# ONLINE APPENDIX

Increasing Organ Donor Registration as a Means to Increase Transplantation: An Experiment With Actual Organ Donor Registrations

Judd B. Kessler and Alvin E. Roth

## Appendix A: Field-in-the-Lab Study Details for Wave 1

Appendix A provides additional information on wave 1 of the field-in-the-lab experiment described in Section I in the main text. In wave 1, we recruited subjects via a posting on the CLER website, shown in Figure A1. Wave 2 used nearly identical recruitment materials. Wave 3 differed somewhat to accommodate online recruitment.

"IN ORDER TO PARTICIPATE IN THIS STUDY YOU MUST HAVE A MASSACHUSETTS DRIVER'S LICENSE, MA PERMIT, OR MA STATE ID AND WILL NEED TO PRESENT IT FOR ENTRY INTO THE STUDY. THOSE WITHOUT A MASSACHUSETTS DRIVER'S LICENSE, MA PERMIT, OR MA STATE ID WILL BE TURNED AWAY. YOU MUST ALSO KNOW THE LAST FOUR DIGITS OF YOUR SOCIAL SECURITY NUMBER."

Study Description: You will log into a state database, make a decision and complete a survey.

Compensation: Participants who arrive on time and are eligible to participate will receive $15 for completing the study. There is the possibility that some subjects will be turned away from the experiment. Those who are eligible and are turned away will receive a $10 turn-away fee and will not be required to stay for the study."

Figure A1. Study Recruitment Text on CLER Website

Participants in wave 1 were in one of four treatments in a two-by-two factorial design shown in Table A1. In waves 2 and 3, subjects were randomized to one of the cells in the top row only. See Figure 1 in the main text and Figure A2 below for the registration question screens associated with each cell.

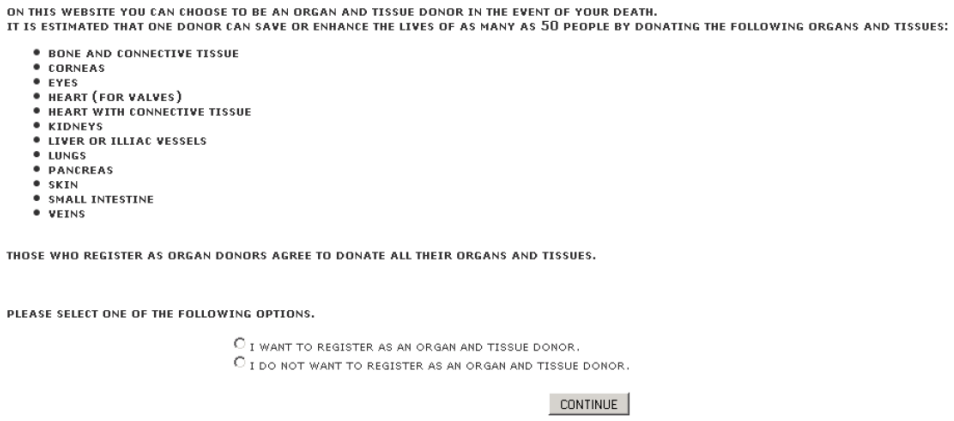
Table A1—Study Design and Subjects (Wave 1)

| *2x2 Design* | | Choice Frame: Yes/No | Choice Frame: Opt-in |
|---|---|---|---|
| Information Provided | Control | 82 subjects (51 non-donors and 31 donors) | 93 subjects (55 non-donors and 38 donors) |
| | List of Organs | 101 subjects (52 non-donors and 49 donors) | 96 subjects (55 non-donors and 41 donors) |

*Note:* The number of subjects, including initial donors and non-donors, in each of the four treatments in the 2x2 design of wave 1.

After arriving at the laboratory, each subject was seated at an isolated computer terminal and signed a consent form (see Figure A3). In addition, the experimenter read aloud a paragraph from the consent form explaining that participants would log into the Massachusetts Organ and Tissue Donor Registry and have the opportunity to change their donor registration status. Subjects initiated the study by logging into the Massachusetts Organ and Tissue Donor Registry maintained by the Department of Transportation (DOT) accessible through the website of the Registry of Motor Vehicles. Our software allowed subjects to log into and interact with the real MA Organ and Tissue Donor Registry (see Figure A4) through a front end that could be manipulated experimentally (see Figure A5).


(a) Opt-in Frame Decision Screen with Organ List




(b) Yes/No Frame Decision Screen with Organ List

Figure A2. Registration Screens from the Experiment (with Organ Lists)

*Note:* Figure A2 shows the message shown to a random subset of wave 1 subjects that included a list of organs that might be donated should the subject become a deceased donor. In wave 1, we had intended to have a third dimension of variation that included an explicit reference to death by car crash. We hypothesized that this messaging would depress registration rates. A software bug inadvertently dropped some text from the screens of the first 39 subjects who received the car crash language without the list of organs. Given the bug and low recruitment numbers, we cut the car crash language from future sessions. In total, 128 subjects in wave 1 saw the car crash language ($n = 54$ initial donors and $n = 74$ initial non-donors). Our results are qualitatively the same if we exclude these subjects from the analysis.

Please consider this information carefully before deciding whether to participate in this research.

**Purpose of the research:** To understand the decision to register as an organ donor.

**What you will do in this research:** You will (1) enter information that will be used to log you into a registry of organ and tissue donors in Massachusetts, (2) be provided with information about organ and tissue donation, (3) decide whether or not you would like to register as an organ and tissue donor, and (4) complete a survey.

**Time required:** Participation will take approximately 45 minutes to complete.

**Risks:** There are no anticipated risks associated with participating in this study.

**Benefits:** At the end of the study, we will provide a thorough explanation of the study and of our hypotheses. We will describe the potential implications of the results of the study both if our hypotheses are supported and if they are disconfirmed. If you wish, you can send an email message to Judd Kessler (jkessler@hbs.edu) and we will send you a copy of any manuscripts based on the research (or summaries of our results).

**Compensation:** You will receive $15 for participating in this study.

**Confidentiality:** Your participation in this study will remain confidential, and your identity or personal information will not be stored with your data. Your responses will be assigned a code number, and we will not connecting your name or any of your personal information with this number.

**Participation and withdrawal:** Your participation in this study is completely voluntary, and you may withdraw at any time without penalty. You will receive payment based on the proportion of the study you completed. You may withdraw by informing the researcher that you no longer wish to participate (no questions will be asked).

**To Contact the Researcher:** If you have questions about this research, please contact Judd Kessler, Doctoral Candidate, Baker Library 420F, 617-495-8845, jkessler@hbs.edu.

Whom to contact about your rights in this research, for questions, concerns, suggestions, or complaints that are not being addressed by the researcher, or research-related harm: Jane Calhoun, Harvard University Committee on the Use of Human Subjects in Research, 1414 Massachusetts Avenue, Room 234, Cambridge, MA 02138. Phone: 617-495-5459. E-mail: jcalhoun@fas.harvard.edu

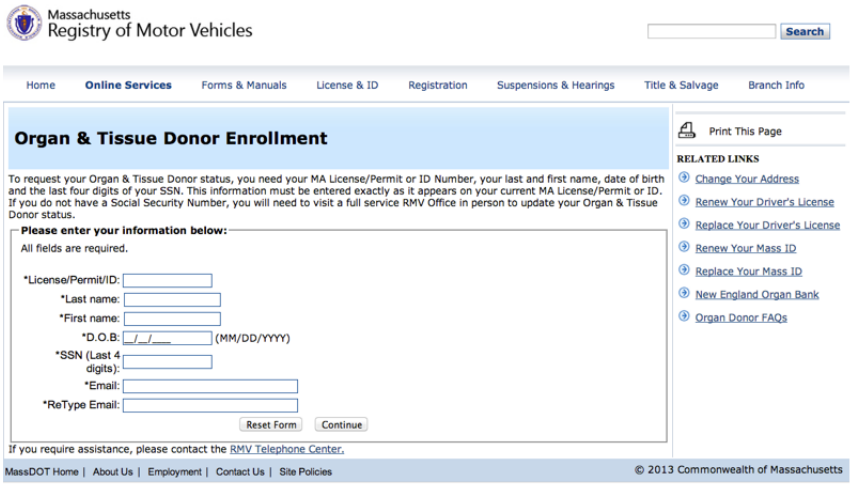
**Agreement:**

The nature and purpose of this research have been sufficiently explained and I agree to participate in this study. I understand that I am free to withdraw at any time without incurring any penalty.

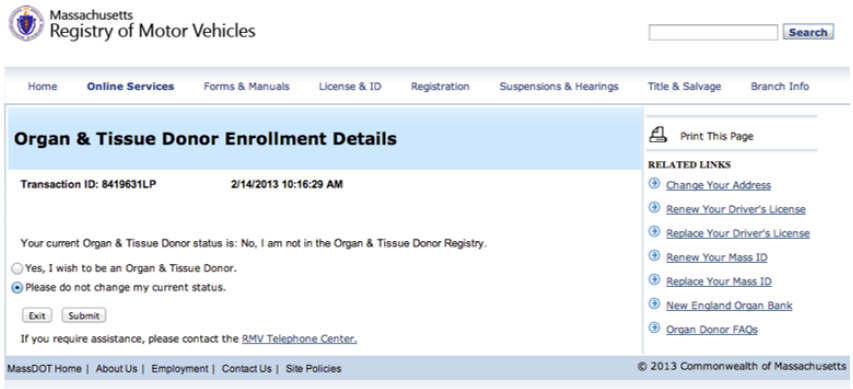
Signature: _____Date: _____

Name (print): _____

Figure A3. Consent Form




(a) Login Page




(b) Donor Registration Page

Figure A4. Login and Registration Page, MA Registry of Motor Vehicles

*Note:* Screenshot of login and registration page on the Massachusetts Registry of Motor Vehicles Webpage that subjects did not see due to the experimental interface. "Please do not change my current status." is the default option that is automatically selected on the page. This selection is implemented when either the "Exit" or "Submit" button is pressed.

After logging into the registry, all subjects—those who were previously donors and those who were previously not donors—were asked whether they wanted to change their organ and tissue donor registration status. After subjects made their organ donor registration decision, they completed a 40-question survey.

Procedures were very similar for wave 2, which utilized a different survey interface. In wave 3, subjects were recruited from a Qualtrics panel to be representative of residents of Massachusetts and completed all parts of the study online.

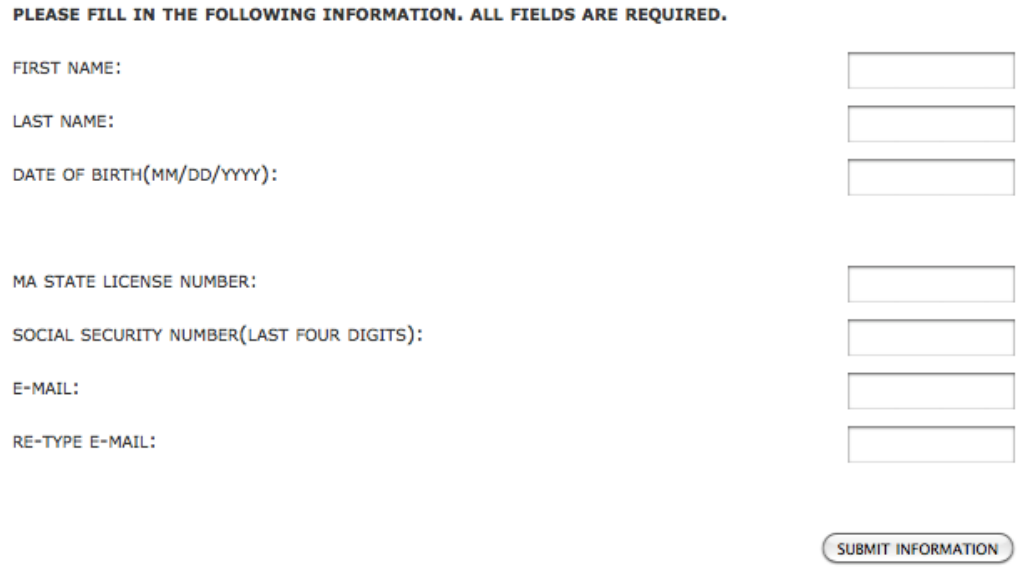



Figure A5. Screenshot of Login Page in Experiment

## Appendix B: Additional Results

Appendix B reports additional results from the field-in-the-lab experiment. Table B1 shows that our main results (Table 2 in the main text) are not meaningfully different when controlling for observables.

Table B1—Organ Donor Registration by Treatment (Initially Unreg.), with Controls

| *Study Wave:* | Wave 1 | Wave 2 | Wave 3 | All Waves | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Yes/No Frame | -0.070 | 0.058 | 0.037 | -0.032 | -0.014 |
| | (0.063) | (0.105) | (0.097) | (0.046) | (0.050) |
| Organ List | 0.122* | | | 0.109* | 0.147** |
| | (0.064) | | | (0.062) | (0.069) |
| Constant | 0.207 | 0.319 | 0.035 | | |
| | (0.205) | (0.285) | (0.266) | | |
| Observations | 213 | 65 | 99 | 377 | 377 |
| R-squared | 0.079 | 0.220 | 0.055 | 0.034 | 0.151 |
| Wave FE | NO | NO | NO | YES | YES |
| Date FE | NO | NO | NO | NO | YES |

*Note:* Analysis includes 377 participants who were unregistered at the beginning of our study. Results are shown for each study wave separately in Columns 1–3 and across all waves jointly in Columns 4–5. Yes/No Frame is an indicator for whether a participant was exposed to the yes/no frame; Organ List is an indicator for whether a participant saw a list of organs. Analysis in Column 4 includes fixed effects for study wave. Analysis in Column 5 includes fixed effects for study wave and for the date on which a subject participated in the study. In all specifications, we include the following demographic indicators as controls: completed some college, has children, non-White, never married, female, religious, republican, socially conservative, and student. We also control for subject age. Standard errors are in parentheses. $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$.

In the main text, we show our primary experimental results estimated on the sample of subjects who were not registered organ donors at the beginning of the experiment. Table B2 repeats this analysis, but leverages the full sample. As before, we estimate the effect of the yes/no frame on the decision to register as a donor in each wave separately and on the pooled data. However, we now also interact an indicator for being registered as a donor at the beginning of the experiment (*Initially Reg.*) with an indicator for being in the yes/no frame and an indicator for having seen an organ list, respectively. We find no effect of the yes/no frame on registration decisions for those who were already registered donors at the start of the experiment. This is not surprising, as very few subjects removed themselves from the registry during the course of the experiment.

Table B2—Organ Donor Registration by Treatment (Full Sample)

| *Study Wave:* | Wave 1 | Wave 2 | Wave 3 | All Waves | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Yes/No Frame | -0.085* | 0.015 | 0.033 | -0.037 | -0.042 |
| | (0.048) | (0.070) | (0.043) | (0.029) | (0.029) |
| Yes/No Frame × Initially Reg. | 0.085 | -0.015 | -0.023 | 0.044 | 0.048 |
| | (0.073) | (0.097) | (0.047) | (0.036) | (0.037) |
| Initially Reg. | 0.718*** | 0.793*** | 0.730*** | 0.721*** | 0.713*** |
| | (0.064) | (0.074) | (0.034) | (0.029) | (0.030) |
| Organ List | 0.120** | | | 0.113*** | 0.124*** |
| | (0.048) | | | (0.035) | (0.037) |
| Organ List × Initially Reg. | -0.116 | | | -0.100** | -0.103** |
| | (0.074) | | | (0.045) | (0.047) |
| Constant | 0.267*** | 0.207*** | 0.255*** | | |
| | (0.041) | (0.052) | (0.031) | | |
| Observations | 372 | 142 | 529 | 1043 | 1043 |
| R-squared | 0.508 | 0.664 | 0.638 | 0.614 | 0.638 |
| Wave FE | NO | NO | NO | YES | YES |
| Date FE | NO | NO | NO | NO | YES |

*Note:* Analysis includes all Massachusetts study participants. Results are shown for each study wave separately in Columns 1–3 and across all waves jointly in Columns 4–5. Yes/No Frame is an indicator for whether a participant was exposed to the yes/no frame; Initially Reg. is an indicator for whether a participant was registered as an organ donor at the start of the experiment; Organ List is an indicator for whether a participant saw a list of organs. Analysis in Column 4 includes fixed effects for study wave. Analysis in Column 5 includes fixed effects for study wave and for the date on which a subject participated in the study. Standard errors are in parentheses. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

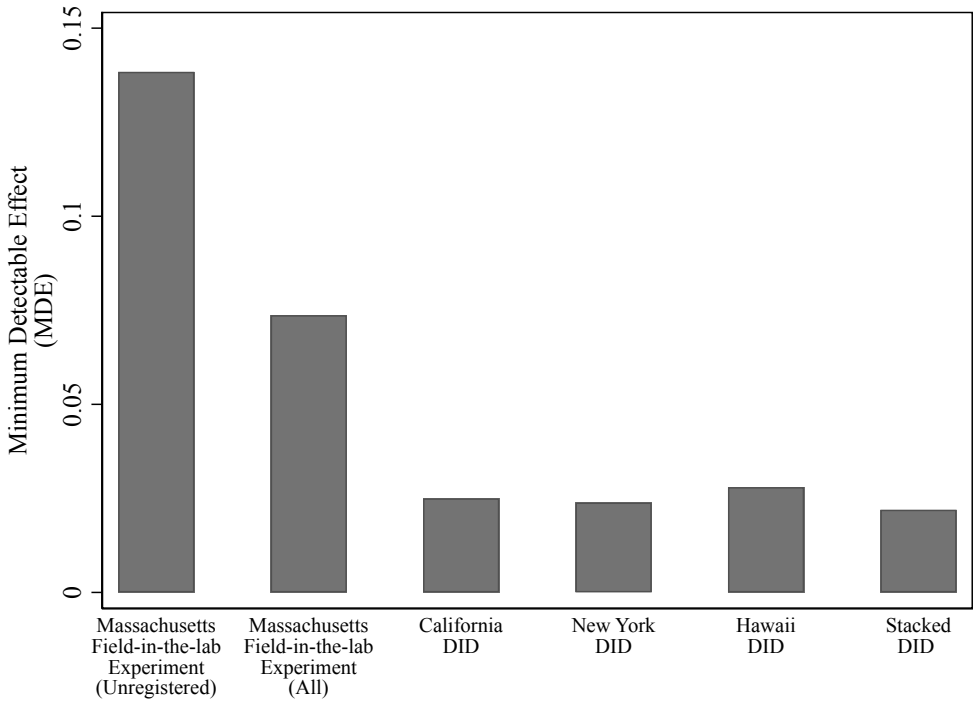



Figure B1. Minimum Detectable Effect (MDE) across Studies

*Note:* Figure B1 shows the Minimum Detectable Effect (MDE) for our main estimates. From left to right, we show the MDE for: the field-in-the-lab study estimated on the sample of subjects who were unregistered at the start of the experiment, the field-in-the-lab study estimated on the full sample, the difference-in-differences analysis for California, New York, and Hawaii, and the stacked difference-in-differences analysis using all three treated states. We calculate the MDE for the experimental studies using power analysis for a two-sample proportions test. For the difference-in-differences MDE calculations, we follow the simulation-based approach in Burlig, Preonas and Woerman (2020).

## Appendix C: Empirical Details

Appendix C provides additional information on the difference-in-differences analysis described in Section II in the main text. For this analysis, we solicited DMV data from each U.S. state on organ donor registration rates using the process outlined in Section C.C1. The resulting dataset is provided in Table C1.

### *C1. Empirical Dataset Construction*

The primary outcome of interest for our empirical analysis is the fraction of individuals who registered to be organ donors, conditional on being asked to register at their state DMV. To construct this variable, we requested from state DMVs the raw number of "yes" responses to the organ donor registration question and the raw number of individuals who were faced with the organ donor registration question, at the finest level of granularity available, from 2010 to 2016 inclusive. Our data collection process was as follows:

1) We collected the first round of data during the summer of 2017. We contacted state DMVs directly as well as state organ donor registration agencies. We also collected copies of license application forms from each state to document changes in the organ donor registration question frame.

2) During the spring of 2018, we submitted Freedom of Information Act (FOIA) requests for states from which we had received incomplete or no information.

3) During the summer and fall of 2018, we sent a final round of FOIA requests to states that had not responded to our previous requests.

In addition, we constructed a dataset of changes in organ donor registration forms, summarized in Table C2. This dataset allowed us to identify treated states (i.e., states that changed their donor question frame from an opt-in to a yes/no frame or vice versa) and control states that did not change their question frame during the sample period.

Through this process, we identified three states that changed the organ donor question frame during our data window and for which we had sufficient data. In the main text, see Figure 4 for the change in California, Figure 5 for the change in New York, and Figure 6 for the change in Hawaii. As noted in the main text, a fourth state, Tennessee, also changed the question frame during this period, but we have insufficient data to analyze how this change impacted registration rates and therefore exclude Tennessee from our analyses.

The top panel of Appendix Figure C1 plots average quarterly registration rates for California and 37 control states that did not change their question frame during the data window.[27] Registration rates are shown as a percentage of the Quarter 2, 2011 rate, the quarter before California switched from opt-in to yes/no. While the other states show a gradual increase in registration rates over time, California shows a dip in registration rates between the second and third quarters of 2011 when the question frame was modified from an opt-in to a yes/no frame.

Panel B of Appendix Figure C1 similarly shows average quarterly registration rates for New York and a cohort of 35 control states, where registration rates are normalized to Quarter 3 of 2013, the quarter before New York changed the organ donor question frame from an opt-in to a yes/no frame. Unlike in California, registration rates in New York follow an inconclusive pattern around the switch to the yes/no frame, while rates in control states are fairly constant over time.

The bottom panel of Appendix Figure C1 shows registration rates in Hawaii and 29 control states, normalized to the registration rate in Quarter 2, 2014, the quarter before Hawaii modified its question frame from a yes/no to an opt-in. Registration rates in Hawaii decrease relative to the quarter prior to the switch to opt-in, suggesting the yes/no frame in Hawaii might be associated with higher registration rates.

Table 3 in the main text summarizes difference-in-differences results based on this data. Figure 7 provides quarterly event-study estimates of the effect of the yes/no frame (or the opt-in frame in Hawaii) on registration rates.

### *C2. Stacked Difference-in-Differences*

To fully leverage the staggered policy changes across treated states, we follow the "stacked" difference-in-differences approach in Gormley and Matsa (2011).

[27] The number of control states varies based on the data availability in the treated state of interest; i.e., we trim the data window to the available periods in the treated state, which excludes some control states where all observations for that state fall outside this data window. However, control states in each figure are pulled from the same baseline group of 39 control states that did not change the organ donor question frame during the sample period.

| State | 2010 | | | | 2011 | | | | 2012 | | | | 2013 | | | | 2014 | | | | 2015 | | | | 2016 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Alabama | . | . | . | . | . | . | . | . | . | 27.84 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Alaska | 54.50 | 53.13 | 54.98 | 53.02 | 56.68 | 54.19 | 53.79 | 53.41 | 55.35 | 53.48 | 54.37 | 53.97 | 54.30 | 53.62 | 53.76 | 54.24 | 52.57 | 52.61 | 52.57 | 53.64 | 51.95 | 52.27 | 53.53 | 51.13 | 53.85 | 52.69 | 55.18 | 53.16 |
| Arizona | 21.46 | 23.39 | 23.85 | 26.34 | 20.92 | 22.61 | 25.03 | 23.51 | 25.87 | 26.19 | . | . | . | . | . | . | . | . | 31.60 | 33.78 | 33.74 | 31.29 | 32.56 | 35.39 | 36.04 | 26.84 | 36.84 | 35.56 |
| California | 26.73 | 27.37 | 27.93 | 26.66 | 27.31 | 27.43 | 26.36 | 26.07 | 26.41 | 27.08 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Colorado | 63.76 | 65.21 | 66.61 | 66.63 | 66.74 | 67.36 | 67.15 | 66.99 | 65.94 | 66.51 | 67.04 | 66.65 | 66.44 | 67.00 | 67.92 | 67.82 | 67.68 | 67.88 | 67.85 | 67.80 | 67.20 | 67.47 | 68.16 | 68.62 | 69.29 | 69.38 | 69.52 | 69.06 |
| Connecticut | 37.09 | 37.90 | 38.39 | 39.05 | 38.53 | 39.52 | 40.31 | 38.64 | 38.54 | 41.76 | 42.88 | 42.87 | 41.33 | 41.54 | 43.11 | 42.87 | 42.31 | 42.77 | 45.23 | 45.24 | 44.59 | 44.62 | 45.18 | 44.42 | 44.02 | 45.55 | 46.21 | 46.18 |
| DC | 39.28 | 37.13 | 36.12 | 33.19 | 28.66 | 29.51 | 40.24 | 37.91 | 36.46 | 37.60 | 40.91 | 37.91 | 35.19 | 36.81 | 40.58 | 39.91 | 37.15 | 39.83 | 41.26 | 36.59 | 32.32 | 34.90 | 38.20 | 35.18 | 33.56 | 34.16 | 37.84 | . |
| Florida | . | . | . | 37.53 | 37.95 | 39.47 | 41.81 | 40.37 | 40.70 | 43.95 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Georgia | 40.40 | 43.22 | 44.42 | 45.99 | 47.01 | 47.06 | 47.63 | 47.68 | 46.72 | 47.12 | 45.99 | 45.46 | 44.48 | 44.76 | 45.62 | 44.83 | 44.34 | 42.96 | 42.83 | 42.32 | 41.92 | 42.16 | 41.61 | 41.86 | 41.49 | 42.92 | 43.31 | 42.64 |
| Hawaii | 42.13 | 43.07 | 42.14 | 41.70 | 41.05 | 42.71 | 42.94 | 43.15 | 41.08 | 42.71 | 41.70 | 41.85 | 42.18 | 43.79 | 45.87 | 46.37 | . | 45.29 | 43.47 | 41.50 | 40.73 | 41.49 | 43.41 | . | . | . | . | . |
| Idaho | 52.45 | 54.94 | 55.51 | 56.49 | 55.61 | 56.17 | 57.03 | 57.94 | 56.88 | 56.81 | 55.87 | 56.49 | 55.81 | 56.10 | 56.68 | 57.39 | 57.11 | 57.58 | 57.79 | 58.17 | 56.75 | 58.12 | 58.83 | 59.94 | 59.02 | 59.22 | 59.55 | 60.76 |
| Illinois | 34.38 | 28.72 | 26.55 | 27.94 | 26.53 | . | 34.62 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Indiana | 34.17 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Iowa | 50.55 | 51.57 | 51.70 | 52.33 | 52.18 | 53.00 | 53.03 | 52.88 | 52.73 | 54.17 | 54.06 | 53.82 | 53.36 | 54.02 | 52.88 | 52.96 | 52.84 | 53.60 | 53.56 | 53.99 | 53.79 | 54.82 | 54.67 | 55.01 | 55.43 | 56.18 | 56.40 | 56.61 |
| Kansas | . | 12.50 | . | . | . | . | . | . | . | 34.65 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Kentucky | 23.65 | 23.72 | 23.22 | 22.26 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Louisiana | 64.18 | 52.59 | 53.74 | 53.72 | 54.60 | 56.19 | 59.49 | 55.10 | 54.86 | 57.74 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Maine | . | . | 49.70 | 49.93 | 51.36 | 51.29 | 52.58 | 52.24 | 51.67 | 50.93 | 51.62 | 51.85 | 51.41 | 52.05 | 52.29 | 50.78 | 50.30 | 49.24 | 51.28 | 51.39 | 52.31 | 53.07 | 54.14 | 53.98 | 54.17 | 54.44 | 55.17 | 55.60 |
| Maryland | 59.42 | 61.61 | 59.75 | 61.53 | 62.25 | 62.44 | 58.26 | 58.14 | 48.90 | 49.32 | 48.06 | 49.54 | 48.79 | 49.35 | 48.58 | 49.45 | 47.74 | 47.21 | 45.78 | 48.31 | 47.07 | 47.36 | 47.04 | 48.22 | 48.44 | 47.93 | 47.33 | 47.61 |
| Massachusetts | 41.33 | 43.21 | 44.35 | 44.73 | 45.29 | 45.67 | 46.50 | 45.59 | 45.28 | 45.69 | 46.15 | 46.02 | 45.51 | 45.94 | 46.51 | 45.42 | 45.04 | 45.51 | 46.42 | 45.79 | 45.49 | 45.90 | 46.75 | 47.06 | 47.32 | 48.71 | 49.91 | 48.88 |
| Michigan | 14.18 | 17.16 | 18.17 | 15.63 | 14.91 | 19.23 | 24.61 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Missouri | 38.34 | 39.96 | 39.68 | 40.25 | 39.87 | 40.63 | 40.89 | 41.50 | 41.27 | 42.61 | 43.26 | 44.88 | 43.93 | 44.97 | 44.76 | 45.70 | 45.55 | 46.15 | 46.11 | 46.26 | 45.50 | 47.01 | 47.54 | 48.09 | 48.33 | 50.21 | 50.17 | 49.94 |
| Montana | 61.52 | 63.39 | 63.52 | 64.29 | 64.06 | 65.78 | 66.83 | 66.74 | 65.23 | 67.02 | 66.25 | 65.75 | 64.74 | 66.12 | 65.93 | 66.13 | 68.53 | 67.58 | 67.08 | 67.52 | 66.79 | 65.78 | 69.68 | 66.12 | 64.84 | 65.99 | 66.81 | 65.00 |
| Nebraska | 43.76 | 44.37 | 44.32 | 45.35 | 43.37 | 43.51 | 44.02 | 43.88 | 45.15 | 44.68 | 44.33 | 45.53 | 44.57 | 45.21 | 45.22 | 45.62 | 45.15 | 44.43 | 44.31 | 45.11 | 44.85 | 43.88 | 44.91 | 45.33 | 44.45 | 43.74 | 44.79 | 44.65 |
| Nevada | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 38.63 | 40.14 | 41.02 | 41.63 | 42.38 | 43.07 | 43.14 | 42.90 | 43.01 | . | 40.32 | 41.16 |
| New Jersey | 46.76 | 46.18 | 45.74 | 42.85 | 44.34 | 42.82 | 44.25 | 44.55 | 49.25 | 50.84 | 52.62 | 53.14 | 50.72 | 52.99 | 53.23 | 47.02 | 45.28 | 45.19 | 46.72 | 44.69 | 45.34 | 46.49 | 48.61 | 48.97 | 38.14 | 40.12 | 40.59 | 39.31 |
| New Mexico | . | . | . | . | . | . | . | . | 54.23 | 50.46 | 56.00 | 54.95 | 54.62 | 55.52 | 55.88 | 55.47 | 55.10 | 55.84 | 55.24 | 58.82 | 58.37 | . | . | 54.89 | 58.96 | 58.81 | 59.50 | 60.93 |
| New York | 11.59 | 12.41 | 12.49 | 12.49 | 12.83 | 12.99 | 12.55 | 11.29 | 11.45 | 11.96 | 12.01 | 11.35 | 10.63 | 9.72 | 9.57 | 10.33 | 10.55 | 10.82 | 11.13 | 10.07 | 9.77 | 10.16 | 12.27 | 15.33 | 16.75 | 16.05 | 16.71 | 16.03 |
| N. Carolina | 51.19 | 53.10 | 52.60 | 52.39 | 51.90 | 53.20 | 53.40 | 52.84 | 51.26 | 51.88 | 40.92 | 40.43 | 38.65 | 36.65 | 36.96 | 36.46 | 36.80 | 35.94 | 35.94 | 33.93 | 30.08 | 28.55 | 28.46 | 26.11 | 26.16 | 24.86 | 23.83 | 21.51 |
| Ohio | 54.27 | 55.52 | 55.51 | 55.45 | 55.93 | 57.01 | 57.01 | 57.51 | 56.45 | 57.60 | . | . | 56.87 | 57.39 | 57.09 | 58.08 | 58.06 | 58.94 | 59.03 | 58.82 | 58.27 | 58.72 | 58.85 | 58.97 | 58.51 | 58.86 | 58.83 | 59.22 |
| Oregon | . | . | . | . | . | . | . | 54.81 | 54.32 | 54.26 | 55.11 | 54.71 | 53.64 | 53.67 | 54.03 | 53.78 | 53.03 | 53.27 | 54.00 | 53.61 | 53.25 | 53.28 | 54.13 | 54.08 | 54.15 | 54.35 | 55.12 | 54.43 |
| Pennsylvania | 44.66 | 44.96 | 45.08 | 45.31 | 45.32 | 45.53 | 45.59 | 45.51 | 45.27 | 45.58 | 45.42 | 45.83 | 45.32 | 46.30 | 46.89 | 46.54 | 45.68 | 46.29 | 46.19 | 46.20 | 46.01 | 46.91 | 47.07 | 47.41 | 47.42 | 48.09 | 48.35 | 48.68 |
| S. Carolina | 39.54 | . | 30.95 | 30.83 | 26.17 | 25.56 | 26.41 | 29.66 | 22.80 | 21.75 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| S. Dakota | 39.02 | 38.71 | 40.08 | 37.93 | 37.13 | 38.91 | 39.42 | 39.55 | 38.52 | 42.71 | 46.05 | 48.33 | 49.49 | 50.22 | 54.03 | 54.56 | 54.18 | 54.92 | 55.31 | 55.86 | 55.69 | 56.93 | 58.14 | 57.62 | 57.58 | 58.05 | 58.66 | 59.26 |
| Tennessee | 30.89 | 32.14 | 32.68 | 32.68 | 32.49 | 33.82 | 34.28 | 33.85 | 34.00 | 34.20 | . | . | . | . | . | . | . | . | . | . | . | 8.91 | 9.06 | 9.09 | 8.77 | 9.47 | 10.00 | 9.38 |
| Texas | 17.95 | 25.22 | 26.90 | 27.69 | 27.96 | 29.47 | 29.60 | 29.54 | 30.11 | 30.91 | 32.03 | 32.10 | 32.54 | 34.41 | 34.50 | 34.14 | 34.69 | 35.68 | 35.91 | 35.35 | 34.68 | 35.53 | 36.03 | 36.39 | 37.14 | 37.42 | 37.50 | 37.45 |
| Utah | 54.97 | 55.70 | 56.13 | 55.80 | 56.04 | 56.40 | 58.74 | 57.84 | 55.88 | 57.63 | 57.44 | 57.31 | 57.34 | 58.11 | 57.79 | 56.78 | 56.38 | 57.14 | 57.08 | 57.03 | 55.80 | 56.68 | 57.56 | 56.81 | 57.69 | 58.00 | 58.06 | 58.16 |
| Vermont | . | . | . | . | . | . | . | . | . | . | . | . | 24.40 | 35.20 | 39.99 | 45.23 | 46.38 | 47.82 | 47.52 | 47.71 | 48.09 | 48.26 | 48.20 | 48.17 | 47.86 | 49.16 | 52.38 | 52.09 |
| Virginia | 32.32 | 32.76 | 34.34 | 26.45 | 36.23 | 34.55 | 35.90 | 34.43 | 37.01 | 34.19 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| Washington | 58.64 | 58.19 | 56.10 | 55.92 | 56.31 | 57.49 | 58.45 | 58.60 | 58.21 | 58.04 | 58.51 | 58.38 | 58.50 | 58.67 | 59.15 | 59.05 | 58.92 | 59.00 | 60.63 | 60.36 | 60.50 | 60.77 | 59.97 | 59.60 | 60.00 | 59.99 | 60.60 | 60.26 |
| West Virginia | 7.71 | 7.81 | 7.90 | 8.21 | 7.80 | 7.56 | 7.72 | 7.85 | 7.06 | 7.32 | 7.54 | 8.16 | 8.28 | 8.99 | 9.32 | 9.53 | 8.90 | 8.49 | 8.37 | 8.42 | 7.68 | 7.23 | 7.77 | 8.49 | 9.09 | 9.53 | 9.54 | 9.79 |
| Wisconsin | 56.04 | 57.94 | 58.56 | 57.35 | 57.20 | 57.51 | 56.88 | 56.60 | 58.14 | 59.62 | 60.19 | 59.77 | 59.46 | 59.03 | 59.58 | 59.14 | 56.80 | 56.79 | 57.04 | 56.14 | 55.37 | 55.47 | 56.04 | 55.26 | 55.07 | 55.13 | 55.87 | 55.99 |
| Wyoming | 59.18 | 59.77 | 60.15 | 59.31 | 59.46 | 59.37 | 59.11 | 58.54 | 59.01 | 58.97 | 58.96 | 59.55 | 59.25 | 59.49 | 59.46 | 59.16 | 59.18 | 59.44 | 60.15 | 59.48 | 59.26 | 58.86 | 58.32 | 57.73 | 57.61 | 56.69 | 58.11 | 58.19 |

*Note*: No data available for Arkansas, Delaware, Minnesota, Mississippi, New Hampshire, North Dakota, Oklahoma, and Rhode Island.

Table C1—State Registration Rates (%) from Q1 2010 to Q4 2016

Table C2—Organ Donor Registration Questions by State (2014)

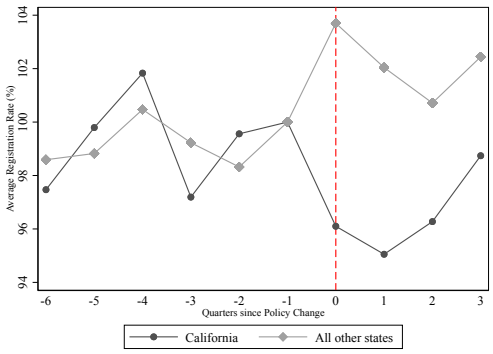
| | | |
|---|---|---|
| *Panel A: Yes/No* | | |
| Positive Wording | Negative Wording | States |
| "Yes" | "No" | AK, CT, GA, HI, IA, LA, MA, MS, NE, NV, NJ, NM, ND, OR, PA, RI, TX, UT, VT, WV, WY |
| "YES, add my name to the donor registry" | "I do not wish to register at this time" | CA |
| "Yes, add my name" | "No, not at this time" | MD |
| "Yes" | "Skip this question" | NY |
| "Yes" | "Not now" | MT |
| Verbal question | | |
| (no fixed response) | | AR, CO, DE, FL, ID, IL, IN, KS, KY, ME, MI, MO, NC, OH, OK, WA |
| *Panel B: Opt-in* | | |
| Positive Wording | | States |
| "Yes" | | TN, WI, DC |
| "I want to be an organ and tissue donor. By checking this box, Donor Network of AZ will add me to the Donate Life AZ Registry" | | AZ |
| "I want my license or ID card to show that I choose to be an organ and tissue donor under the Uniform Anatomical Gift Act" | | MN |
| "Check here to consent to organ & tissue donation" | | NH |
| "YES, I want to be an organ and tissue donor" | | SC |
| "In the event of my death, I would like to be an organ/tissue donor" | | SD |
| "Yes, I would like to remain or become an organ, eye and tissue donor" | | VA |

*Note:* Table C2 shows the question framing and responses for 49 states and Washington DC as of 2014, which either had DMV forms online, shared forms for our research, or answered questions about their organ donation policies when called by our research assistants (all U.S. jurisdictions excluding Alabama).

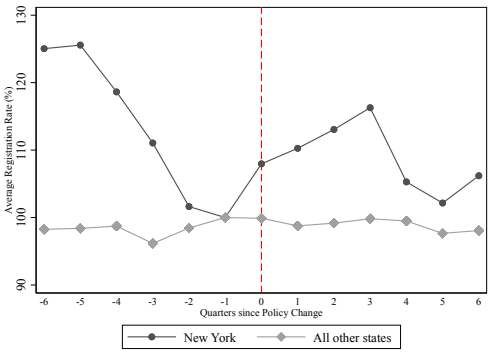
Results from this exercise are included in Table 3 in the main text. For each year-quarter in which a treated state changed their organ donation question frame from an opt-in to a yes/no frame (or vice versa in the case of Hawaii), we construct a cohort of treated states and clean control states, restricting the sample to observations from the 6 quarters before and 4 quarters after the policy change. Clean controls in our setting are states that do not change the format of the organ donor question during the sample period. We create a cohort-specific identifier and append the event-specific datasets. Using this stacked dataset, we estimate Equation C1:

$$y_{stc} = \beta_0 + \beta_1 Yes/NoFrame_{stc} + \gamma_{sc} + \delta_{tc} + \epsilon_{stc} \tag{C1}$$

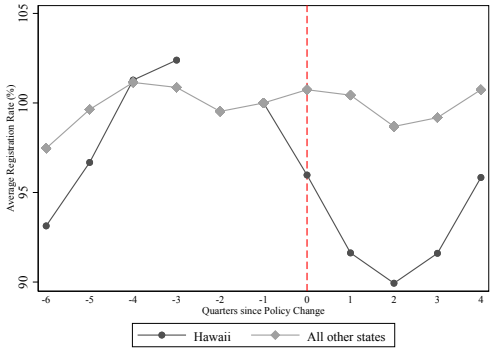
where $y$ is the organ donor registration rate in state $s$ and year-quarter $t$ and *Yes/No Frame* is an indicator equal to 1 if a state had a yes/no frame in year-quarter $t$. To estimate the impact of the yes/no frame net of any time-invariant differences between states, we include state-cohort fixed effects, $\gamma_{sc}$. We also account for aggregate time trends by including year-quarter-cohort fixed effects, $\delta_{tc}$. $\beta_1$ estimates the average treatment effect. Intuitively, this approach estimates the difference-in-differences for each cohort separately and uses variance weighting to combine cohort-specific treatment effects into one pooled estimate (Baker,




(a) California




(b) New York




(c) Hawaii

Figure C1. Quarterly Organ Donor Registration Rates (Treated States)

*Note:* Panel (a) shows average organ donor registration rates for California and 37 control states. Each state's registration rate is normalized to Quarter 2, 2011 (the registration rate in the quarter before the switch to the yes/no frame). The dashed line indicates the quarter in which California switched from an opt-in to a yes/no frame (Quarter 3, 2011). Panel (b) shows average organ donor registration rates for New York and 35 control states. Each state's registration rate is normalized to Quarter 3, 2013 (the registration rate in the quarter before the switch to the yes/no frame). The dashed line indicates the quarter in which New York switched from an opt-in to a yes/no frame (Quarter 4, 2013). Panel (c) shows average organ donor registration rates for Hawaii and 29 control states. Each state's registration rate is normalized to Quarter 2, 2014 (the registration rate in the quarter before the switch to the opt-in frame). The dashed line indicates the quarter in which Hawaii switched from a yes/no to an opt-in frame (Quarter 3, 2014). Data from Hawaii is missing from quarter $t = -2$. In each figure, $t = -1$ is mechanically set to 100%.

Larcker and Wang, 2022).[28]

[28]We prefer this approach because using only clean controls allows us to relax the assumption in the canonical two-way fixed effects framework that treatment effects are constant over time (Borusyak, Jaravel and Spiess, 2022; de Chaisemartin and D'Haultfoeuille, 2020; Goodman-Bacon, 2021).

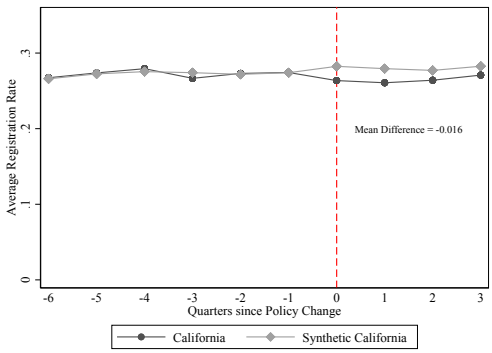
*C3. Parallel Trends*

The key identifying assumption underpinning our difference-in-differences analysis is that the organ donor registration rate in treated and control states would have evolved similarly in the absence of the policy change. We take two approaches to address potential violations of the parallel trends assumption.

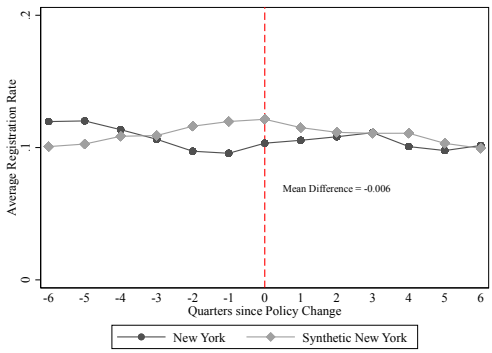
First, we implement the synthetic control method introduced by Abadie and Gardeazabal (2003). We compare the evolution of the organ donor registration rate in treated states with the evolution in a weighted combination of control states that do not change the frame of the organ donor question during the sample period. This synthetic control group is chosen to best approximate pre-treatment registration rates in the treated state. The treatment effect of interest is the difference between the observed registration rate in the treated state and the synthetic control cohort post treatment. More formally, let $X^T$ and $X^C$ be the value of the organ donor registration rate for the treated state and synthetic control group, respectively. As in Abadie and Gardeazabal (2003) and Abadie et al. (2010), we choose $W = W^*$ to minimize:

$$(X^T - X^C W)^2 \tag{C2}$$

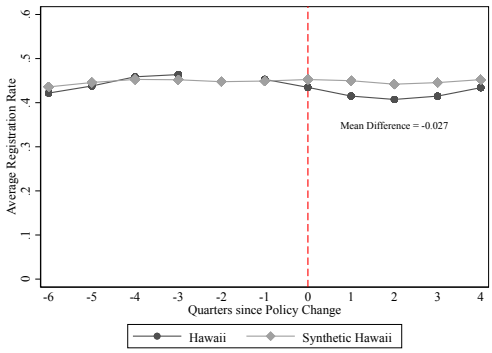
The synthetic control estimator is given by $Y^T - Y^C W^*$. See, e.g., Abadie et al. (2021; 2010; 2015) for additional details. Results from this analysis are summarized in Figure C2 below. Additionally, Table C3 summarizes the weights assigned to each control state used in this analysis. We note that the weight assigned to West Virginia in the New York analysis is very large. However, weights are assigned here solely based on pre-period organ donor registration rates, and not other characteristics that we would expect to differ across these two states.




(a) California




(b) New York




(c) Hawaii

Figure C2. Quarterly Organ Donor Registration Rates (Synthetic Control)

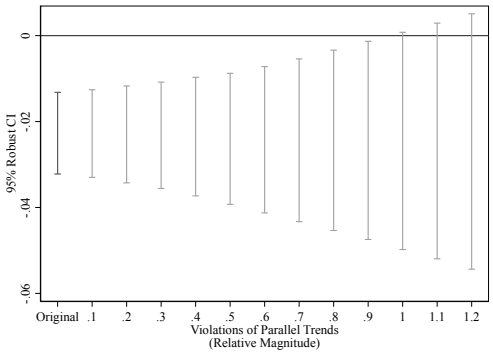
*Note:* Panels (a)–(c) compare average quarterly organ donor registration rates for treated states and their synthetic control counterparts. Appendix Section C.C3 details the method used to construct the synthetic cohorts. The dashed line indicates the quarter in which the treated states switched from an opt-in to a yes/no frame or vice versa. The mean difference is calculated by subtracting the registration rate for the synthetic control group from the registration rate for the treated states in each quarter following the change to the question frame and then averaging across quarters.

Table C3—Synthetic Control Weights

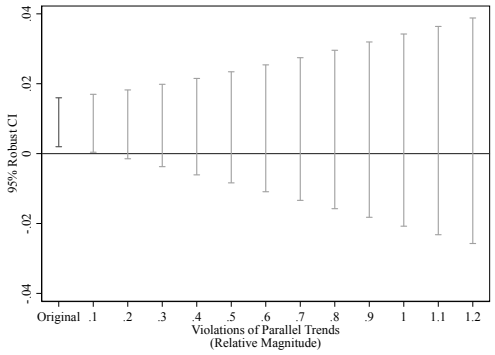
| *Treated State:* | California (1) | New York (2) | Hawaii (3) |
|---|---|---|---|
| Alaska | 0.015 | 0.002 | 0.033 |
| Arizona | 0.056 | | |
| Colorado | 0.008 | 0.001 | 0.026 |
| Connecticut | 0.031 | 0.004 | 0.041 |
| DC | 0.037 | 0.006 | 0.043 |
| Georgia | 0.024 | 0.004 | 0.039 |
| Idaho | 0.015 | 0.002 | 0.032 |
| Iowa | 0.017 | 0.002 | 0.034 |
| Louisiana | 0.014 | | |
| Maine | | 0.003 | 0.035 |
| Maryland | 0.011 | 0.003 | 0.036 |
| Massachusetts | 0.025 | 0.004 | 0.038 |
| Missouri | 0.029 | 0.004 | 0.039 |
| Montana | 0.009 | 0.001 | 0.026 |
| Nebraska | 0.025 | 0.004 | 0.039 |
| New Jersey | 0.024 | 0.002 | 0.036 |
| North Carolina | 0.017 | 0.005 | 0.045 |
| Ohio | 0.014 | | 0.031 |
| Oregon | | 0.002 | 0.033 |
| Pennsylvania | 0.024 | 0.004 | 0.038 |
| South Dakota | 0.031 | 0.003 | 0.034 |
| Texas | 0.050 | 0.008 | 0.047 |
| Utah | 0.014 | 0.002 | 0.031 |
| Vermont | | | 0.043 |
| Virginia | 0.039 | | |
| Washington | 0.013 | 0.002 | 0.030 |
| West Virginia | 0.433 | 0.932 | 0.111 |
| Wisconsin | 0.013 | 0.001 | 0.030 |
| Wyoming | 0.012 | 0.001 | 0.030 |

Second, we implement a sensitivity analysis introduced by Rambachan and Roth (2023) on our initial difference-in-differences results. This exercise imposes restrictions on how large the violation of parallel trends in the first post-period can be relative to the worst violation in the pre-period (across two consecutive pre-periods). In Figure C3, we report 95% robust confidence intervals for various violations of parallel trends, which allows us to identify the largest violation for which there is still a significant effect of the question frame on organ donor registrations. We find that this "breakdown value", borrowing language from

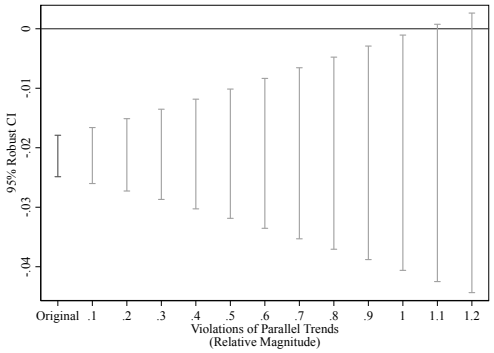
Rambachan and Roth (2023), is roughly 1 in California, 0.1 in New York, and 1.1 in Hawaii. This means that if post-period violations exceed these relative values, we are unable to conclude a significant effect of the question frame on registration rates.




(a) California




(b) New York



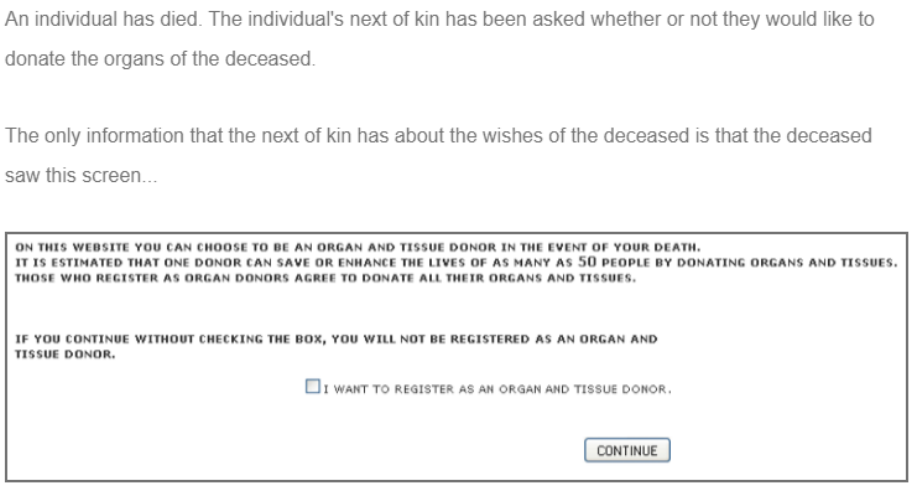

(c) Hawaii

Figure C3. Event Study Sensitivity Test

*Note:* Figure C3 shows results from a sensitivity test proposed by Rambachan and Roth (2023). In each panel, we plot 95% robust confidence intervals under different assumptions about the relative magnitude of post-treatment violations of parallel trends. A value of 0.1 imposes that the violation of parallel trends in the first post-treatment period is no more than 0.1 times the worst pre-treatment violation between consecutive periods. A value of 1.2 imposes that the violation of parallel trends in the first post-treatment period is no more than 1.2 times the worst pre-treatment violation between consecutive periods. Panel (a) shows results for California, Panel (b) for New York, and Panel (c) for Hawaii.

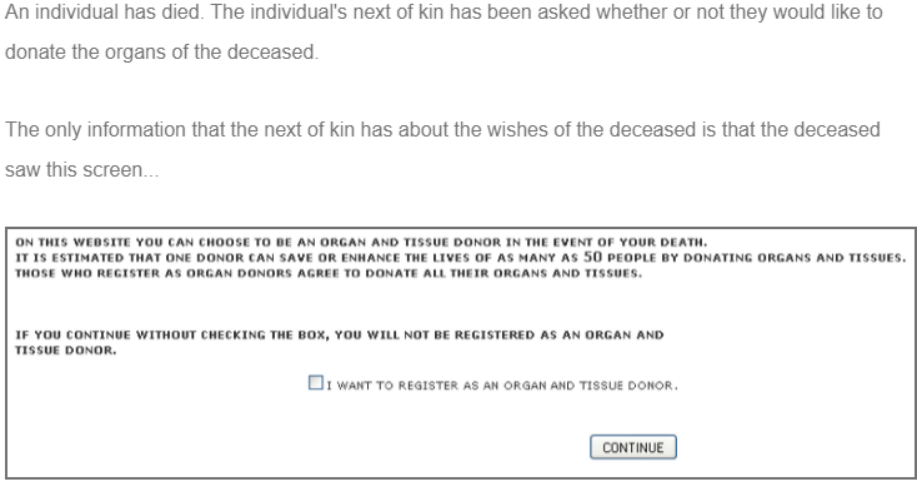
## Appendix D: Next of Kin Study Details

Appendix D provides additional information on the next of kin follow-on experiment described in Section III in the main text. Subjects on Amazon's Mechanical Turk were asked to answer a set of questions about one of the randomly selected scenarios in Figure D1.



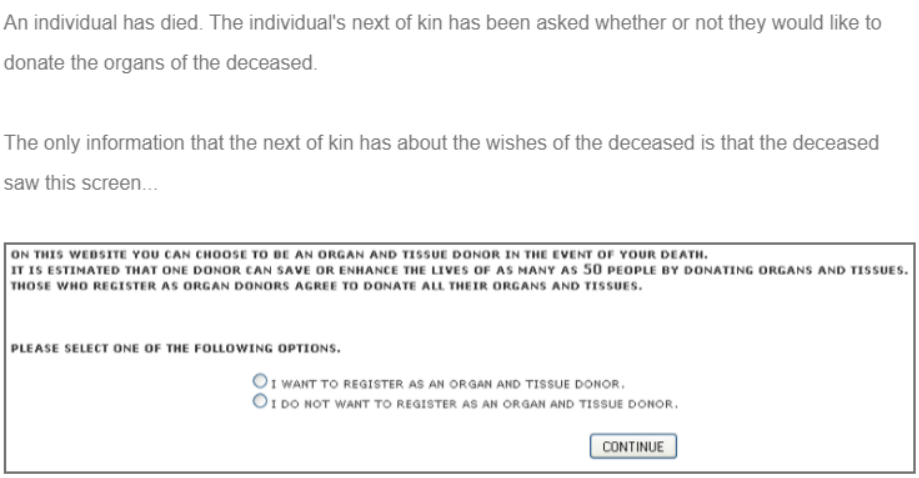

**...and did not select "I want to register as an organ and tissue donor."**

(a) Opt-in Frame Decision Screen (Deceased Unregistered)

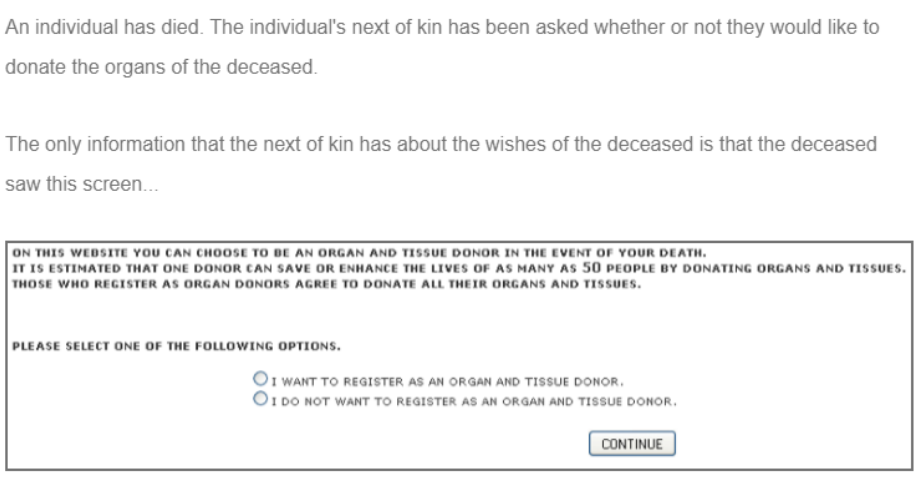



**...and selected "I want to register as an organ and tissue donor."**

(b) Opt-in Frame Decision Screen (Deceased Registered)

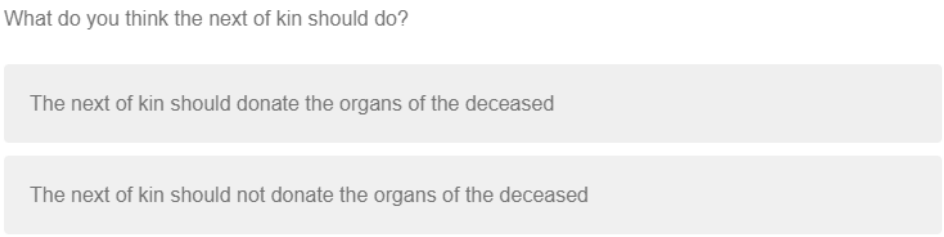



(c) Yes/No Frame Decision Screen (Deceased Unegistered)

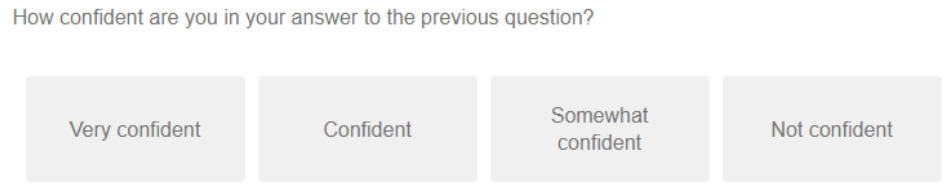



(d) Yes/No Frame Decision Screen (Deceased Registered)

Figure D1. Decision Screens




(a) Hypothetical Next of Kin Decision




(b) Confidence in Hypothetical Next of Kin Decision

Figure D2. Decision and Confidence Screens

Subjects were then asked whether hypothetical next of kin should donate the organs of the deceased and how confident they were in their answer (Figure D2).

Table D1 displays regression results on data from this experiment (also see Figure 8 in the main text for a graphical analysis). In these regressions, the excluded group is beliefs about what next of kin should do when the deceased chose to register in the opt-in frame. Consequently, the coefficient *Yes/No Frame* reflects the change in what subjects think the next of kin should do when the deceased registered under a yes/no frame rather than an opt-in frame. The coefficient *Deceased Unregistered* reflects the change when the deceased chose not to register rather than register under the opt-in frame. The interaction *Yes/No Frame* $\times$ *Deceased Unregistered* is the differential effect of going from opt-in to yes/no for those who are unregistered rather than registered. The regressions show that people respond differentially to the yes/no frame when the deceased was not on the registry. In particular, they are significantly less likely to think next of kin should donate the organs of the deceased when the deceased chose not to register under the yes/no frame than when they chose not to register under the opt-in frame. Results are consistent for the confidence measure with all the same differences statistically significant ($p < 0.01$).[29]

Interestingly, these regressions also demonstrate that subjects are somewhat more likely to think the next of kin should donate the organs of a deceased who registered under a yes/no frame than who registered under an opt-in frame—the difference is significant when considering all four scenarios in regression (2). How-

[29]See notes in Table D1 for details on this analysis.

ever, this difference is small relative to the decrease observed when the deceased is not registered (i.e., the effect of the yes/no frame is 3% for registered donors and –14.3% for those who are not registered).

In addition, there is reason to be a bit less concerned about how next of kin respond when the deceased is registered, since due to improvements in registration technology, a deceased being registered is increasingly likely to proceed with donation. In particular, since the Uniform Anatomical Gift Act of 1968 (UAGA), joining a state registry has been a legally binding decision to be an organ donor after death, but next of kin were often consulted about donation anyway, given that the deceased may have joined the state registry years ago and so their presence on the registry might not reflect the deceased's current intent to donate (Glazier et al., 2009).[30] Recently, however, computer-based registries have provided a way for potential donors to easily change their organ donor status if they change their mind, which means being on the registry can be more easily interpreted as current intent to donate. Consequently, doctors can now sometimes recover organs from registered donors (but not from unregistered potential donors) without receiving explicit permission from the next of kin (Glazier, 2006).

[30]Next of kin were historically asked since: (1) the driver's license of a potential donor was often not available at the time of death and (2) a registered donor might have changed his or her mind about donation after having been issued the driver's license and these wishes might have been communicated to the next of kin (Glazier, 2006).

Table D1—Next-of-Kin Decisions and Confidence by Condition

| | Next of Kin Should Donate | | Confidence | |
|---|---|---|---|---|
| | First Scenario Only | All Four Scenarios | First Scenario Only | All Four Scenarios |
| | (1) | (2) | (3) | (4) |
| Yes/No Frame × Deceased Unregistered | -0.130** | -0.173*** | -0.843*** | -1.186*** |
| | (0.052) | (0.016) | (0.292) | (0.084) |
| Yes/No Frame | 0.016 | 0.030*** | 0.064 | 0.209*** |
| | (0.024) | (0.009) | (0.148) | (0.047) |
| Deceased Unregistered | -0.551*** | -0.564*** | -3.200*** | -3.345*** |
| | (0.038) | (0.019) | (0.211) | (0.105) |
| Constant | 0.932*** | 0.913*** | 2.647*** | 2.518*** |
| | (0.018) | (0.015) | (0.114) | (0.089) |
| Observations | 803 | 3212 | 803 | 3212 |
| R-squared | 0.411 | 0.456 | 0.438 | 0.482 |
| Subjects (clusters) | | 803 | | 803 |
| Order FE | NO | YES | NO | YES |

*Note:* The dependent variable in Columns 1 and 2 is an indicator for whether the subject said next of kin should donate the organs of the deceased. The dependent variable in Columns 3 and 4 is a 7-point scale that indicates how confident the subject was in their decision in Columns 1 and 2. The values of the scale are as follows: the subject was Very Confident that next of kin should donate (3.5), Confident that next of kin should donate (2.5); Somewhat Confident that next of kin should donate (1.5); Not Confident that next of kin should donate (0.5); Not Confident that next of kin should not donate (-0.5); Somewhat Confident that next of kin should not donate (-1.5); Confident that next of kin should not donate (-2.5); and Very Confident that next of kin should not donate (-3.5). Columns 1 and 2 focus on the first scenario the subject saw (between-subject analysis) and Columns 2 and 4 look at all data (between- and within-subject analysis). Yes/No Frame and Deceased Unregistered are indicators for the scenario the subject was being asked about. Analysis in Columns 2 and 4 includes fixed effects for the order in which a subject saw the four scenarios. Robust standard errors are in parentheses, clustered at the subject level in Columns 2 and 4. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.