Barnes, Stephen R.; Beland, Louis-Philippe; Huh, Jason; Kim, Dongwoo

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The Effect of COVID-19 Lockdown on Mobility and Traffic Accidents: Evidence from Louisiana

Stephen R. Barnes, Louis-Philippe Beland, Jason Huh, and Dongwoo Kim*

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Abstract

We use a regression discontinuity design to study the effect of the COVID-19 lockdown on mobility and traffic accidents. Based on data from Google Community Mobility reports and Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD), we find that the stay-at-home order led to a large decrease in traffic accidents (-47 percent). In particular, we find a large decrease in accidents involving injury (-46 percent), distracted drivers (-43 percent), and ambulances (-41 percent). We also find evidence of a change in the composition of accidents, with more incidents involving individuals aged 25 to 64, male, and nonwhite drivers. Interestingly, we find no impact on ambulance response time, despite lower traffic. Finally, we document a large decrease in mobility in Louisiana. Our results have important policy implications for traffic management policies.

JEL Classification: R20, R41, R42, R48, H41, D62

Keywords: COVID-19, Lockdown, Accidents, Traffic Management, Regression Discontinuity

*Barnes: Associate Professor and Director of Kathleen Babineaux Blanco Public Policy Center at the University of Louisiana at Lafayette, barnes@louisiana.edu; Beland: Assistant Professor and Public Affairs Excellence Research Chair at Carleton University, louisphilippe.beland@carleton.ca; Huh: Assistant Professor at Rensselaer Polytechnic Institute, huhj2@rpi.edu; and Kim: Assistant Professor at Texas Christian University, dongwoo.kim@tcu.edu. We would like to thank Tobi Fakorede for excellent research assistance and the Louisiana Department of Transportation and Development for providing the data.

1 Introduction

The COVID-19 pandemic has had severe negative health consequences, leading to nearly 3.5 million cases and more than 138,000 deaths in the United States as of mid-July 2020.[1] COVID-19 has led most state governors to shutdown nonessential businesses and services, and impose physical distancing policies. The COVID-19 pandemic and the lockdown have resulted in severe negative impacts on Americans on several dimensions: COVID-19 has been shown to have drastic impacts on labor market outcomes (e.g., Beland et al. (2020)), mental health (e.g., Brodeur et al. (2020a)), and domestic violence incidents (e.g., Leslie and Wilson (2020)). The pandemic is having unprecedented consequences on individuals across the US.

In this paper, we study the externalities associated with the effect of the COVID-19 lockdown on mobility and traffic accidents. The stay-at-home orders may have significantly altered the number of cars on roads. Traffic has been shown to have large externalities: lost time, pollution, health, happiness, employment growth, and crime (e.g., Kahneman et al. (2004), Currie and Walker (2011), Anderson (2014), Knittel et al. (2016), Anderson et al. (2016), Hymel (2009) and Beland and Brent (2018)). We document how the COVID-19 lockdown affects mobility and traffic accidents.

We use the timing of the stay-at-home order to implement a regression discontinuity design, and compare the outcomes of interest days before and after the stay-at-home order in Louisiana. We use a unique data set of traffic accidents, the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD), and mobility data from Google Community Mobility reports. The Uniform Traffic Crash Report data allow us to investigate differential impact based on the driver's age, gender, and race, and has information on the driver's drug and alcohol use. The data also have information on whether the incident was a hit-and-run, involved a pedestrian, involved any driver distraction such as the use of cell phones or other electronic devices while driving, required an ambulance to be called, and resulted in death or injury. If an ambulance was called to the scene, we have information on time called, time arrived on scene, and time arrived at the hospital. We use these different variables to study the effect of the COVID-19

[1] See https://covidtracking.com/ for additional statistics on COVID-19 cases.

lockdown on accidents and investigate heterogeneous effects based on types of crashes and driver characteristics. We also document the effect of the lockdown on changes in mobility in Louisiana using Google Community Mobility reports.

Our results show a large decrease in total traffic accidents (-47 percent), including accidents involving injury (-46 percent), distracted drivers (-43 percent), and ambulances (-41 percent). We also find evidence of a change in the composition of accidents, with more incidents involving individuals aged 25 to 64, male, and nonwhite drivers. Interestingly, we find no impact on ambulance response time, despite lower traffic. We also show a large decrease in mobility across Louisiana for all categories of locations involving mobility (e.g., groceries and pharmacies, parks, transit stations, retail and recreation locations, and workplaces), and a large increase in time spent in residential locations.[2]

We calculate the dollar value gain from the reduction in car accidents. We use data from the National Highway Traffic Safety Administration and our estimate of 47 percent reduction in daily accidents to approximate that the COVID-19 lockdown led to a reduction in car crash externalities of $21 billion nationally and $289.6 million in Louisiana. Our results have important implications for traffic management in urban areas. They suggest that decreasing traffic on roads would lead to a substantial decrease in accidents. Promoting work from home would likely help reduce congestion. Expanding public transit to reduce the number of cars on roads is possibly another potential solution (e.g., Adler and van Ommeren (2016) and Bauernschuster et al. (2017)).[3]

The rest of our paper is organized as follows: Section 2 describes COVID-19 in Louisiana and presents the data and descriptive statistics; Section 3 discusses the empirical strategy; Section 4 presents the results; and Section 5 concludes with policy recommendations.

[2] Brodeur et al. (2020b) study the effects of COVID-19 on pollution and car crashes. To measure the effect on traffic accidents, they use aggregated daily count data from five states (i.e., Alabama, Connecticut, Kentucky, Missouri, and Vermont) and have fatal crash data from one state (i.e., Kentucky). Our data allow us to document a decrease in accidents, but also study the effects by types of crashes and driver characteristics. We also investigate differential effects by parish characteristics. We document a change in the composition of accidents and provide several important insights for traffic management policies.

[3] According to Duranton and Turner (2011), building new roads is unlikely to be the best policy to reduce congestion in the long run as the elasticity of travel demand with respect to capacity is equal to 1. In other words, building new roads will lead to additional cars on the roads and not lead to less traffic.

2 COVID-19 in Louisiana, Data, and Descriptive statistics

2.1 COVID-19 in Louisiana

The first COVID-19 case in Louisiana was announced on March 9, 2020. The number of cases increased rapidly since the first case such that Louisiana reported 6,424 positive cases and 273 deaths by April 1, and 28,711 cases and 1,927 deaths by May 1. Appendix Figure A.1 shows the evolution of cases and deaths in Louisiana from March to June of 2020. We obtain the number of cases and deaths across Louisiana due to COVID-19 using data from the COVID Tracking Project.[4] We use this data set to investigate if the effect of the COVID-19 lockdown has heterogeneous impacts on mobility and traffic accidents in parishes with high versus low case numbers.[5]

The governor - John Bel Edwards - created a COVID-19 task force in early March, including members from the Louisiana Department of Health (LDH), the Governor's Office of Homeland Security and Emergency Preparedness, and a number of other agencies, which was to collaborate with the Centers for Disease Control and Prevention (CDC). Louisiana implemented a series of orders from March 12 to 22, 2020.[6] On March 12, Louisiana limited visitors to healthcare facilities to those deemed essential to the care of patients.[7]

On March 13, the governor signed another proclamation immediately prohibiting gatherings of more than 250 people, and closing elementary and secondary public schools in the state effective on March 16.[8] We use the date of March 16 as our discontinuity, as it is the date of implementation of the first order to significantly alter mobility. On March 21, the governor issued a state-wide stay-at-home order effective on March 23, 2020. This stay-at-home order was extended to May 15, 2020. The stay-at-home order stipulated that non-essential businesses, including all places of public amusement, all personal care and grooming businesses, and all malls except stores with a direct outdoor entrance, were or-

[4] See https://covidtracking.com/data/state/louisiana/ for detailed data on COVID-19 cases across the United States. The data are collected using several data sources such as state public health authorities, trusted media, and news conferences.

[5] A parish is the equivalent of a county in Louisiana.

[6] See http://ldh.la.gov/coronavirus/ for more details.

[7] This was to last 30 days, ending on April 10, 2020. The LDH further recommended that all licensed healthcare facilities restrict elective and voluntary medical procedures for 30 days.

[8] The proclamation excluded airports, grocery, medical facilities, and department stores.

dered to be closed. All state office buildings were closed and gatherings of more than 10 people were prohibited.[9]

2.2 Louisiana Uniform Traffic Crash Report

We use data from the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). The LaDOTD collects information on crashes that result in fatality, injury, property damage, and other minor crashes reported to the police. The data include information on the crash, vehicle, and people involved. The LaDOTD receives traffic crash data submitted daily by state, sheriff, and local police agencies in Louisiana.[10]

The data contain information on the crash (drug use, alcohol use, hit-and-run, involvement of a pedestrian, or involvement of driver distraction) and characteristics of the driver (age, gender, race). It also has information if the crash resulted in death or injury. The data report the date and time of the crash, as well as the parish and city the incident took place. The data also include information regarding if an ambulance was called to the scene, time called, time arrived on scene, and time arrived at the hospital. We use these detailed different variables to study the effect of the COVID-19 lockdown on accidents and investigate heterogeneous effects based on the types of crashes and driver characteristics. In our main estimates, we employ data from January 26 to May 5, 2020 to implement a regression discontinuity design, using the governor's order effective on March 16, 2020. This gives 50 days on each side of the cutoff date. We present in Table 1 the baseline numbers of our outcome variables of interest one month prior to the lockdown (mean of February 15 to March 15). This allows us to establish a baseline and discuss effect sizes. It shows that Louisiana had 377.3 daily accidents on average, 78.7 accidents involving ambulance (20.9 percent), and 62.3 accidents involving injury (16.5 percent). It also shows an average of 12.8 drunk drivers (1.8

[9]The governor announced on May 11 that the state would move to Phase 1 of reopening on May 15 and the stay-at-home order would be lifted. Businesses such as gyms, theaters, museums, bars and breweries, and barber shops were allowed to open with 25 percent occupancy limits. On June 5, the governor announced its readiness to move on to Phase 2 starting immediately.

[10]We exclude New Orleans from our main estimation due to possible data issues with under-reported counts in 2019 and 2020. In the Appendix, we present our main results including New Orleans and results are qualitatively the same. To a lesser extent, some issues might also be of concern for the data from Baton Rouge due to potential processing delays. While we decided to keep Baton Rouge for the main estimation, we show in Appendix Table A.12 that the results are similar whether we include or exclude Baton Rouge.

percent) and 40.3 distracted drivers (5.6 percent) of 716.1 drivers involved in accidents.

2.3 Google Mobility data

We use data from Google Community Mobility reports to document the effect of the COVID-19 lockdown on mobility. The data are generated using Google account users' derived location history, which could differ from the general population. These mobility data present information on visits to and lengths of stay in specific places as described below and how they change compared to a baseline number in the same area and same day of the week. This baseline is computed from January 3 to February 6, 2020. Individual mobility activities are coded into six categories: groceries and pharmacies, parks, transit stations, retail and recreation locations, residential areas, and workplaces.[11] We use these data to document the effect of the lockdown on mobility in Louisiana.

3 Empirical Strategy

Our main empirical strategy is a regression discontinuity (RD) design. We estimate the following equation using March 16, 2020 as the cutoff date when the governor's first major order significantly affecting mobility was implemented, as described in Section 2.1.

$$y_d = \beta_0 + \beta_1 PostLockdown_d + \beta_2 Days_d + \beta_3 Days_d * PostLockdown_d + W_d + \epsilon_d \quad (1)$$

where y_d is the outcome of interest aggregated at the daily level. Our main outcomes of interest are the following: all accidents, accidents by types of crashes (distraction, alcohol, drug, pedestrian, hit-and-run, ambulance, fatality) and by driver characteristics (race, gender, age). We consider the number and fraction of accidents by different types of crashes and driver characteristics. $PostLockdown_d$ is an indicator that is equal to one for all days after the lockdown on March 16 and zero for all preceding days. We use data from January 26 to May 5, 2020 for our main specification, which allows 50 days on either side of the cutoff.

[11] These six categories are defined as: (1) Groceries and pharmacies: grocery markets, farmers markets, specialty food shops, food warehouses, drug stores, and pharmacies, (2) Parks: local parks, national parks, public beaches, marinas, dog parks, and public gardens, (3) Transit stations: public transport hubs such as subway, bus, and train stations, (4) Retail and recreation locations: restaurants, cafes, libraries, shopping centers, theme parks, museums, and movie theaters, (5) Residential areas: places of residence, (6) Workplaces: places of work.

$Days_d$ represents number of days since the lockdown and $Days_d * PostLockdown_d$ is an interaction between $Days_d$ and $PostLockdown_d$. Our coefficient of interest is β_1. W_d represents day-of-the-week fixed effects. For our main specification, we use a triangular kernel, and a linear polynomial approximation. We report standard errors robust to heteroskedasticity.

We also use Equation (1) to investigate the impact on individual mobility (groceries and pharmacies, parks, transit stations, retail and recreation locations, residential areas, and workplaces) after the COVID-19 lockdown.[12] Using Equation (1), we also look at several sources of heterogeneity in accidents, such as rush hour (between 5am-10am or between 3pm and 7pm on weekdays) versus non-rush hour, day versus night, metropolitan versus nonmetropolitan parishes, parishes with above-median versus below-median confirmed cases of COVID-19 during one month following the lockdown, and parishes with an above-median versus below-median number of total accidents one month prior to the lockdown.

We also estimate a fuzzy RD, given the set of orders implemented between March 12 and 22 by the governor of Louisiana. In this method, we use the discontinuity in the probability of being on the road during the time period. We use the data on mobility in the first stage and then estimate the following in the second stage:

$$y_d = \gamma_0 + \gamma_1 Pr(ChangeMobility)_d + \gamma_2 Days_d + \gamma_3 Days_d * PostLockdown_d + W_d + \epsilon_d \quad (2)$$

$Pr(ChangeMobility)_d$ is a measure of the probability of changes in mobility following the state orders during March 12 and 22. The other variables are defined as before. Fuzzy RD allows us to estimate the effect of changes in mobility on traffic accidents. The interpretation of the coefficient of interest, γ_1, is the change in accidents implied by a 1 percent increase in mobility.[13]

In the Appendix, we present alternative specifications using different bandwidths (i.e., a bandwidth of 40 or 60 days and an MSE-optimal bandwidth with robust bias-corrected standard errors), a uniform kernel, and a quadratic polynomial.[14] We also present results from

[12] For the mobility data, we only have 30 days prior to the lockdown, which allows a maximum bandwidth of 30 to the left of the cutoff date.

[13] For this exercise, we use a summary mobility index calculated based on the five mobility categories (i.e., excluding time spent in residential areas). Results are similar if we use any single category of mobility.

[14] We follow Calonico et al. (2014) when implementing an MSE-optimal bandwidth with robust bias-corrected

a sharp RD design using data aggregated at the weekly level, and a regression discontinuity design – difference-in-differences (RDD-DiD) approach, in which we control for changes over the same period in 2019. We also show a historical graph (using accidents data from 2010 to 2020) to put our results in context.

4 Results

We first provide graphical evidence on the effect of the COVID-19 lockdown on traffic accidents. Figure 1 presents RD graphs illustrating the effect on different types of crashes. Panel (a) in Figure 1 shows the results for all crashes, Panel (b) for crashes involving ambulance, Panel (c) for hit-and-runs, Panel (d) for crashes involving injury, Panel (e) for crashes in construction work zones, Panel (f) for crashes involving pedestrians, Panel (g) for fatal crashes, and Panel (h) for minor crashes. We find a significant discontinuity and a decrease at the cutoff date in nearly all panels, except for crashes involving fatality and those involving pedestrians.[15]

We next investigate if the lockdown affects the composition of accidents, using RD graphs. The lockdown could alter individual behaviors, and the compliance with the stay-at-home order could be different for certain groups, which could affect the composition of accidents.[16] Figure 2 presents the fraction of accidents by contributing factors (distraction, alcohol use, and drug use) and characteristics of drivers (gender, race, and age). First, in Panels (a)-(c), we graphically document the effect on the fraction of incidents involving distraction, alcohol use, and drug use. We observe an increase in the fraction of accidents involving drug use and driver distraction (e.g., using cell phones or other electronic devices while driving), but no significant change for those involving alcohol. Panels (d) and (e) present results for the fraction of traffic accidents by male and white drivers, respectively. It shows a large increase in the fraction of accidents by males and a decrease in the fraction of accidents by whites. Finally, Panels (f)-(h) in Figure 2 present the fraction of crashes by age groups (15 to 24 in

standard errors.

[15]The effect for crashes in construction work zones is significant, but the RD graph is noisier compared to other significant outcomes.

[16]For example, Gallagher and Fisher (2020) found that traffic cameras affect the composition, but not the total number of accidents.

Panel (f), 25 to 64 in Panel (g), and 65 and above in Panel (h)). It shows an increase in the fraction of crashes for the age category 25 to 64, and a decrease for the age groups of 15 to 24 and above 65. School closures likely reduced mobility among the younger group while elevated COVID-19 risks for older individuals may have reduced mobility among the 65 and above age group.

Next, we document the effect of the COVID-19 lockdown on mobility in Louisiana, using data from Google Community Mobility reports. As discussed above, individual mobility activities are coded into six categories: groceries and pharmacies, parks, transit stations, retail and recreation locations, residential areas, and workplaces. Panels (a)-(f) in Figure 3 (and Appendix Table A.1) show a large decrease in mobility across Louisiana (groceries and pharmacies, parks, transit stations, retail and recreation locations, and workplaces) and a large increase in time spent in residential locations. Panels (g) and (h) in Figure 3 also present results for ambulance time of arrival at the accident and time from departure to hospital arrival. We find no significant impact on either ambulance response time or time to hospital. This is surprising given the literature that shows how traffic affects response time of first responders (e.g., Jena et al. (2017) and Beland and Brent (2020)). This provides suggestive evidence that the COVID-19 pandemic has put strains on the emergency response system.

Table 1 reports our main estimates of the effect of the lockdown on accidents. Columns (1) and (4) present a baseline for the average daily number and average fraction of crashes one month prior to the lockdown (mean of February 15 to March 15), respectively. These baseline numbers provide a useful reference to assess the effect size. Columns (2) and (5) present RD estimates of Equation (1), and Columns (3) and (6) present fuzzy RD estimates of Equation (2). Panel A of Table 1 provides differential effects of the lockdown by types of crashes: all crashes, crashes involving pedestrians, fatal crashes, hit-and-runs, crashed involving injury, crashes involving ambulance, crashes involving public property damage, crashes in construction work zones, and minor crashes. Panel A shows a large and significant decrease in overall crashes (-176.8 for a baseline of 377.3 accidents or -47 percent). It also shows a large and significant decrease in hit-and-runs (-21.9 for a baseline of 44.8 accidents or -49 percent), crashes involving injury (-28.7 for a baseline of 62.3 or -46 percent), crashes involving ambulance (-31.9 for a baseline of 78.7 or -41 percent), and minor crashes (-115.4 for a baseline of 231.2 or -50 percent). We find no significant changes in crashes involving pedestrians or fatal crashes. Column (5) in Panel A of Table 1 shows the fraction of total accidents for each category described above. It shows an increase in the fraction for crashes involving fatality, ambulance, property damage, but a decrease for minor crashes. These findings suggest an increase in the severity of accidents. In Columns (3) and (6), we present fuzzy RD estimates, which allow us to examine the effect of the change in mobility on traffic accidents. The interpretation of the coefficient is the change in accidents implied by a 1 percent increase in mobility. Column (3) shows that an increase in mobility (i.e., the inverse of a lockdown) on a per-percent basis significantly increases accidents for all categories, except for crashes involving pedestrians or fatality crashes, which is consistent with our RD estimates in Column (2). For instance, a 1 percent higher mobility would raise total daily accidents by 6, or 1.6 percent. Finally, Column (6) suggests that an increase in mobility increases the share of minor accidents and reduces the share of severe accidents.

We calculate the dollar value benefits from a reduction in car accidents due to the COVID-19 lockdown. According to the National Highway Traffic Safety Administration from the US Department of Transportation, the average cost of the 13.6 million annual car accidents in the US is around $21,036.[17] Based on this average cost of accidents and our estimate of 47 percent reduction in daily accidents in Louisiana during the stay-at-home order, we estimate that the benefits associated with the reduction in car crashes due to the lockdown to be $289.6 million in Louisiana. Applying our estimates to all states with a stay-at-home order, the associated benefits are approximately $21 billion nationally.[18]

Panel B of Table 1 presents results by characteristics of the drivers: distracted drivers, drunk drivers, drivers on drug, males, whites, drivers aged 15 to 24, drivers aged 25 to 64, and drivers aged 65 or above. Column (2) presents the results for the number of accidents

[17] These estimates include ambulance, legal, and hospital costs. See for more detail: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013/. The average estimated cost is $17,794 in 2010 dollars or approximately $21,036 in 2020 dollars.

[18] Most US states were under stay-at-home orders from late March to May 2020. It is estimated that 95 percent of the US population were under a lockdown in April and May. See https://www.nytimes.com/interactive/2020/us/coronavirus-stay-at-home-order.html/ and https://www.nytimes.com/interactive/2020/us/states-reopen-map-coronavirus.html/

and Column (5) shows the results for the fraction of accidents. Column (2) in Panel B shows a significant decrease for all categories, except for drivers on drug, following the stay-at-home order.[19] Column (5) in Panel B shows an increase in the share of accidents involving male drivers and drivers aged 25 to 64. Inversely, we find a decrease in the share of accidents involving white drivers and drivers aged 65 or above. In Column (3), using fuzzy RD, we show that an increase in mobility (i.e., the inverse of a lockdown) leads to an increase in accidents for all drivers, except for drivers on drug, which is again consistent with our RD results. In Column (6), we show that the composition of accidents is altered by a change in mobility. An increase in mobility (i.e., the inverse of a lockdown) on a per-percent basis leads to more accidents involving drivers aged above 65 and less for drivers aged 25 to 64. We also find that an increase in mobility decreases the fraction of accidents by male drivers and increases the fraction of accidents by white drivers.

We next investigate several heterogeneities of our results. Table 2 presents the results for crashes during rush hours (i.e., weekdays between 5 a.m. and 10 a.m., or between 3 p.m. and 7 p.m.) versus non-rush hours. It shows that the COVID-19 lockdown decreased accidents both during rush hours and non-rush hours, but the decrease is larger during rush hours (-54 percent versus -40 percent). We also present results for accidents during the day versus night in Appendix Table A.2. We find that the lockdown decreased mobility for both daytime and nighttime accidents, but the effect is larger during the day (-50 percent versus -38 percent). In Appendix Table A.3, we see that the decrease in accidents is larger in metropolitan parishes compared to nonmetropolitan parishes (-48 percent versus -38 percent). Similarly, we find a reduction in accidents in both parishes with an above- and below-median number of COVID-19 cases, shown in Appendix Table A.4. The effect is larger for parishes with an above-median number of COVID-19 cases compared to below-median parishes (-48 percent versus -37 percent). In Appendix Table A.5, we look at the impact on accidents in areas above versus below the median number of daily accidents. While we find a reduction in both, the effect is larger in above-median-accident areas (-48 percent versus -32 percent). We also present associated RD graphs in Appendix Figures A.2 and A.3. It shows again

[19] In Panel A, we present all crashes, and in Panel B, all drivers. The number of drivers is larger than the number of crashes as most accidents involve more than one driver.

a decrease in the number of accidents during both rush hours and non-rush hours, with a larger discontinuity during rush hours. We find a decrease in accidents for all the other subgroups, consistent with our RD estimates discussed above.

In the Appendix, we also present several robustness checks for our main results reported in Table 1. We present alternative specifications using different bandwidths (bandwidth of 40 days in Appendix Table A.6, bandwidth of 60 days in Appendix Table A.7, and MSE-optimal bandwidth in Appendix Table A.8), a uniform kernel in Appendix Table A.9, and a quadratic polynomial in Appendix Table A.10.[20] We also present estimates from a sharp RD using weekly data (shown in Appendix Figure A.4), and a regression discontinuity design – difference-in-differences (RDD-DiD) using daily data (shown in Appendix Table A.13 and Figure A.5), in which we control for changes over the same period in 2019. Our results are robust to those different specifications. We also provide a historical graph (using accidents data from 2010 to 2020) to put our results in context in Appendix Figure A.6. We show that accidents are historically low following the COVID-19 lockdown.

In sum, our results show a large decrease in accidents, including accidents involving injury, ambulance, and hit-and-runs. We document a large decrease in mobility in Louisiana and a large increase in time spent in residential locations. We also find evidence of a change in the composition of accidents, with more incidents involving male drivers, drivers aged 25 to 64, and nonwhite drivers. Interestingly, we find no significant impact on ambulance response time, despite lower traffic.

5 Conclusion

In this paper, we study the potential externalities associated with the effect of the COVID-19 lockdown on mobility and traffic accidents, using a regression discontinuity design based on data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

[20] As discussed in the data section, the crash data in New Orleans might be less reliable and we exclude it in the main analysis. We show in Appendix Table A.11 that our results hold if we include data from New Orleans. To a lesser extent, some issues might also be of a concern for the data from Baton Rouge. While we decided to keep Baton Rouge for the main estimation, we show in Appendix Table A.12 that the results are similar whether we include or exclude Baton Rouge.

Our results show a large decrease in accidents (-47 percent), including accidents involving injury (-46 percent) and ambulance (-41 percent). We also find evidence of a change in the composition of accidents, with more incidents involving male drivers, drivers aged 25 to 64, and nonwhite drivers. Despite lower traffic, however, we find no impact on ambulance response time. Finally, we document a large decrease in mobility in Louisiana (i.e., groceries and pharmacies, parks, transit stations, retail and recreation locations, and workplaces) and a large increase in time spent in residential locations. We also calculate the dollar value benefits associated with the reduction in car accidents. Using data from the National Highway Traffic Safety Administration and our estimates, we approximate that the COVID-19 lockdown leads to a reduction in car accident externalities by $21 billion nationally and $289.6 million in Louisiana alone.

Our results have important implications for traffic management in urban areas. Our results suggest that decreasing traffic on roads would lead to a severe decrease in accidents. Building new roads is unlikely to reduce congestion in the long run as the elasticity of travel demand with respect to capacity is equal to 1, and will lead to additional cars on roads and not lead to less traffic (e.g., Duranton and Turner (2011)). Promoting work from home might be a good policy for cities trying to reduce congestion. According to Dingel and Neiman (2020), 37 percent of jobs in the US could be done at home. Removing cars on the road could significantly reduce accidents and other traffic externalities. Expanding public transit to reduce cars on roads is possibly an additional potential solution (e.g., Adler and van Ommeren (2016) and Bauernschuster et al. (2017)). More generally, our results highlight that the impact and externalities of physical distancing policies are large and difficult to fully capture for urban areas.

References

Adler, Martin W and Jos N van Ommeren, "Does public transit reduce car travel externalities? Quasi-natural experiments' evidence from transit strikes," *Journal of Urban Economics*, 2016, *92*, 106–119.

Anderson, Michael L, "Subways, strikes, and slowdowns: The impacts of public transit on traffic congestion," *American Economic Review*, 2014, *104* (9), 2763–96.

— , **Fangwen Lu, Yiran Zhang, Jun Yang, and Ping Qin**, "Superstitions, Street Traffic, and Subjective Well-Being," *Journal of Public Economics*, 2016, *142*, 1–10.

Bauernschuster, Stefan, Timo Hener, and Helmut Rainer, "When labor disputes bring cities to a standstill: The impact of public transit strikes on traffic, accidents, air pollution, and health," *American Economic Journal: Economic Policy*, 2017, *9* (1), 1–37.

Beland, Louis-Philippe, Abel Brodeur, and Taylor Wright, "COVID-19, Stay-at-Home Orders and Employment: Evidence from CPS Data," *IZA Discussion Paper*, 2020.

— **and Daniel Brent**, "Traffic and Crime," *Journal of Public Economics*, 2018, *160*, 96–116.

— **and** — , "Traffic congestion, transportation policies, and the performance of first responders," *Journal of Environmental Economics and Management*, 2020.

Brodeur, Abel, Andrew Clark, Sarah Fleche, and Nattavudh Powdthavee, "Covid-19, lockdowns and well-being: Evidence from google trends," 2020.

— , **Nikolai Cook, and Taylor Wright**, "On the Effects of COVID-19 Safer-At-Home Policies on Social Distancing, Car Crashes and Pollution," 2020.

Calonico, Sebastian, Matias D Cattaneo, and Rocio Titiunik, "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs," *Econometrica*, 2014, *82* (6), 2295–2326.

Currie, Janet and Reed Walker, "Traffic Congestion and Infant Health: Evidence from E-ZPass," *American Economic Journal: Applied Economics*, 2011, *3* (1), 65–90.

Dingel, Jonathan I and Brent Neiman, "How Many Jobs Can be Done at Home?," *Journal of Public Economics*, 2020.

Duranton, Gilles and Matthew A Turner, "The Fundamental Law of Road Congestion: Evidence from US Cities," *American Economic Review*, 2011, *101* (6), 2616–2652.

Gallagher, Justin and Paul Fisher, "Criminal Deterrence when there are Offsetting Risks: Traffic Cameras, Vehicular Accidents, and Public Safety," *American Economic Journal: Economic Policy*, 2020.

Hymel, Kent, "Does traffic congestion reduce employment growth?," *Journal of Urban Economics*, 2009, *65* (2), 127–135.

Jena, Anupam B, N Clay Mann, Leia N Wedlund, and Andrew Olenski, "Delays in emergency care and mortality during major US marathons," *New England Journal of Medicine*, 2017, *376* (15), 1441–1450.

Kahneman, Daniel, Alan B Krueger, David A Schkade, Norbert Schwarz, and Arthur A Stone, "A survey method for characterizing daily life experience: The day reconstruction method," *Science*, 2004, *306* (5702), 1776–1780.

Knittel, Christopher R, Douglas L Miller, and Nicholas J Sanders, "Caution, drivers! Children present: Traffic, pollution, and infant health," *Review of Economics and Statistics*, 2016, *98* (2), 350–366.

Leslie, Emily and Riley Wilson, "Sheltering in place and domestic violence: Evidence from calls for service during COVID-19," *Journal of Public Economics*, 2020.

Table 1: Effects on traffic accidents for crash- and driver-level analysis

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	377.30	-176.78 ***	6.0431 ***			
		(21.12)	(0.7195)			
Crashes involving pedestrian	2.63	-0.01	0.0036	0.73	0.44 *	-0.0144 *
		(0.64)	(0.0222)		(0.22)	(0.0080)
Fatal crashes	1.87	0.30	-0.0148	0.54	0.55 ***	-0.0204 ***
		(0.59)	(0.0219)		(0.18)	(0.0067)
Hit-and-runs	44.80	-21.91 ***	0.7337 ***	12.34	-0.58	0.0170
		(3.41)	(0.1329)		(1.06)	(0.0420)
Crashes involving injury	62.30	-28.73 ***	0.9785 ***	16.85	0.60	-0.0250
		(4.10)	(0.1284)		(1.03)	(0.0358)
Crashes involving ambulance	78.73	-31.89 ***	1.1038 ***	21.33	3.30 ***	-0.1117 ***
		(4.74)	(0.1602)		(1.16)	(0.0414)
Crashes involving public property damage	13.50	-0.89	0.0288	3.75	2.36 ***	-0.0827 ***
		(1.76)	(0.0616)		(0.63)	(0.0218)
Crashes in construction work zone	5.83	-3.40 ***	0.1263 ***	1.55	-0.33	0.0152
		(0.99)	(0.0345)		(0.31)	(0.0117)
Minor crashes	231.20	-115.43 ***	3.9742 ***	60.32	-3.60 **	0.1334 ***
		(14.86)	(0.5501)		(1.40)	(0.0509)
Panel B: Driver level						
All drivers	716.07	-365.02 ***	12.6092 ***			
		(42.58)	(1.4385)			
Distracted drivers	40.27	-17.46 ***	0.5594 ***	5.64	0.95 *	-0.0412 **
		(3.92)	(0.1370)		(0.51)	(0.0186)
Drunk drivers	12.77	-6.14 ***	0.2010 ***	2.03	0.01	-0.0022
		(1.49)	(0.0502)		(0.30)	(0.0104)
Drivers on drug	3.13	-0.39	0.0155	0.45	0.37 *	-0.0121 *
		(0.83)	(0.0268)		(0.20)	(0.0069)
Male drivers	364.40	-171.86 ***	5.8193 ***	50.93	2.95 ***	-0.1158 ***
		(21.64)	(0.6484)		(0.92)	(0.0353)
White drivers	395.97	-214.59 ***	7.4574 ***	54.66	-3.79 ***	0.1374 ***
		(26.22)	(0.9500)		(0.88)	(0.0312)
Drivers aged 15-24	151.23	-79.93 ***	2.7438 ***	21.10	-0.81	0.0289
		(11.45)	(0.4038)		(0.92)	(0.0319)
Drivers aged 25-64	442.97	-214.88 ***	7.3793 ***	61.69	2.54 **	-0.0968 **
		(25.99)	(0.8663)		(1.11)	(0.0415)
Drivers aged 65 or above	70.63	-44.25 ***	1.5734 ***	9.67	-1.83 ***	0.0677 ***
		(6.42)	(0.2195)		(0.59)	(0.0193)

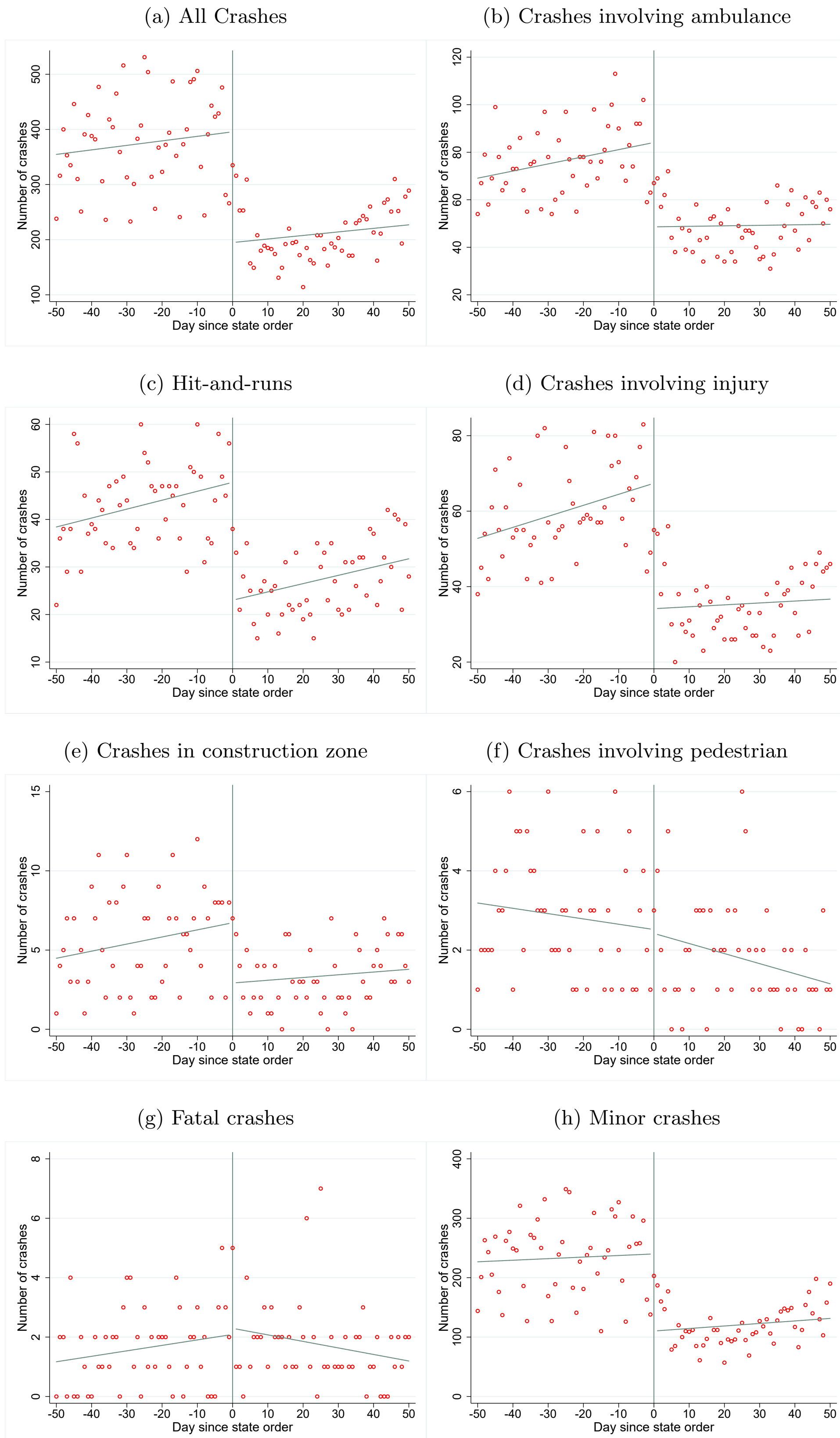
Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table 2: Effects on traffic accidents for crash- and driver-level analysis: Heterogeneity by rush hour versus non-rush hour

	Rush hour			Non-rush hour		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	233.40	-125.61 ***	4.8931 ***	219.37	-88.06 ***	2.8969 ***
		(12.80)	(0.5867)		(13.10)	(0.3444)
Crashes involving pedestrian	1.40	-0.32	0.0144	1.67	0.21	-0.0044
		(0.51)	(0.0184)		(0.48)	(0.0169)
Fatal crashes	0.80	0.23	-0.0145	1.30	0.09	-0.0030
		(0.47)	(0.0179)		(0.44)	(0.0164)
Hit-and-runs	23.00	-11.25 ***	0.3657 ***	28.73	-13.48 ***	0.4694 ***
		(2.41)	(0.1016)		(3.46)	(0.1269)
Crashes involving injury	34.45	-18.54 ***	0.7706 ***	39.00	-15.56 ***	0.4868 ***
		(2.70)	(0.0960)		(3.05)	(0.0849)
Crashes involving ambulance	43.70	-21.98 ***	0.9014 ***	49.13	-16.52 ***	0.5372 ***
		(2.99)	(0.1391)		(3.55)	(0.0986)
Crashes involving public property damage	6.05	-0.82	0.0306	9.37	-0.34	0.0104
		(1.18)	(0.0441)		(1.56)	(0.0551)
Crashes in construction work zone	3.20	-1.22	0.0441	3.70	-2.54 ***	0.0968 ***
		(0.88)	(0.0333)		(0.74)	(0.0292)
Minor crashes	153.05	-86.15 ***	3.3891 ***	128.03	-54.62 ***	1.8016 ***
		(10.05)	(0.4636)		(8.09)	(0.2416)
Panel B: Driver level						
All drivers	458.20	-262.28 ***	10.3788 ***	407.13	-180.97 ***	6.0088 ***
		(26.20)	(1.1454)		(26.29)	(0.7034)
Distracted drivers	26.05	-18.85 ***	0.7634 ***	22.83	-4.33	0.0807
		(2.65)	(0.1475)		(2.83)	(0.0886)
Drunk drivers	2.60	-1.59 **	0.0597 *	11.00	-4.92 ***	0.1578 ***
		(0.77)	(0.0329)		(1.37)	(0.0458)
Drivers on drug	1.40	-0.36	0.0157	2.17	-0.11	0.0057
		(0.57)	(0.0196)		(0.58)	(0.0197)
Male drivers	230.05	-123.85 ***	4.8142 ***	209.90	-85.79 ***	2.7807 ***
		(13.82)	(0.5548)		(13.97)	(0.3478)
White drivers	266.20	-162.21 ***	6.4976 ***	217.30	-101.23 ***	3.3505 ***
		(15.82)	(0.6988)		(14.97)	(0.4395)
Drivers aged 15-24	98.00	-65.22 ***	2.5068 ***	85.30	-34.21 ***	1.1445 ***
		(8.03)	(0.3958)		(7.38)	(0.2333)
Drivers aged 25-64	292.50	-155.38 ***	6.2433 ***	246.23	-105.68 ***	3.4125 ***
		(16.67)	(0.6703)		(15.21)	(0.3638)
Drivers aged 65 or above	41.80	-28.63 ***	1.1835 ***	42.70	-24.65 ***	0.8462 ***
		(3.97)	(0.1415)		(3.72)	(0.1171)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

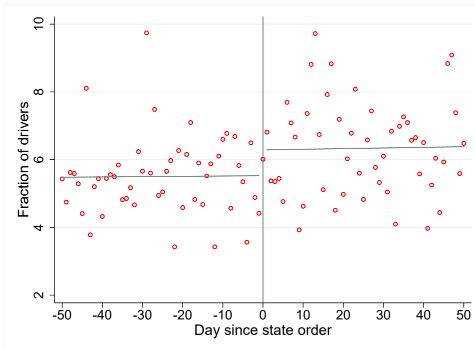
Figure 1: Regression discontinuity plots for crash-level analysis



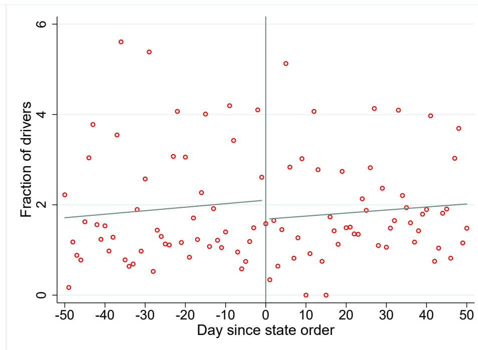
Notes: Panels show RD plots with fitted lines corresponding to Equation (1) for various types of crashes, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

Figure 2: Regression discontinuity plots for driver-level analysis

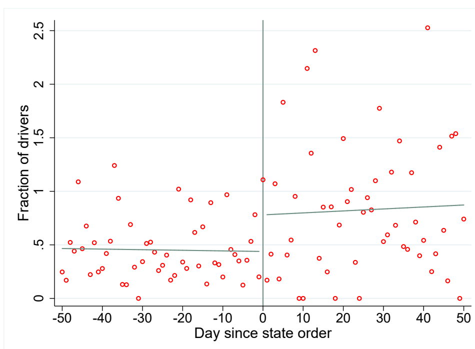
(a) Distracted drivers



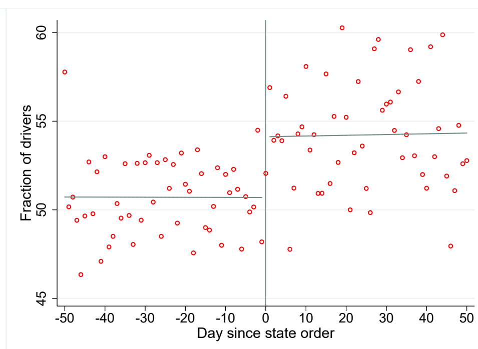
(b) Drunk drivers



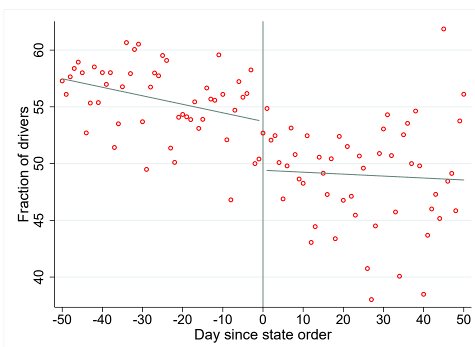
(c) Drivers on drug



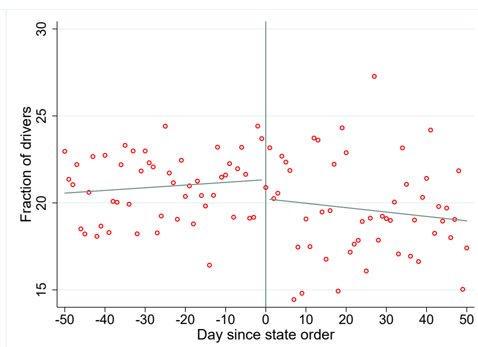
(d) Male drivers



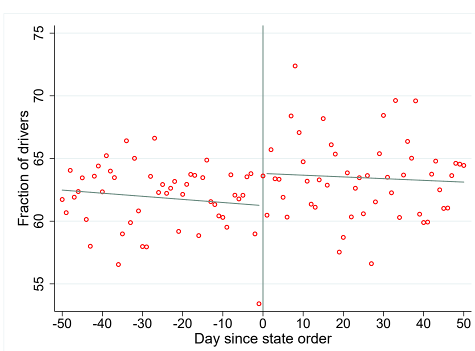
(e) White drivers



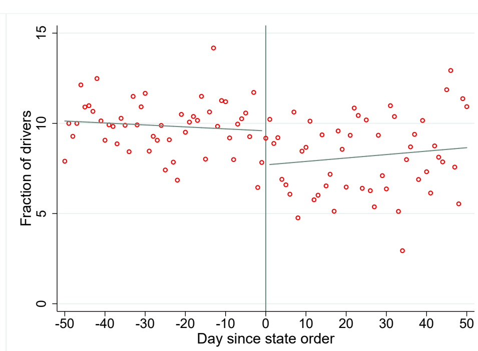
(f) Drivers aged 15-24



(g) Drivers aged 25-64

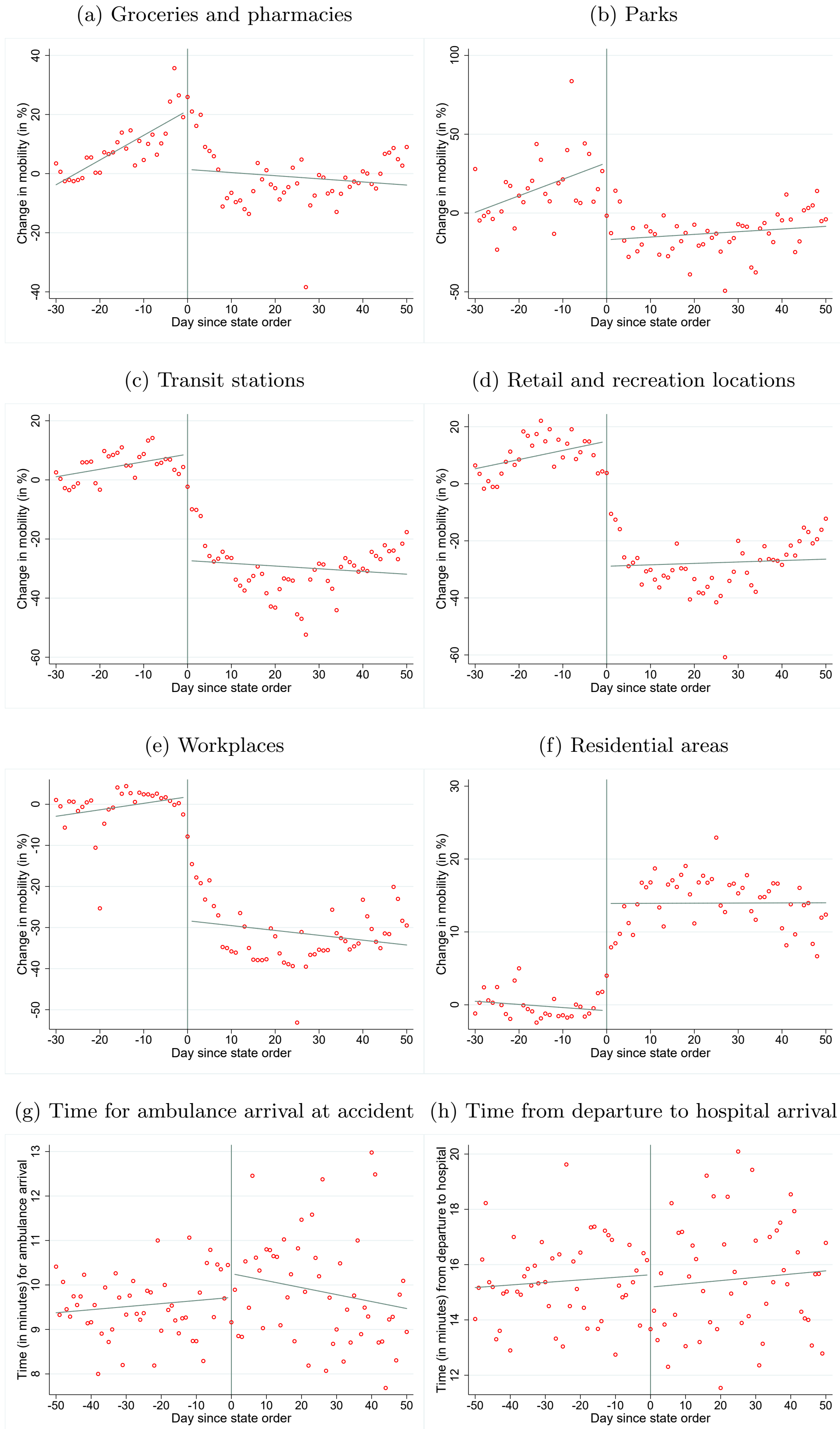


(h) Drivers aged 65 or above



Notes: Panels show RD plots with fitted lines corresponding to Equation (1) for various types of driver characteristics, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

Figure 3: Regression discontinuity plots for mobility and crash-level analysis



Notes: Panels (a)-(f) show RD plots with fitted lines corresponding to Equation (1) for individual mobility, using the data from Google Community Mobility reports. Panels (g) and (h) show RD plots for ambulance response time, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

Appendix

Table A.1: Effects on mobility

	Change in mobility	
	Baseline	RD
Outcome	(1)	(2)
Groceries and pharmacies	8.36	-15.95 ***
		(4.59)
Parks	15.65	-40.25 ***
		(7.27)
Transit stations	4.74	-29.30 ***
		(3.00)
Retail and recreation locations	9.93	-35.47 ***
		(3.55)
Workplaces	-0.63	-25.30 ***
		(2.73)
Places of residence	-0.14	12.00 ***
		(1.52)
Summary mobility index	*7.61*	*-29.25* ***
		(3.29)

Notes: This table shows estimates of Equation (1) for mobility in six categories, using the data from Google Community Mobility reports. Column (1) presents a baseline from February 15 to March 15 for the average daily mobility. Column (2) shows RD estimates of Equation (1) for the average daily mobility. Summary mobility index is the average across the first five categories involving mobility: groceries and pharmacies, parks, transit stations, retail and recreation locations, and workplaces. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.2: Effects on traffic accidents for crash- and driver-level analysis: Heterogeneity by day versus night

	Nighttime			Daytime		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	105.63	-39.94 ***	1.2881 ***	269.33	-135.68 ***	4.7159 ***
		(6.27)	(0.1544)		(17.08)	(0.6479)
Crashes involving pedestrian	1.30	0.38	-0.0124	1.30	-0.40	0.0175
		(0.39)	(0.0127)		(0.47)	(0.0165)
Fatal crashes	0.97	-0.22	0.0113	0.87	0.51	-0.0245 *
		(0.35)	(0.0130)		(0.40)	(0.0143)
Hit-and-runs	17.60	-7.83 ***	0.2666 ***	26.47	-13.70 ***	0.4542 ***
		(1.89)	(0.0669)		(2.19)	(0.0834)
Crashes involving injury	20.90	-8.63 ***	0.2929 ***	41.07	-19.71 ***	0.6699 ***
		(1.87)	(0.0608)		(3.50)	(0.1241)
Crashes involving ambulance	27.13	-10.55 ***	0.3628 ***	51.13	-21.09 ***	0.7312 ***
		(2.41)	(0.0758)		(3.82)	(0.1432)
Crashes involving public property damage	6.43	-1.88	0.0686	6.97	0.93	-0.0365
		(1.31)	(0.0473)		(1.27)	(0.0439)
Crashes in construction work zone	1.43	-0.08	0.0065	4.40	-3.34 ***	0.1198 ***
		(0.40)	(0.0144)		(0.88)	(0.0325)
Minor crashes	54.73	-19.85 ***	0.6029 ***	175.33	-94.86 ***	3.3484 ***
		(4.19)	(0.1279)		(12.86)	(0.5066)
Panel B: Driver level						
All drivers	184.10	-76.45 ***	2.4688 ***	528.50	-287.13 ***	10.0949 ***
		(11.45)	(0.2649)		(35.18)	(1.3159)
Distracted drivers	9.70	-1.16	0.0067	30.50	-16.37 ***	0.5542 ***
		(1.41)	(0.0475)		(3.20)	(0.1247)
Drunk drivers	9.93	-4.95 ***	0.1620 ***	2.80	-1.07 **	0.0336 **
		(1.26)	(0.0429)		(0.51)	(0.0170)
Drivers on drug	1.70	-0.40	0.0115	1.40	0.06	0.0031
		(0.53)	(0.0174)		(0.56)	(0.0188)
Male drivers	99.13	-39.19 ***	1.2452 ***	264.13	-132.46 ***	4.5700 ***
		(6.84)	(0.1593)		(17.09)	(0.5862)
White drivers	89.87	-38.41 ***	1.1872 ***	304.90	-176.00 ***	6.2664 ***
		(5.69)	(0.1438)		(22.33)	(0.8627)
Drivers aged 15-24	41.47	-15.16 ***	0.4852 ***	109.17	-64.19 ***	2.2391 ***
		(3.42)	(0.1023)		(9.75)	(0.3708)
Drivers aged 25-64	112.43	-46.37 ***	1.4704 ***	328.80	-167.52 ***	5.8780 ***
		(7.90)	(0.1940)		(21.35)	(0.8045)
Drivers aged 65 or above	10.80	-6.17 ***	0.2137 ***	59.77	-38.32 ***	1.3663 ***
		(1.47)	(0.0536)		(5.49)	(0.1860)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.3: Effects on traffic accidents for crash- and driver-level analysis: Heterogeneity by metropolitan and nonmetropolitan parishes

	Metropolitan parishes			Nonmetropolitan parishes		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	340.03	-162.76 ***	5.3873 ***	37.27	-14.02 ***	0.5736 ***
		(19.74)	(0.6253)		(2.84)	(0.1144)
Crashes involving pedestrian	2.43	-0.13	0.0087	0.20	0.12	-0.0054
		(0.57)	(0.0188)		(0.15)	(0.0070)
Fatal crashes	1.27	0.47	-0.0228	0.60	-0.17	0.0086
		(0.49)	(0.0180)		(0.38)	(0.0146)
Hit-and-runs	42.67	-21.42 ***	0.6938 ***	2.13	-0.49	0.0283
		(3.20)	(0.1238)		(0.59)	(0.0212)
Crashes involving injury	55.00	-27.03 ***	0.8755 ***	7.30	-1.70	0.0895
		(3.58)	(0.1113)		(1.66)	(0.0594)
Crashes involving ambulance	66.43	-27.17 ***	0.8897 ***	12.30	-4.72 ***	0.2030 ***
		(4.29)	(0.1246)		(1.63)	(0.0664)
Crashes involving public property damage	11.47	-0.24	0.0071	2.03	-0.65	0.0221
		(1.68)	(0.0592)		(0.56)	(0.0215)
Crashes in construction work zone	5.33	-3.16 ***	0.1187 ***	0.50	-0.23	0.0057
		(0.97)	(0.0322)		(0.25)	(0.0092)
Minor crashes	210.40	-107.11 ***	3.5872 ***	20.80	-8.32 ***	0.3310 ***
		(14.12)	(0.4871)		(1.80)	(0.0765)
Panel B: Driver level						
All drivers	652.70	-339.72 ***	11.3959 ***	63.37	-25.31 ***	1.0351 ***
		(39.99)	(1.2741)		(5.21)	(0.2037)
Distracted drivers	36.40	-15.44 ***	0.4695 ***	3.87	-2.02 **	0.0836 ***
		(3.77)	(0.1287)		(0.78)	(0.0314)
Drunk drivers	10.80	-4.60 ***	0.1346 ***	1.97	-1.54 ***	0.0656 ***
		(1.45)	(0.0440)		(0.58)	(0.0233)
Drivers on drug	2.47	-0.28	0.0094	0.67	-0.11	0.0061
		(0.81)	(0.0265)		(0.38)	(0.0135)
Male drivers	331.57	-162.05 ***	5.3191 ***	32.83	-9.81 ***	0.4156 ***
		(20.41)	(0.5866)		(2.63)	(0.0928)
White drivers	359.37	-198.33 ***	6.7010 ***	36.60	-16.26 ***	0.6526 ***
		(24.53)	(0.8556)		(3.50)	(0.1338)
Drivers aged 15-24	135.40	-72.89 ***	2.4109 ***	15.83	-7.03 ***	0.2971 ***
		(10.18)	(0.3508)		(2.45)	(0.0880)
Drivers aged 25-64	404.77	-200.51 ***	6.6997 ***	38.20	-14.37 ***	0.5741 ***
		(24.75)	(0.7673)		(3.15)	(0.1261)
Drivers aged 65 or above	63.70	-41.20 ***	1.4437 ***	6.93	-3.05 ***	0.1065 ***
		(6.10)	(0.2025)		(1.01)	(0.0382)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.4: Effects on traffic accidents for crash- and driver-level analysis: Heterogeneity by above- and below-median number of COVID-19 cases

	High-risk parishes in COVID-19 cases			Low-risk parishes in COVID-19 cases		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	342.90	-163.89 ***	5.3746 ***	34.40	-12.88 ***	0.5147 ***
		(19.59)	(0.6059)		(2.81)	(0.1121)
Crashes involving pedestrian	2.47	-0.10	0.0075	0.17	0.08	-0.0044
		(0.58)	(0.0187)		(0.16)	(0.0074)
Fatal crashes	1.23	0.29	-0.0085	0.63	0.02	-0.0063
		(0.50)	(0.0183)		(0.37)	(0.0154)
Hit-and-runs	43.13	-21.66 ***	0.6974 ***	1.67	-0.25	0.0133
		(3.35)	(0.1232)		(0.49)	(0.0190)
Crashes involving injury	55.17	-26.79 ***	0.8730 ***	7.13	-1.93	0.0802 *
		(3.53)	(0.1091)		(1.25)	(0.0465)
Crashes involving ambulance	67.17	-27.68 ***	0.9206 ***	11.57	-4.20 ***	0.1611 ***
		(4.14)	(0.1241)		(1.36)	(0.0556)
Crashes involving public property damage	11.33	-0.46	0.0147	2.17	-0.43	0.0144
		(1.64)	(0.0573)		(0.56)	(0.0218)
Crashes in construction work zone	5.50	-3.13 ***	0.1117 ***	0.33	-0.27	0.0114
		(1.00)	(0.0333)		(0.25)	(0.0092)
Minor crashes	212.37	-108.00 ***	3.5708 ***	18.83	-7.43 ***	0.2987 ***
		(13.93)	(0.4681)		(2.14)	(0.0891)
Panel B: Driver level						
All drivers	659.37	-341.22 ***	11.3177 ***	56.70	-23.80 ***	0.9603 ***
		(39.96)	(1.2425)		(4.79)	(0.1867)
Distracted drivers	36.83	-15.03 ***	0.4515 ***	3.43	-2.43 ***	0.0982 ***
		(3.67)	(0.1210)		(0.58)	(0.0246)
Drunk drivers	10.83	-4.77 ***	0.1424 ***	1.93	-1.37 **	0.0572 **
		(1.35)	(0.0394)		(0.59)	(0.0263)
Drivers on drug	2.57	-0.16	0.0046	0.57	-0.23	0.0114
		(0.75)	(0.0243)		(0.35)	(0.0120)
Male drivers	334.80	-162.70 ***	5.2565 ***	29.60	-9.16 ***	0.4067 ***
		(20.19)	(0.5654)		(3.32)	(0.1175)
White drivers	361.37	-198.84 ***	6.6386 ***	34.60	-15.76 ***	0.6283 ***
		(24.33)	(0.8282)		(3.50)	(0.1354)
Drivers aged 15-24	137.43	-75.00 ***	2.4310 ***	13.80	-4.93 **	0.2439 ***
		(10.42)	(0.3468)		(2.00)	(0.0743)
Drivers aged 25-64	408.07	-199.32 ***	6.6038 ***	34.90	-15.55 ***	0.5837 ***
		(24.66)	(0.7545)		(3.20)	(0.1211)
Drivers aged 65 or above	64.47	-41.00 ***	1.4148 ***	6.17	-3.25 ***	0.1170 ***
		(6.00)	(0.1952)		(0.87)	(0.0330)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.5: Effects on traffic accidents for crash- and driver-level analysis: Heterogeneity by above- and below-median number of accidents

	High-accident parishes			Low-accident parishes		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	352.77	-168.90 ***	5.5498 ***	24.53	-7.87 ***	0.3278 ***
		(20.40)	(0.6245)		(2.17)	(0.0997)
Crashes involving pedestrian	2.53	-0.08	0.0076	0.10	0.07	-0.0051
		(0.61)	(0.0199)		(0.09)	(0.0049)
Fatal crashes	1.40	0.43	-0.0196	0.47	-0.12	0.0066
		(0.48)	(0.0182)		(0.35)	(0.0156)
Hit-and-runs	43.73	-22.31 ***	0.7167 ***	1.07	0.40	-0.0127
		(3.32)	(0.1234)		(0.46)	(0.0189)
Crashes involving injury	57.10	-27.57 ***	0.8990 ***	5.20	-1.15	0.0526
		(3.91)	(0.1147)		(1.03)	(0.0443)
Crashes involving ambulance	69.70	-30.10 ***	1.0113 ***	9.03	-1.78	0.0628
		(4.80)	(0.1494)		(1.28)	(0.0581)
Crashes involving public property damage	12.30	-1.08	0.0406	1.20	0.20	-0.0158
		(1.57)	(0.0523)		(0.41)	(0.0169)
Crashes in construction work zone	5.50	-3.19 ***	0.1146 ***	0.33	-0.20	0.0086
		(0.96)	(0.0320)		(0.22)	(0.0093)
Minor crashes	218.33	-109.62 ***	3.6131 ***	12.87	-5.81 ***	0.2605 ***
		(14.48)	(0.4859)		(1.61)	(0.0773)
Panel B: Driver level						
All drivers	675.83	-350.60 ***	11.6479 ***	40.23	-14.43 ***	0.6006 ***
		(41.44)	(1.2752)		(3.36)	(0.1521)
Distracted drivers	37.77	-16.02 ***	0.4894 ***	2.50	-1.44 **	0.0601 *
		(3.89)	(0.1250)		(0.63)	(0.0308)
Drunk drivers	11.13	-4.82 ***	0.1475 ***	1.63	-1.32 ***	0.0564 ***
		(1.44)	(0.0429)		(0.45)	(0.0218)
Drivers on drug	2.73	-0.44	0.0185	0.40	0.05	-0.0044
		(0.80)	(0.0246)		(0.27)	(0.0103)
Male drivers	341.60	-164.00 ***	5.3266 ***	22.80	-7.85 ***	0.3372 ***
		(21.44)	(0.5770)		(2.34)	(0.1088)
White drivers	371.63	-203.87 ***	6.7967 ***	24.33	-10.72 ***	0.4680 ***
		(25.53)	(0.8476)		(2.60)	(0.1207)
Drivers aged 15-24	142.27	-74.99 ***	2.4620 ***	8.97	-4.94 ***	0.2197 ***
		(10.83)	(0.3366)		(1.60)	(0.0782)
Drivers aged 25-64	416.73	-205.01 ***	6.7841 ***	26.23	-9.87 ***	0.3914 ***
		(25.33)	(0.7752)		(2.24)	(0.0988)
Drivers aged 65 or above	66.70	-44.22 ***	1.5112 ***	3.93	-0.03	0.0042
		(6.44)	(0.2148)		(0.86)	(0.0363)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.6: Robustness: Effects on traffic accidents for crash- and driver-level analysis using bandwidth 40

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	377.30	-158.96 ***	6.2598 ***			
		(21.81)	(0.8257)			
Crashes involving pedestrian	2.63	-0.19	0.0102	0.73	0.28	-0.0101
		(0.71)	(0.0265)		(0.25)	(0.0095)
Fatal crashes	1.87	0.27	-0.0115	0.54	0.45 **	-0.0182 **
		(0.68)	(0.0264)		(0.20)	(0.0080)
Hit-and-runs	44.80	-20.43 ***	0.7900 ***	12.34	-0.93	0.0344
		(3.82)	(0.1574)		(1.20)	(0.0492)
Crashes involving injury	62.30	-26.19 ***	1.0121 ***	16.85	0.50	-0.0264
		(4.38)	(0.1470)		(1.15)	(0.0436)
Crashes involving ambulance	78.73	-29.25 ***	1.1361 ***	21.33	2.88 **	-0.1180 **
		(5.03)	(0.1836)		(1.27)	(0.0490)
Crashes involving public property damage	13.50	-0.02	0.0051	3.75	2.37 ***	-0.0929 ***
		(1.91)	(0.0725)		(0.68)	(0.0253)
Crashes in construction work zone	5.83	-3.16 ***	0.1305 ***	1.55	-0.36	0.0163
		(1.09)	(0.0388)		(0.34)	(0.0130)
Minor crashes	231.20	-103.92 ***	4.1315 ***	60.32	-3.20 **	0.1363 **
		(15.57)	(0.6324)		(1.58)	(0.0613)
Panel B: Driver level						
All drivers	716.07	-332.13 ***	13.1328 ***			
		(44.24)	(1.6472)			
Distracted drivers	40.27	-15.11 ***	0.5750 ***	5.64	0.98 *	-0.0426 **
		(4.23)	(0.1570)		(0.55)	(0.0214)
Drunk drivers	12.77	-5.51 ***	0.2082 ***	2.03	0.06	-0.0033
		(1.58)	(0.0565)		(0.31)	(0.0117)
Drivers on drug	3.13	-0.24	0.0082	0.45	0.36 *	-0.0140 *
		(0.89)	(0.0321)		(0.21)	(0.0083)
Male drivers	364.40	-152.76 ***	5.9756 ***	50.93	3.03 ***	-0.1264 ***
		(22.15)	(0.7339)		(0.98)	(0.0419)
White drivers	395.97	-195.90 ***	7.8190 ***	54.66	-3.31 ***	0.1387 ***
		(27.68)	(1.0880)		(0.90)	(0.0351)
Drivers aged 15-24	151.23	-71.74 ***	2.8519 ***	21.10	-0.57	0.0264
		(11.93)	(0.4651)		(0.98)	(0.0369)
Drivers aged 25-64	442.97	-193.58 ***	7.6206 ***	61.69	2.75 **	-0.1149 **
		(27.20)	(0.9810)		(1.24)	(0.0495)
Drivers aged 65 or above	70.63	-41.63 ***	1.6582 ***	9.67	-1.82 ***	0.0720 ***
		(6.93)	(0.2522)		(0.64)	(0.0225)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.7: Robustness: Effects on traffic accidents for crash- and driver-level analysis using bandwidth 60

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	377.30	-192.33 ***	5.9045 ***			
		(20.57)	(0.6535)			
Crashes involving pedestrian	2.63	-0.24	0.0030	0.73	0.44 **	-0.0152 **
		(0.58)	(0.0195)		(0.21)	(0.0070)
Fatal crashes	1.87	0.24	-0.0135	0.54	0.58 ***	-0.0201 ***
		(0.54)	(0.0191)		(0.17)	(0.0059)
Hit-and-runs	44.80	-23.23 ***	0.7005 ***	12.34	-0.33	0.0070
		(3.12)	(0.1184)		(0.97)	(0.0375)
Crashes involving injury	62.30	-31.27 ***	0.9639 ***	16.85	0.51	-0.0197
		(3.88)	(0.1163)		(0.93)	(0.0306)
Crashes involving ambulance	78.73	-34.36 ***	1.0914 ***	21.33	3.49 ***	-0.1021 ***
		(4.54)	(0.1451)		(1.05)	(0.0363)
Crashes involving public property damage	13.50	-1.51	0.0385	3.75	2.43 ***	-0.0787 ***
		(1.63)	(0.0542)		(0.59)	(0.0194)
Crashes in construction work zone	5.83	-3.54 ***	0.1211 ***	1.55	-0.28	0.0134
		(0.91)	(0.0314)		(0.29)	(0.0108)
Minor crashes	231.20	-125.91 ***	3.8685 ***	60.32	-3.94 ***	0.1282 ***
		(14.31)	(0.4976)		(1.27)	(0.0442)
Panel B: Driver level						
All drivers	716.07	-393.86 ***	12.2582 ***			
		(41.18)	(1.3097)			
Distracted drivers	40.27	-19.27 ***	0.5518 ***	5.64	0.93 *	-0.0386 **
		(3.66)	(0.1234)		(0.48)	(0.0166)
Drunk drivers	12.77	-6.70 ***	0.1934 ***	2.03	-0.04	-0.0021
		(1.39)	(0.0457)		(0.28)	(0.0094)
Drivers on drug	3.13	-0.53	0.0183	0.45	0.38 **	-0.0114 *
		(0.77)	(0.0233)		(0.19)	(0.0060)
Male drivers	364.40	-186.63 ***	5.6879 ***	50.93	3.26 ***	-0.1151 ***
		(21.07)	(0.5943)		(0.87)	(0.0310)
White drivers	395.97	-232.59 ***	7.2391 ***	54.66	-4.48 ***	0.1413 ***
		(25.22)	(0.8624)		(0.88)	(0.0285)
Drivers aged 15-24	151.23	-86.35 ***	2.6760 ***	21.10	-0.92	0.0308
		(11.04)	(0.3658)		(0.88)	(0.0287)
Drivers aged 25-64	442.97	-233.25 ***	7.1911 ***	61.69	2.49 **	-0.0902 **
		(25.06)	(0.7935)		(1.03)	(0.0372)
Drivers aged 65 or above	70.63	-47.45 ***	1.5284 ***	9.67	-2.02 ***	0.0677 ***
		(6.05)	(0.1984)		(0.55)	(0.0171)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.8: Robustness: Effects on traffic accidents for crash- and driver-level analysis using MSE-optimal bandwidth

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	377.30	-141.73 ***	6.5378 ***			
		(22.04)	(1.1606)			
Crashes involving pedestrian	2.63	-0.31	0.0046	0.73	0.44 *	-0.0151 **
		(0.71)	(0.0254)		(0.25)	(0.0096)
Fatal crashes	1.87	0.25	-0.0040	0.54	0.53 *	-0.0181
		(0.62)	(0.0256)		(0.22)	(0.0106)
Hit-and-runs	44.80	-23.03 ***	0.7390 ***	12.34	-0.36	0.0191
		(3.64)	(0.2120)		(1.15)	(0.0702)
Crashes involving injury	62.30	-32.58 ***	0.9418 ***	16.85	0.61	-0.0205
		(3.23)	(0.1661)		(0.97)	(0.0396)
Crashes involving ambulance	78.73	-32.66 ***	1.0779 ***	21.33	3.57 ***	-0.1085 ***
		(4.58)	(0.2122)		(1.16)	(0.0490)
Crashes involving public property damage	13.50	-0.83	0.0304	3.75	2.41 ***	-0.0768 ***
		(2.25)	(0.1109)		(0.65)	(0.0318)
Crashes in construction work zone	5.83	-3.52 ***	0.1246 **	1.55	-0.22	0.0121
		(1.22)	(0.0531)		(0.36)	(0.0148)
Minor crashes	231.20	-92.75 ***	4.3056 ***	60.32	-4.21 **	0.1318 ***
		(15.63)	(0.7685)		(1.41)	(0.0485)
Panel B: Driver level						
All drivers	716.07	-299.13 ***	13.7747 ***			
		(44.73)	(2.3798)			
Distracted drivers	40.27	-13.85 **	0.5894 **	5.64	0.96 **	-0.0327 ***
		(4.62)	(0.2384)		(0.45)	(0.0161)
Drunk drivers	12.77	-6.52 ***	0.1854 ***	2.03	-0.04	-0.0040
		(1.58)	(0.0538)		(0.32)	(0.0129)
Drivers on drug	3.13	-0.44	0.0069	0.45	0.42	-0.0131 **
		(0.91)	(0.0349)		(0.22)	(0.0089)
Male drivers	364.40	-128.23 ***	6.1002 ***	50.93	3.85 ***	-0.1167 ***
		(20.98)	(1.1014)		(0.90)	(0.0412)
White drivers	395.97	-179.51 ***	8.2401 ***	54.66	-4.62 ***	0.1527 ***
		(29.57)	(1.5514)		(0.85)	(0.0351)
Drivers aged 15-24	151.23	-68.25 ***	2.9415 ***	21.10	-1.66 *	0.0569 *
		(11.42)	(0.6028)		(0.79)	(0.0339)
Drivers aged 25-64	442.97	-168.13 ***	7.8816 ***	61.69	2.50 **	-0.1038 **
		(29.69)	(1.4641)		(1.13)	(0.0756)
Drivers aged 65 or above	70.63	-39.83 ***	1.7113 ***	9.67	-2.10 ***	0.0662 *
		(7.32)	(0.4121)		(0.63)	(0.0268)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust bias-corrected standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.9: Robustness: Effects on traffic accidents for crash- and driver-level analysis using uniform kernel

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Crash level			
All crashes	377.30	-208.58 ***	5.8122 ***			
		(21.22)	(0.6553)			
Crashes involving pedestrian	2.63	-0.07	-0.0019	0.73	0.57 **	-0.0176 ***
		(0.59)	(0.0186)		(0.23)	(0.0068)
Fatal crashes	1.87	0.26	-0.0165	0.54	0.64 ***	-0.0215 ***
		(0.55)	(0.0178)		(0.19)	(0.0058)
Hit-and-runs	44.80	-24.65 ***	0.6569 ***	12.34	-0.06	-0.0081
		(3.12)	(0.1084)		(1.01)	(0.0341)
Crashes involving injury	62.30	-33.81 ***	0.9532 ***	16.85	0.48	-0.0164
		(3.98)	(0.1140)		(0.92)	(0.0274)
Crashes involving ambulance	78.73	-36.23 ***	1.0704 ***	21.33	4.01 ***	-0.1006 ***
		(4.73)	(0.1426)		(1.10)	(0.0340)
Crashes involving public property damage	13.50	-2.36	0.0529	3.75	2.42 ***	-0.0721 ***
		(1.68)	(0.0500)		(0.62)	(0.0180)
Crashes in construction work zone	5.83	-3.92 ***	0.1193 ***	1.55	-0.33	0.0130
		(0.95)	(0.0306)		(0.31)	(0.0107)
Minor crashes	231.20	-136.40 ***	3.8164 ***	60.32	-4.25 ***	0.1311 ***
		(14.80)	(0.4906)		(1.32)	(0.0409)
			Panel B: Driver level			
All drivers	716.07	-425.34 ***	12.0708 ***			
		(42.34)	(1.3077)			
Distracted drivers	40.27	-21.78 ***	0.5550 ***	5.64	0.82	-0.0365 **
		(3.79)	(0.1172)		(0.51)	(0.0160)
Drunk drivers	12.77	-7.67 ***	0.1941 ***	2.03	-0.16	-0.0010
		(1.46)	(0.0448)		(0.30)	(0.0093)
Drivers on drug	3.13	-0.62	0.0225	0.45	0.39 **	-0.0104 *
		(0.82)	(0.0226)		(0.19)	(0.0056)
Male drivers	364.40	-203.09 ***	5.6382 ***	50.93	3.47 ***	-0.1113 ***
		(21.86)	(0.6116)		(1.02)	(0.0296)
White drivers	395.97	-250.83 ***	7.1207 ***	54.66	-4.88 ***	0.1447 ***
		(26.07)	(0.8489)		(1.07)	(0.0296)
Drivers aged 15-24	151.23	-92.53 ***	2.5862 ***	21.10	-0.84	0.0225
		(11.17)	(0.3591)		(0.91)	(0.0273)
Drivers aged 25-64	442.97	-254.13 ***	7.1608 ***	61.69	2.22 **	-0.0718 **
		(26.12)	(0.7977)		(1.05)	(0.0346)
Drivers aged 65 or above	70.63	-50.47 ***	1.5106 ***	9.67	-2.10 ***	0.0676 ***
		(6.11)	(0.1898)		(0.59)	(0.0166)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.10: Robustness: Effects on traffic accidents for crash- and driver-level analysis using quadratic polynomial approximation

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	377.30	-114.31 ***	6.5771 ***			
		(24.39)	(1.6163)			
Crashes involving pedestrian	2.63	-0.23	0.0096	0.73	0.05	-0.0041
		(0.89)	(0.0592)		(0.31)	(0.0215)
Fatal crashes	1.87	0.08	0.0398	0.54	0.20	0.0008
		(0.97)	(0.0623)		(0.29)	(0.0193)
Hit-and-runs	44.80	-17.82 ***	1.3512 ***	12.34	-2.07	0.2264 *
		(5.10)	(0.4139)		(1.68)	(0.1363)
Crashes involving injury	62.30	-18.85 ***	0.9858 ***	16.85	0.34	-0.0679
		(5.44)	(0.3381)		(1.34)	(0.1024)
Crashes involving ambulance	78.73	-21.39 ***	1.0310 **	21.33	1.94	-0.2029 *
		(6.06)	(0.4107)		(1.55)	(0.1233)
Crashes involving public property damage	13.50	1.43	-0.0828	3.75	2.27 **	-0.1513 **
		(2.57)	(0.1881)		(0.91)	(0.0688)
Crashes in construction work zone	5.83	-2.69 *	0.1626	1.55	-0.50	0.0352
		(1.46)	(0.1059)		(0.46)	(0.0341)
Minor crashes	231.20	-75.13 ***	4.2830 ***	60.32	-2.05	0.1364
		(17.71)	(1.2450)		(1.89)	(0.1411)
Panel B: Driver level						
All drivers	716.07	-246.20 ***	13.8272 ***			
		(50.18)	(3.2315)			
Distracted drivers	40.27	-9.12 *	0.5270	5.64	0.97	-0.0505
		(5.26)	(0.3814)		(0.65)	(0.0510)
Drunk drivers	12.77	-3.45 *	0.1888	2.03	0.26	-0.0181
		(2.03)	(0.1432)		(0.42)	(0.0302)
Drivers on drug	3.13	0.45	-0.0796	0.45	0.38	-0.0333
		(1.17)	(0.0840)		(0.26)	(0.0203)
Male drivers	364.40	-104.15 ***	5.8196 ***	50.93	3.27 **	-0.1838 *
		(23.92)	(1.4341)		(1.31)	(0.0984)
White drivers	395.97	-148.75 ***	8.6800 ***	54.66	-2.42 **	0.1888 **
		(32.22)	(2.1840)		(1.04)	(0.0810)
Drivers aged 15-24	151.23	-52.09 ***	3.1755 ***	21.10	-0.23	0.0534
		(12.75)	(0.8972)		(1.11)	(0.0778)
Drivers aged 25-64	442.97	-137.75 ***	7.4167 ***	61.69	3.32 **	-0.2688 *
		(32.54)	(2.0394)		(1.67)	(0.1410)
Drivers aged 65 or above	70.63	-32.01 ***	1.5170 ***	9.67	-1.44 *	0.0566
		(8.70)	(0.5643)		(0.81)	(0.0555)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.11: Robustness: Effects on traffic accidents for crash- and driver-level analysis including New Orleans

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	424.50	-205.27 ***	6.6015 ***			
		(22.70)	(0.7338)			
Crashes involving pedestrian	3.23	-0.31	0.0053	0.79	0.39 *	-0.0138 *
		(0.70)	(0.0229)		(0.22)	(0.0073)
Fatal crashes	1.97	0.43	-0.0199	0.50	0.55 ***	-0.0200 ***
		(0.63)	(0.0228)		(0.17)	(0.0061)
Hit-and-runs	59.53	-30.61 ***	0.9051 ***	14.57	-1.01	0.0129
		(3.53)	(0.1219)		(0.91)	(0.0339)
Crashes involving injury	73.30	-37.58 ***	1.2063 ***	17.55	-0.40	0.0107
		(4.20)	(0.1207)		(0.89)	(0.0290)
Crashes involving ambulance	86.70	-37.69 ***	1.2400 ***	20.87	2.58 **	-0.0800 **
		(4.81)	(0.1414)		(0.98)	(0.0344)
Crashes involving public property damage	14.73	-1.39	0.0402	3.60	2.38 ***	-0.0794 ***
		(1.74)	(0.0609)		(0.60)	(0.0193)
Crashes in construction work zone	6.07	-3.56 ***	0.1327 ***	1.43	-0.28	0.0143
		(0.97)	(0.0316)		(0.27)	(0.0099)
Minor crashes	252.13	-126.45 ***	4.1459 ***	58.48	-2.25 *	0.0960 **
		(15.85)	(0.5621)		(1.31)	(0.0457)
Panel B: Driver level						
All drivers	810.77	-422.52 ***	13.7378 ***			
		(45.58)	(1.4472)			
Distracted drivers	42.47	-18.58 ***	0.5720 ***	5.25	0.93 **	-0.0369 **
		(3.88)	(0.1300)		(0.45)	(0.0161)
Drunk drivers	13.70	-7.13 ***	0.2253 ***	1.87	-0.06	0.0014
		(1.53)	(0.0499)		(0.26)	(0.0084)
Drivers on drug	3.17	-0.28	0.0122	0.40	0.37 **	-0.0116 *
		(0.87)	(0.0275)		(0.18)	(0.0062)
Male drivers	406.13	-194.01 ***	6.1904 ***	50.04	3.45 ***	-0.1248 ***
		(23.27)	(0.6609)		(0.83)	(0.0311)
White drivers	422.40	-233.40 ***	7.8161 ***	51.39	-3.45 ***	0.1454 ***
		(27.61)	(0.9524)		(0.95)	(0.0328)
Drivers aged 15-24	162.30	-86.07 ***	2.8430 ***	19.92	-0.38	0.0218
		(12.16)	(0.4067)		(0.89)	(0.0298)
Drivers aged 25-64	498.33	-249.91 ***	8.0898 ***	61.25	2.02 **	-0.0722 **
		(27.73)	(0.8760)		(0.95)	(0.0326)
Drivers aged 65 or above	76.17	-47.34 ***	1.6222 ***	9.20	-1.48 ***	0.0580 ***
		(6.68)	(0.2219)		(0.56)	(0.0191)

Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.12: Robustness: Effects on traffic accidents for crash- and driver-level analysis excluding Baton Rouge and New Orleans

	Total number			Fraction of total		
	Baseline	RD	Fuzzy RD	Baseline	RD	Fuzzy RD
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Crash level						
All crashes	312.47	-140.06 ***	4.7910 ***			
		(17.50)	(0.5792)			
Crashes involving pedestrian	2.30	0.09	-0.0010	0.77	0.47 *	-0.0157 *
		(0.65)	(0.0232)		(0.27)	(0.0094)
Fatal crashes	1.77	0.25	-0.0156	0.62	0.57 ***	-0.0228 ***
		(0.57)	(0.0217)		(0.21)	(0.0079)
Hit-and-runs	35.37	-15.34 ***	0.5023 ***	11.78	-0.09	-0.0027
		(2.88)	(0.1105)		(1.08)	(0.0427)
Crashes involving injury	55.40	-24.16 ***	0.7989 ***	18.10	0.51	-0.0318
		(4.08)	(0.1283)		(1.17)	(0.0415)
Crashes involving ambulance	70.70	-29.77 ***	1.0268 ***	23.10	2.13	-0.0739
		(4.39)	(0.1494)		(1.35)	(0.0475)
Crashes involving public property damage	11.93	-0.31	0.0000	3.98	2.52 ***	-0.0909 ***
		(1.62)	(0.0554)		(0.72)	(0.0240)
Crashes in construction work zone	4.77	-2.17 **	0.0803 **	1.51	-0.17	0.0102
		(1.08)	(0.0402)		(0.40)	(0.0159)
Minor crashes	187.70	-90.69 ***	3.1603 ***	59.13	-3.49 **	0.1417 **
		(12.38)	(0.4485)		(1.73)	(0.0623)
Panel B: Driver level						
All drivers	586.63	-289.22 ***	10.0206 ***			
		(34.82)	(1.1354)			
Distracted drivers	33.93	-14.73 ***	0.4867 ***	5.83	0.95	-0.0395 *
		(3.56)	(0.1236)		(0.59)	(0.0218)
Drunk drivers	11.07	-4.68 ***	0.1514 ***	2.11	0.12	-0.0058
		(1.39)	(0.0483)		(0.33)	(0.0115)
Drivers on drug	2.93	-0.40	0.0146	0.50	0.40 *	-0.0131 *
		(0.78)	(0.0253)		(0.22)	(0.0076)
Male drivers	300.53	-136.61 ***	4.6542 ***	51.32	3.21 ***	-0.1231 ***
		(17.99)	(0.5268)		(0.95)	(0.0363)
White drivers	343.93	-181.11 ***	6.2960 ***	58.04	-3.90 ***	0.1382 ***
		(22.56)	(0.7964)		(0.96)	(0.0347)
Drivers aged 15-24	121.63	-59.56 ***	2.0557 ***	20.72	-0.09	0.0058
		(9.88)	(0.3471)		(1.09)	(0.0384)
Drivers aged 25-64	364.70	-172.42 ***	5.9320 ***	62.01	1.92	-0.0783 *
		(22.21)	(0.6886)		(1.18)	(0.0450)
Drivers aged 65 or above	59.80	-37.85 ***	1.3365 ***	9.99	-2.12 ***	0.0761 ***
		(5.21)	(0.1884)		(0.68)	(0.0232)

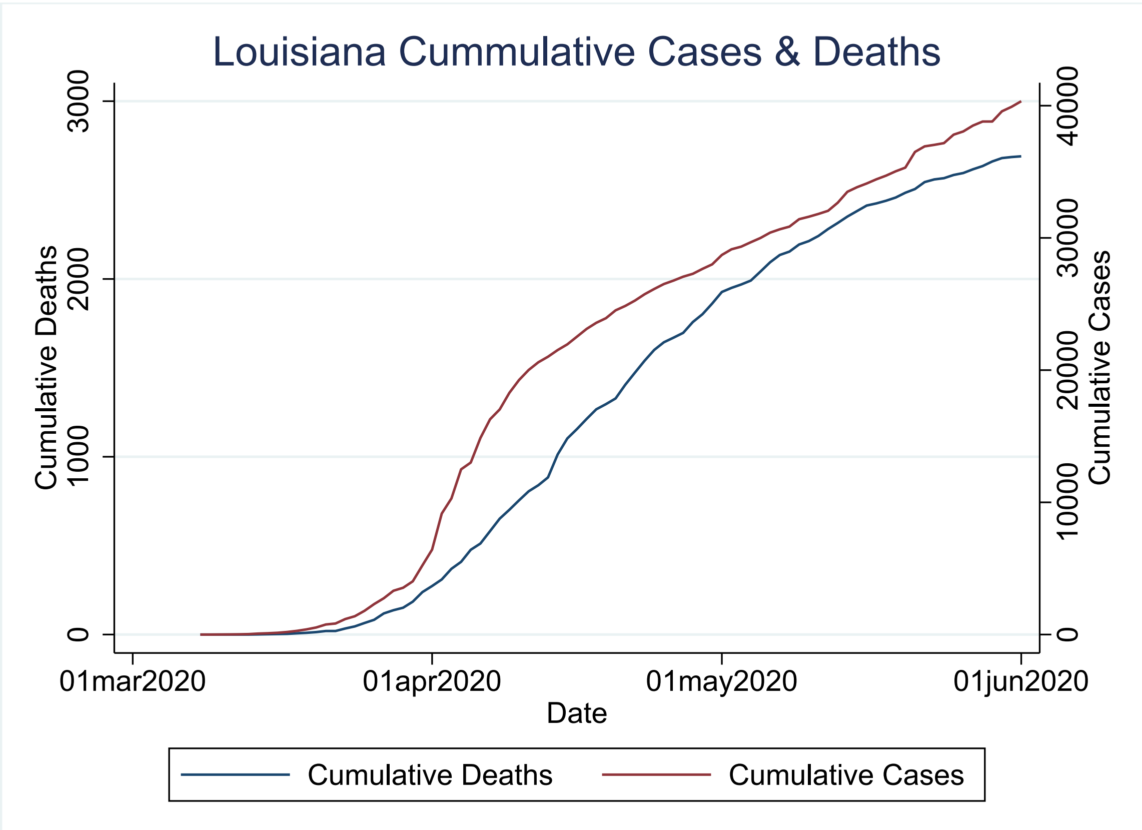
Notes: This table shows estimates of Equations (1) and (2) for various types of crashes, using the data from Google Community Mobility reports and the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (4) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (5) show RD estimates of Equation (1) for the total number of crashes and the fraction of crashes by categories, respectively. Columns (3) and (6) provide fuzzy RD estimates of Equation (2), which allows us to estimate the effect of change in mobility on traffic accidents. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table A.13: Robustness: Effects on traffic accidents for crash- and driver-level analysis using regression discontinuity design – difference-in-differences (RDD-DiD)

	Total number		Fraction of total	
	Baseline	RDD-DiD	Baseline	RDD-DiD
Outcome	(1)	(2)	(3)	(4)
Panel A: Crash level				
All crashes	377.30	-190.93 ***		
		(27.34)		
Crashes involving pedestrian	2.63	-0.09	0.73	0.42
		(0.89)		(0.27)
Fatal crashes	1.87	0.28	0.54	0.52 **
		(0.79)		(0.22)
Hit-and-runs	44.80	-22.35 ***	12.34	-0.16
		(4.67)		(1.27)
Crashes involving injury	62.30	-36.54 ***	16.85	-0.67
		(6.38)		(1.32)
Crashes involving ambulance	78.73	-36.56 ***	21.33	2.70 *
		(7.07)		(1.43)
Crashes involving public property damage	13.50	-0.03	3.75	2.74 ***
		(2.65)		(0.78)
Crashes in construction work zone	5.83	-5.92 ***	1.55	-0.81 *
		(1.82)		(0.47)
Minor crashes	231.20	-123.09 ***	60.32	-3.53 **
		(18.58)		(1.76)
Panel B: Driver level				
All drivers	740.08	-407.69 ***		
		(54.41)		
Distracted drivers	42.25	-21.24 ***	5.72	0.78
		(5.37)		(0.67)
Drunk drivers	12.27	-5.09 **	1.84	0.15
		(2.24)		(0.36)
Drivers on drug	3.10	0.74	0.42	0.53 **
		(1.19)		(0.22)
Male drivers	371.67	-191.51 ***	50.27	2.96 **
		(28.09)		(1.22)
White drivers	411.55	-243.64 ***	54.98	-4.75 ***
		(33.69)		(1.31)
Drivers aged 15-24	155.72	-82.89 ***	21.03	-0.27
		(15.39)		(1.21)
Drivers aged 25-64	460.30	-239.25 ***	62.00	3.00 **
		(34.74)		(1.43)
Drivers aged 65 or above	70.57	-56.49 ***	9.44	-2.79 ***
		(7.67)		(0.76)

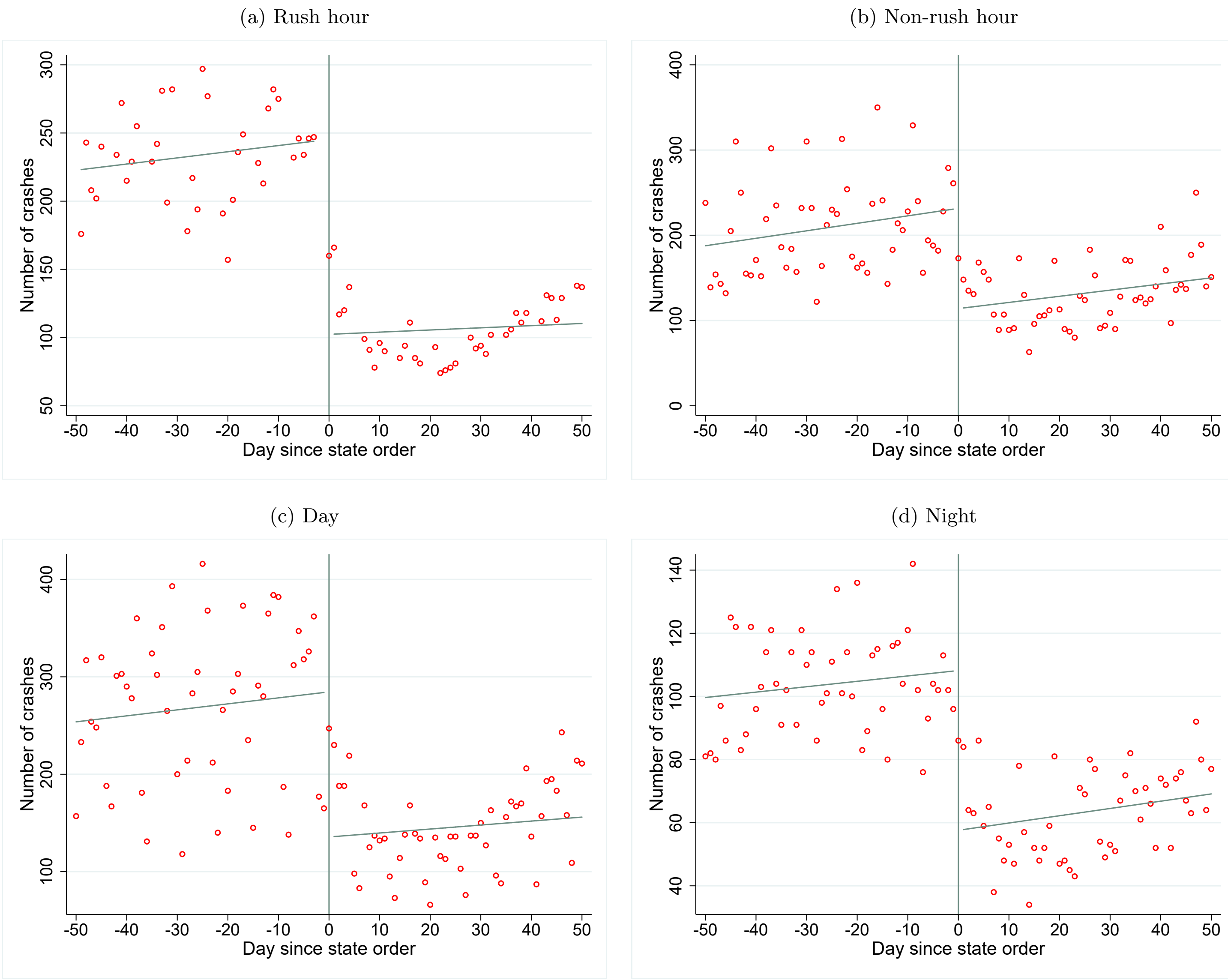
Notes: This table shows RDD-DiD estimates for various types of crashes, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD). Panel A reports crash-level estimates and Panel B reports driver-level estimates. Columns (1) and (3) present a baseline from February 15 to March 15 for the average daily number and average fraction of crashes, respectively. Columns (2) and (4) show RDD-DiD estimates for the total number of crashes and the fraction of crashes by categories, respectively. Robust standard errors are reported in parentheses. * Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Figure A.1: COVID-19 cases and deaths in Louisiana



Notes: Using the data from the COVID Tracking Project, Figure A.1 shows the evolution of COVID-19 cases and deaths in Louisiana from March to June of 2020.

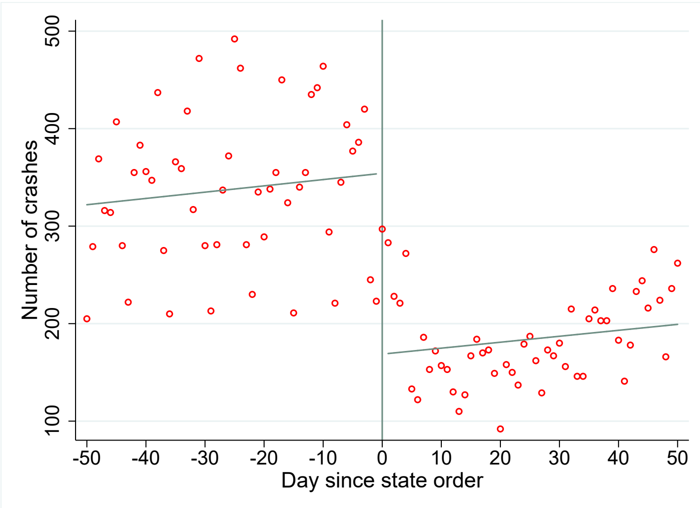
Figure A.2: Regression discontinuity plots for crash-level analysis: Heterogeneity by rush hour versus non-rush hour, and by day versus night



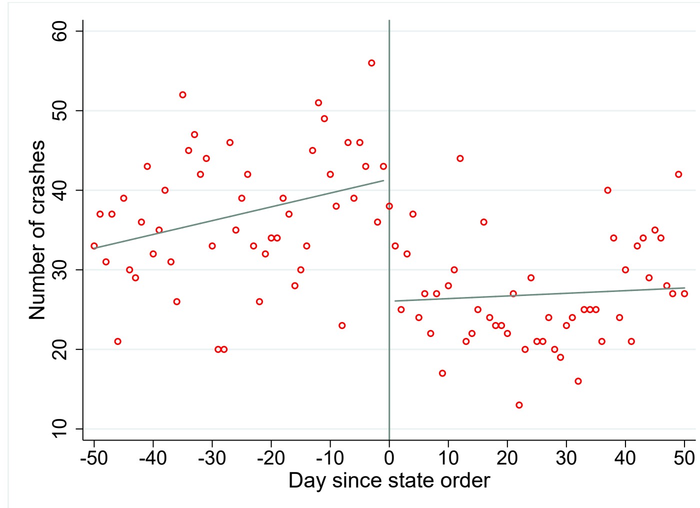
Notes: Panels show RD plots with fitted lines corresponding to Equation (1) for all crashes by subgroups, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

Figure A.3: Regression discontinuity plots for crash-level analysis: Heterogeneity by metropolitan status, and by above- and below-median number of COVID-19 cases and number of accidents

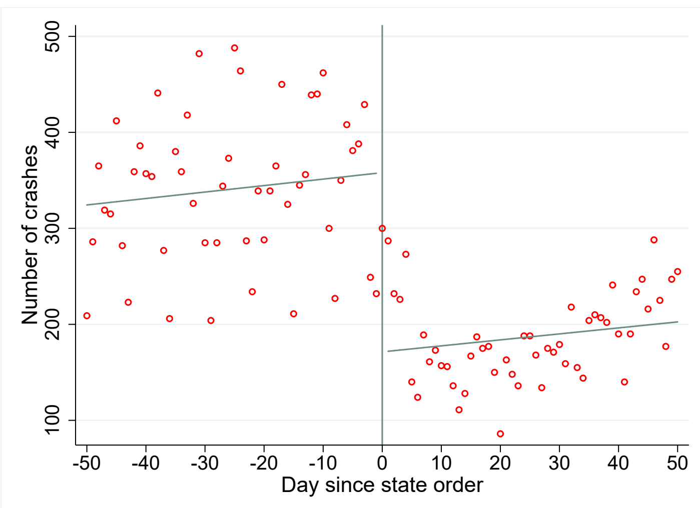
(a) Metropolitan



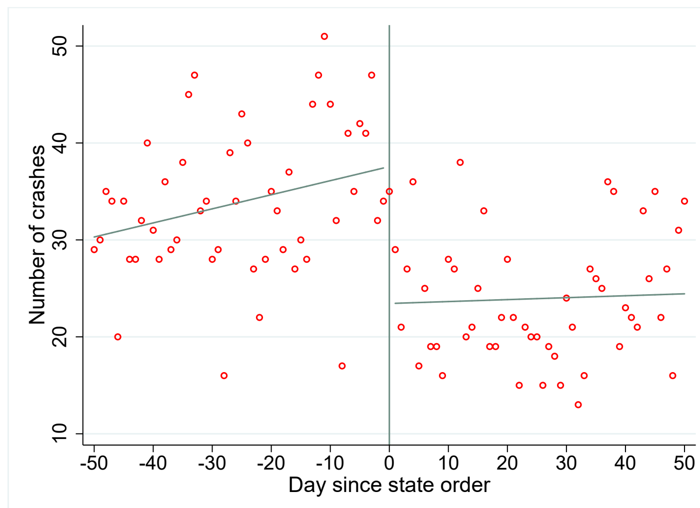
(b) Nonmetropolitan



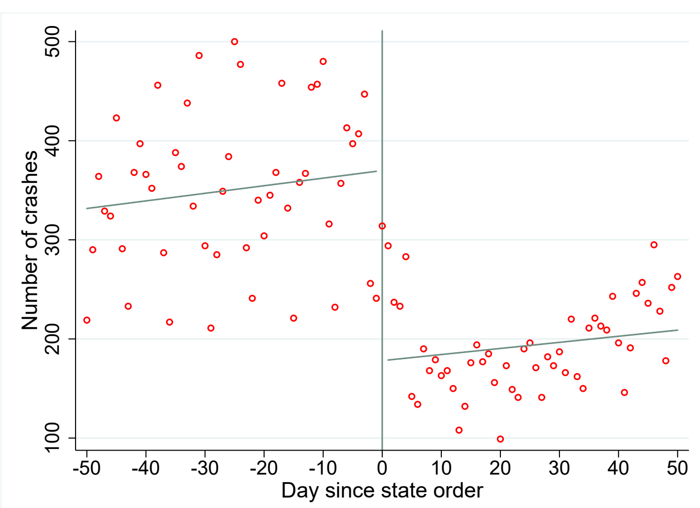
(c) Above-median COVID-19 cases



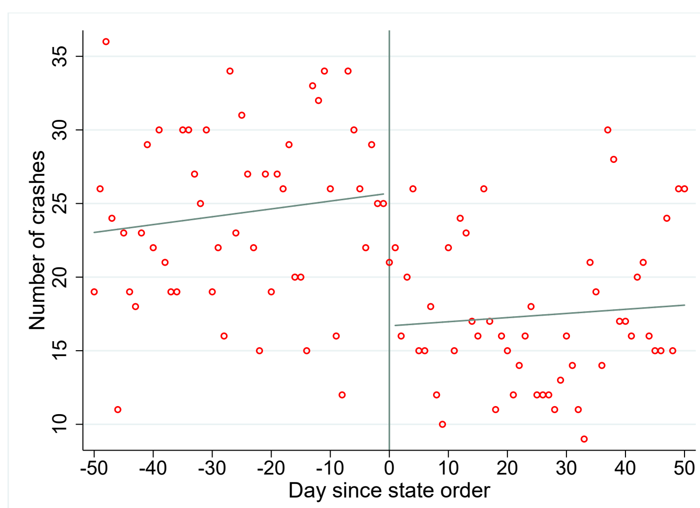
(d) Below-median COVID-19 cases



(e) Above-median number of crashes

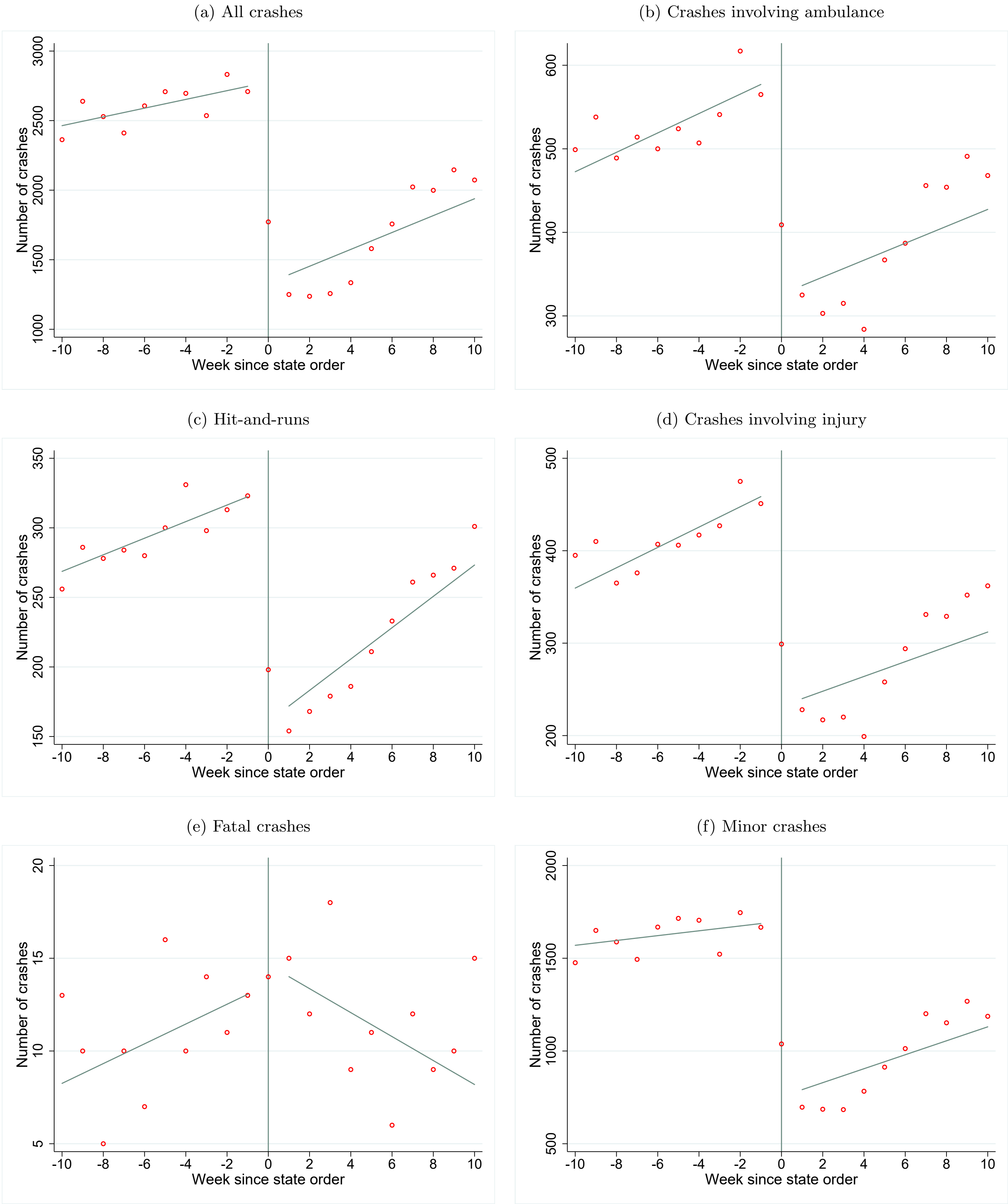


(f) Below-median number of crashes



Notes: Panels show RD plots with fitted lines corresponding to Equation (1) for all crashes by subgroups, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

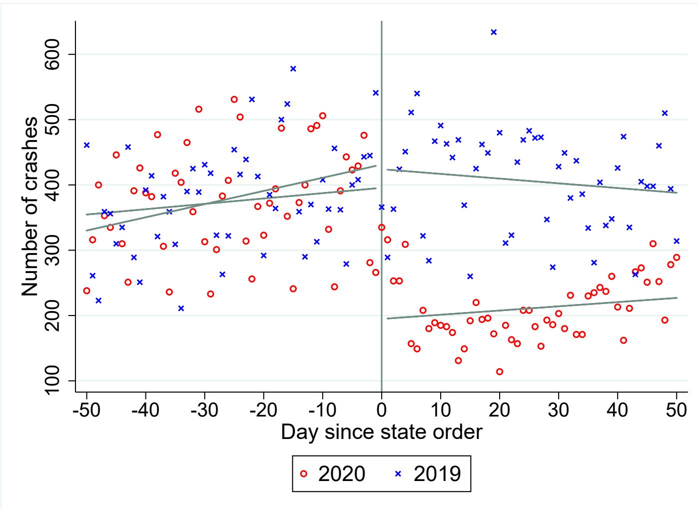
Figure A.4: Robustness: Regression discontinuity plots for weekly crash-level analysis



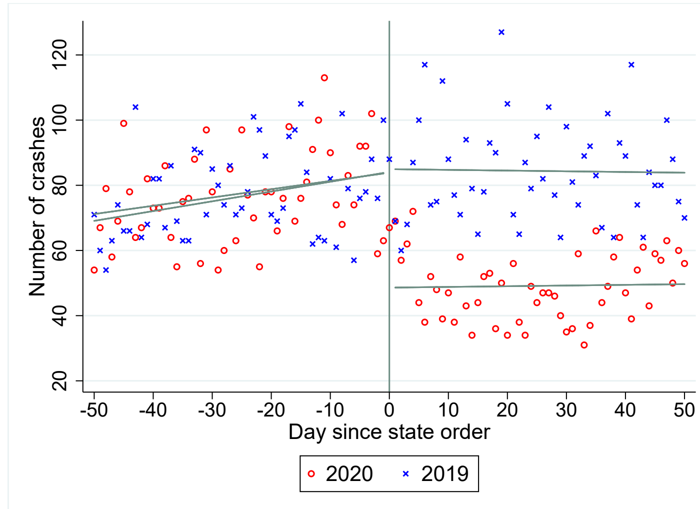
Notes: Panels show RD plots with fitted lines Equation (1) for various types of crashes at the week-level, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

Figure A.5: Robustness: Regression discontinuity design – difference-in-differences (RDD-DiD) plots for crash-level analysis

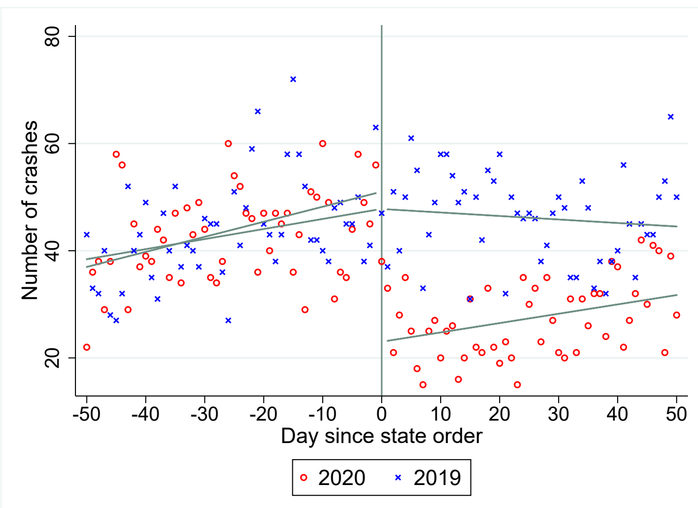
(a) All crashes



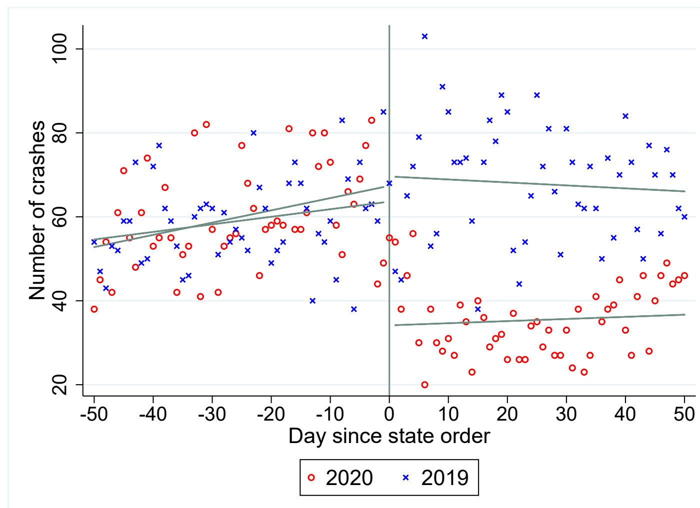
(b) Crashes involving ambulance



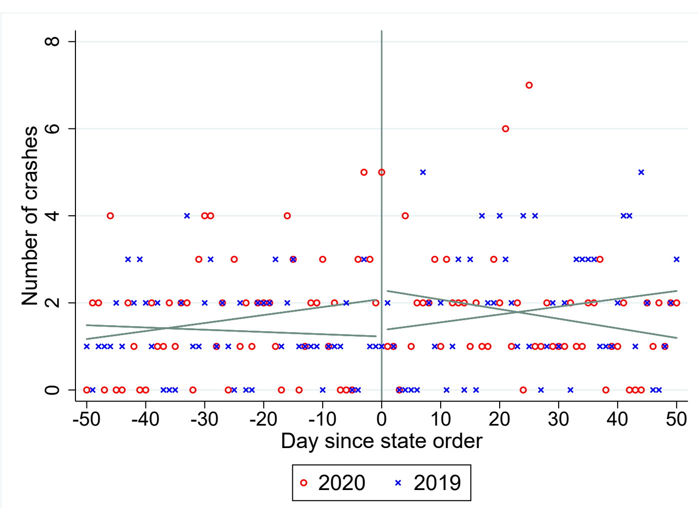
(c) Hit-and-runs



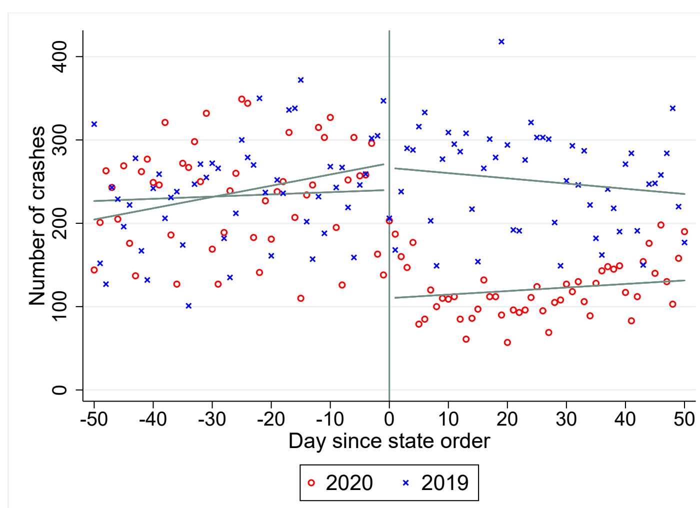
(d) Crashes involving injury



(e) Fatal crashes

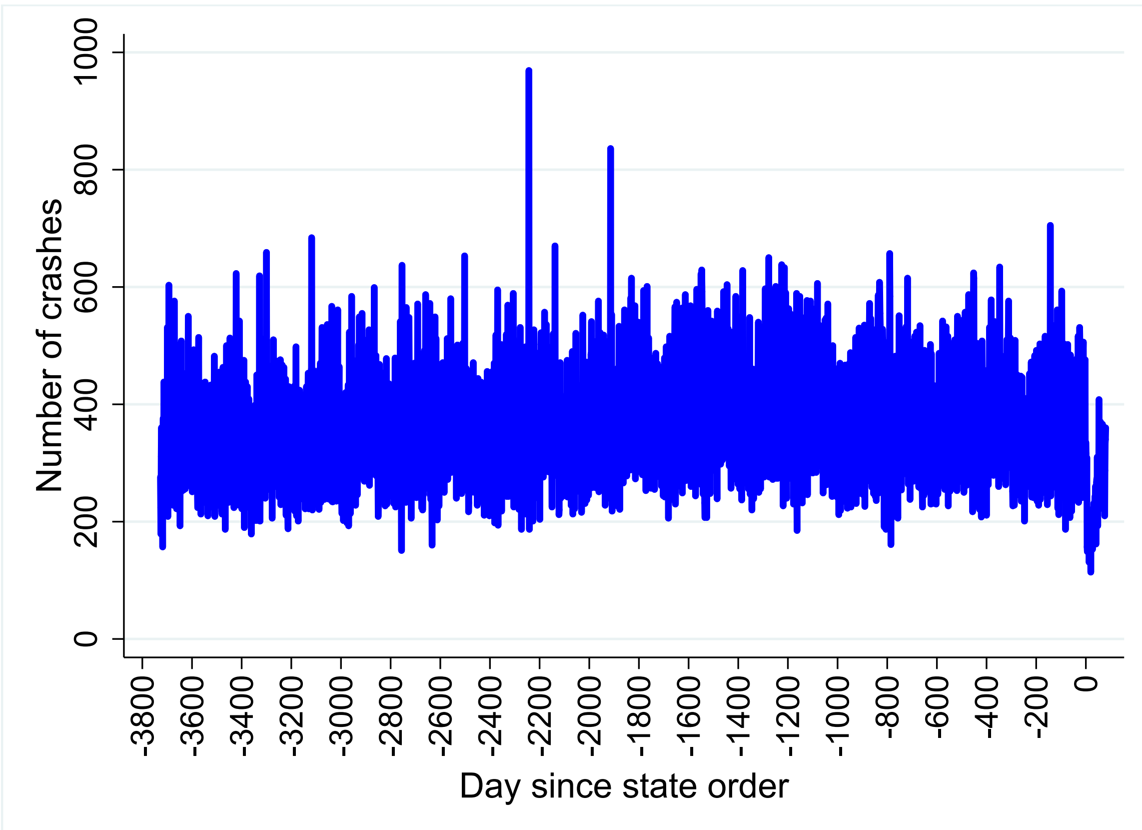


(f) Minor crashes



Notes: Panels show regression discontinuity design – difference-in-differences (RDD-DiD) plots with fitted lines for various types of crashes comparing 2020 and 2019, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).

Figure A.6: Daily number of crashes between 2010-2020



Notes: Figure A.6 shows the number of crashes in Louisiana from 2010 to 2020 at the daily level, using the Uniform Traffic Crash Report from the Louisiana Department of Transportation and Development (LaDOTD).