of the most important determinants of *stay at home* behavior. Across all four equations the estimated coefficient is positive, and its magnitude does not fluctuate. In populated and urbanized states people stay at home more. Cost of staying at home

matters as well. In states with higher median incomes in which workers are unionized compliance with *stay at home* orders is higher.

Digression: Trusting the State Government vs. Trusting Donald Trump

In late April, Donald Trump started showing his opposition to the preventive measures including stay at home orders issued by individual states. On one late Friday night, he posted a trio of tweets calling for the "liberation" of Michigan, Minnesota, and Virginia. In his news conferences during late April and early May he asked for individual states to relax the social distancing policies arguing that the spread of the virus was slowing down. During May, there were protests in most states. To investigate the effects of Donald Trump's behavior on people's compliance with stay at home orders, the SUR system is re-estimated for the three Saturdays following Donald Trump's infamous tweet of April 17 including a new variable, Trust in Donald Trump. The data again are from the COVID States Project and the variable is measured as the percentage of people who trust Donald Trump "a lot". The results are given in Table 3. As expected, *Trust in Donald Trump* is negative and statistically significant (albeit only marginally in equation 2). Perhaps more interestingly, the magnitudes of the estimated coefficients of Trust in Donald Trump and Trust in Government are not statistically significantly different from each other. In other words, Trust in Donald Trump wipes out the positive effects of Trust in Government on compliance with stay at home orders.

Discussion

The results presented above have important implications regarding vaccinating people against *COVID*-19. According to Anthony Fauci, the most prominent U.S. infectious disease expert, herd immunity against *COVID*-19 requires vaccination rates approaching

as high as 90 percent.⁵ Will 90 percent of the population accept to be vaccinated, when the vaccine is available widely? According to Larson et al. (2018) vaccine acceptance depends on multiple levels of trust: trust in the vaccine, trust in the health professionals providing and administering the vaccine, and trust in government approving and recommending the vaccine. Trust in government also affects social trust (Levi 1998, Levi and Stoker 2000, Rothstein 2000, 2005) which in turn affects vaccine acceptance.

Freimuth et al. (2017), for example, find that even when racial and ideological variables are controlled for, there is a positive relationship between social trust and vaccine acceptance (for influenza vaccine) using a national sample 800 Black and White Americans.

Vaccinating millions of Americans against *COVID*-19 creates an opportunity for state governments for building trust. Although there are federal guidelines regarding the distribution of the vaccine both across and within the states, state governors decide on who receives the first doses of the vaccine and who administers them. Failure to distribute and administrate the vaccine fairly and effectively will cause significant damage to trust in government. Florida, for example, is a complete mess. Governor of Florida decided to vaccinate people 65 and older even before the most essential workers but left the administration of the vaccine to the counties. Lee County in Southwest Florida had a first-come first-serve approach which led to people camping out overnight to get vaccinated. In Palm Beach County, while wealthy people with connections get vaccinated, others were told the wait, possibly months. Adding to the mess, the Florida Division of Emergency Management announced the temporary closure of its coronavirus testing and vaccination site at Hard Rock Stadium in Miami Gardens because of the

College Football Playoff national championship game.⁷ This is bad news for Florida as the percentage of people who trust the state government in Florida already falls into the lowest quartile.

Conclusion

Government legitimacy plays a crucial role in successful implementation of public health policies. According to Christensen and Lægreid (2020), Norway's success of handling the COVID-19 pandemic was mostly due to its government's legitimacy. A vast majority of Norwegians complied with the social distancing orders issued by the government because they trust their government. In this study, the relationship between trust in government and compliance with stay at home orders is investigated using data from American states. The regression results indicate that there is indeed a positive relationship between the two. In terms of policy, this suggests that states such Oklahoma, South Dakota, Mississippi, Georgia, Alabama, Florida and Idaho in which the trust in government is low, need the help of trusted personalities to legitimize the public health policies. Donald Trump, who is trusted more than the governments in these states, made it only worse by opposing the stay at home orders. Illinois, on the other hand, launched an "all in" campaign at the beginning of April, asking Illinoisans to comply with the stay at home orders. The campaign was very successful partly because local celebrities ranging from hip hop artist Chance the Rapper to Chicago Blackhawks right winger Patrick Kane to comedian Jane Lynch were heavily involved.

Endnotes

- 1. For other studies regarding the relationship between trust in government and vaccination, see Nawa and Fujiwara (2019) for Japan, Chuang et al. (2015) for Taiwan, and Yaqub et al. (2014) for Germany, UK, France, Italy, and Spain.
- 2. See safegraph.com for details.
- 3. See Moreland et al. (2020).
- 4. Lydia Saad, "Americans Rapidly Answering the Call to Isolate, Prepare", gallup.com, March 20, 2020.
- 5. Jonathan Allen, "Fauci Says Herd Immunity Could Require Nearly 90% to Get Coronavirus Vaccine", reuterts.com, December 24, 2020.
- 6. Eric Levenson, Angela Barajas and Ryan Young, "Florida's First-Come, First-Serve COVID-19 Vaccination Plan for the Elderly Leads to Scramble." CNN.com, December 30, 2020.
- 7. Patricia Mazzei, Eric Adelson and Kate Kelly, "It Became Sort of Lawless: Florida Vaccine Rollout Turns into a Free-for-All", New York Times, January 10, 2021.

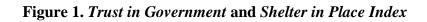
References

- Blair, Robert A., Benjamin S. Morse, and Lily L. Tsai. 2017. "Public Health and Public Trust: Survey Evidence from the Ebola Virus Disease Epidemic in Liberia." Social Science & Medicine 172: 89–97.
- Gilley, Bruce. 2006. "The Meaning and Measure of State Legitimacy: Results for 72 Countries." *European Journal of Political Research* 45 (3): 499–525.
- ———. 2012. "State Legitimacy: An Updated Dataset for 52 Countries." *European Journal of Political Research* 51 (5): 693–699.
- Christensen, Tom, and Per Lægreid. 2005. "Trust in Government: The Relative Importance of Service Satisfaction, Political Factors, and Demography." *Public Performance & Management Review* 28 (4): 487–511.
- ———. 2020. "Balancing Governance Capacity and Legitimacy: How the Norwegian Government Handled the COVID-19 Crisis as a High Performer." *Public Administration Review* 80 (5): 774–79.
- Christensen, Tom, Per Lægreid, and Lise H. Rykkja. 2016. "Organizing for Crisis Management: Building Governance Capacity and Legitimacy." *Public Administration Review* 76 (6): 887–97.
- Chuang, Ying-Chih, Ya-Li Huang, Kuo-Chien Tseng, Chia-Hsin Yen, and Lin-hui Yang. 2015. "Social Capital and Health-Protective Behavior Intentions in an Influenza Pandemic." *PLOS ONE* 10 (4): e0122970.
- DeMaio, Theresa. 1984. "Social Desirability and Survey Measurement: A Review." In Surveying Subjective Phenomena, edited by Charles Turner and Elizabeth Martin. New York: Russell Sage Foundation.
- Freimuth, Vicki S., Amelia M. Jamison, Ji An, Gregory R. Hancock, and Sandra Crouse Quinn. 2017. "Determinants of Trust in the Flu Vaccine for African Americans and Whites." *Social Science & Medicine* 193: 70–79.
- Helsingen, Lise M., Erle Refsum, Dagrun Kyte Gjøstein, Magnus Løberg, Michael Bretthauer, Mette Kalager, and Louise Emilsson. 2020. "The COVID-19 Pandemic in Norway and Sweden Threats, Trust, and Impact on Daily Life: A Comparative Survey." *BMC Public Health* 20 (1).

- Henry, Keith, Scott Campbell, and Myra Maki. 1992. "A Comparison of Observed and Self-Reported Compliance with Universal Precautions among Emergency Department Personnel at a Minnesota Public Teaching Hospital: Implications for Assessing Infection Control Programs." *Annals of Emergency Medicine* 21 (8): 940–46.
- Larson, Heidi J., Richard M. Clarke, Caitlin Jarrett, Elisabeth Eckersberger, Zachary Levine, Will S. Schulz, and Pauline Paterson. 2018. "Measuring Trust in Vaccination: A Systematic Review." *Human Vaccines & Immunotherapeutics* 14 (7): 1599–1609.
- Levi, Margaret. 1998. "A State of Trust." In *Trust and Governance*, edited by Valerie Braithwaite and Margaret Levi. New York: Russell Sage Foundation.
- Levi, Margaret, Audrey Sacks, and Tom Tyler. 2009. "Conceptualizing Legitimacy, Measuring Legitimating Beliefs." *American Behavioral Scientist* 53 (3): 354–75.
- Levi, Margaret, and Laura Stoker. 2000. "Political Trust and Trustworthiness." *Annual Review of Political Science* 3 (1): 475–507.
- Marien, Sofie, and Marc Hooghe. 2011. "Does Political Trust Matter? An Empirical Investigation into the Relation between Political Trust and Support for Law Compliance." *European Journal of Political Research* 50 (2): 267–91.
- McNicholas, Celine, Lynn Rhinehart, Margaret Poydock, Heidi Shierholz, and Daniel Perez. 2020. "Why Unions Are Good for Workers—Especially in a Crisis like COVID-19." Washington, DC: Economic Policy Institute.
- Moreland, Amanda. 2020. "Timing of State and Territorial COVID-19 Stay-at-Home Orders and Changes in Population Movement United States, March 1–May 31, 2020." MMWR. Morbidity and Mortality Weekly Report 69.
- Nawa, Nobutoshi, and Takeo Fujiwara. 2019. "Association between Social Capital and Second Dose of Measles Vaccination in Japan: Results from the A-CHILD Study." *Vaccine* 37 (6): 877–81.
- Robinson, Scott E., Joseph T. Ripberger, Kuhika Gupta, Jennifer A. Ross, Andrew S. Fox, Hank C. Jenkins-Smith, and Carol L. Silva. 2020. "The Relevance and Operations of Political Trust in the COVID-19 Pandemic." *Public Administration Review*, forthcoming.

- Rothstein, Bo. 2000. "Trust, Social Dilemmas and Collective Memories." *Journal of Theoretical Politics* 12 (4): 477–501.
- ———. 2005. *Social Traps and the Problem of Trust*. Cambridge: Cambridge University Press.
- Vinck, Patrick, Phuong N Pham, Kenedy K Bindu, Juliet Bedford, and Eric J Nilles. 2019. "Institutional Trust and Misinformation in the Response to the 2018–19 Ebola Outbreak in North Kivu, DR Congo: A Population-Based Survey." *The Lancet Infectious Diseases* 19 (5): 529–36.
- Yaqub, Ohid, Sophie Castle-Clarke, Nick Sevdalis, and Joanna Chataway. 2014.

 "Attitudes to Vaccination: A Critical Review." *Social Science & Medicine* 112: 1–11.



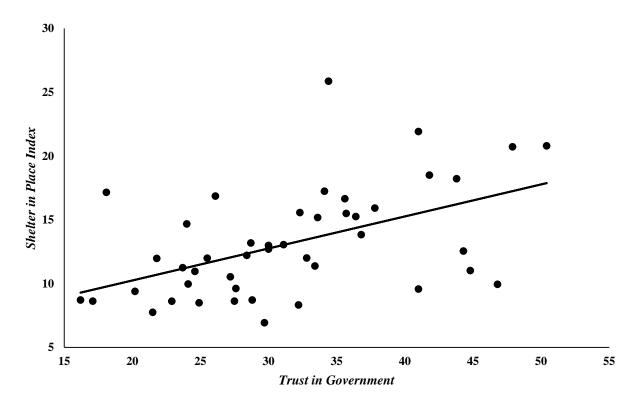


Table 1. Summary Statistics

	Mean	Std. Dev.	Min.	Max.	
Shelter in Place Index					
April 18, 2020	16.204	4.214	10.370	29.050	
April 25, 2020	13.088	4.201	6.910	26.080	
May 2, 2020	11.344	4.532	4.220	24.260	
May 9, 2020	11.872	4.363	5.660	24.040	
COVID-19 Positive					
April 16, 2020	12.819	9.363	2.560	49.606	
April 23, 2020	13.017	9.255	2.265	49.957	
April 30, 2020	12.450	8.765	1.877	47.859	
May 7, 2020	11.816	8.220	1.536	45.662	
Trust in Government	31.480	8.552	16.200	50.400	
Trust in Donald Trump	25.668	5.823	11.600	41.400	
Income	61,549	10,184	44,097	83,242	
Union	11.531	5.199	3.600	24.400	
Urban	74.166	14.775	38.700	95.000	
Old	16.506	1.970	11.100	20.600	
Population P. C. S.	6,550,675	7,389,282	578,759	39,512,223	

Data Sources:

Shelter in Place Index: SafeGraph (safegraph.com)

COVID-19 Positive: COVID Tracking Project (covidtracking.com)

Legitimacy: COVID States Project (covidstates.org) *Income*, *Union*, *Urban*, *Old*, *Population*: U.S. Census Bureau (census.gov)

Table 2. Maximum Likelihood SUR Estimation Dependent Variable: Log Shelter in Place Index

	_	ation 1 18, 2020	-	ation 2 25, 2020	-	nation 3 7 2, 2020	-	uation 4 y 9, 2020
COVID-19 Positive	.210 (.005)***	.177 (.002)***	.206 (.005)***	.156 (.002)***	.188 (.006)***	.141 (.002)***	.195 (.006)***	.161 (.002)***
Legitimacy	.175 (.057)***	.057 (.015)***	.160 (.060)***	.042 (0.020)**	.221 (.066)***	.082 (.021)***	.227 (.061)***	.095 (.021)***
Log Income		10.707 (1.354)***		8.728 (1.714)***		12.138 (1.659)***		12.069 (1.492)***
Union		.071 (.043)*		.104 (.037)***		.097 (.036)***		.107 (0.040)***
Urban		.081 (.017)***		.097 (.019)***		.096 (.017)***		.073 (.015)***
Old		.299 (.095)***		.315 (.098)***		.514 (.090)***		.504 (.096)***
Log Population		.363 (.204)*		.705 (.190)***		.554 (.222)**		.341 (.214)
Constant	7.993 (1.847)***	-123.128 (16.111)***	5.362 (1.940)***	-110.752 (19.144)***	2.051 (2.236)	-151.875 (18.321)***	2.404 (2.117)	-146.187 (16.146)***

Robust standard errors (clustered at the state level) in parentheses. ***, **, and * represent statistical significance levels at 1%, 5%, and 10% levels, respectively. Breusch-Pagan test for the independence of residuals is rejected at the 1% significance level for both specifications.

Table 3. Maximum Likelihood SUR Estimation Dependent Variable: Log Shelter in Place Index

	Equation 1	Equation 2	Equation 3
	April 25, 2020	May 2, 2020	May 9, 2020
COVID-19 Positive	.162	.146	.169
	(.002)***	(.002)***	(.002)***
Trust in Government	.039	.079	.089
	(.019)*	(.019)***	(.018)***
Trust in Donald Trump	059	054	088
	(.033)*	(.039)	(.034)***
Log Income	7.308	10.843	9.948
	(1.908)***	(1.768)***	(1.489)***
Union	.109	.103	.118
	(.036)*	(.034)***	(0.039)***
Urban	.095	.094	.071
	(.018)***	(.016)***	(.012)***
Old	.227	.434	.373
	(.120)*	(.120)***	(.107)***
Log Population	.654	.512	.278
	(.195)***	(.219)**	(.187)
Constant	-91.253	-134.160	-117.274
	(22.833)***	(20.903)***	(16.665)***

Robust standard errors (clustered at the state level) in parentheses. ***, **, and * represent statistical significance levels at 1%, 5%, and 10% levels, respectively. Breusch-Pagan test for the independence of residuals is rejected at the 1% significance level for both specifications.