Online Appendix

Youth Enfranchisement, Political Responsiveness, and Education Expenditure: Evidence from the U.S.

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These appendices present supplementary material referenced in the paper. Appendix A contains the figures and tables not presented in the text. Appendix B provides information on preregistration legislation. Appendix C provides evidence for the divergence between young and old in terms of policy preferences. Appendix D investigates the hypothesis of voters electing policies in the context of preregistration. Appendix E presents the theoretical framework. Appendix F describes the data.

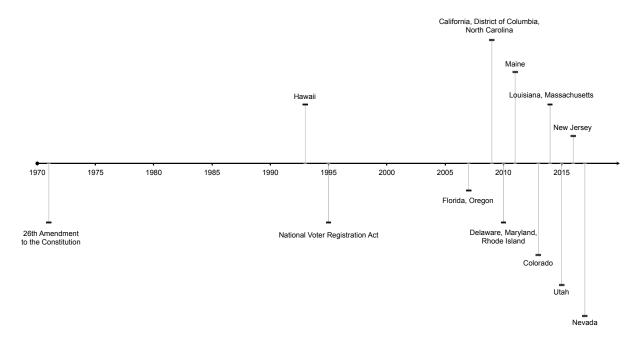## APPENDIX A. Supplementary Figures and Tables

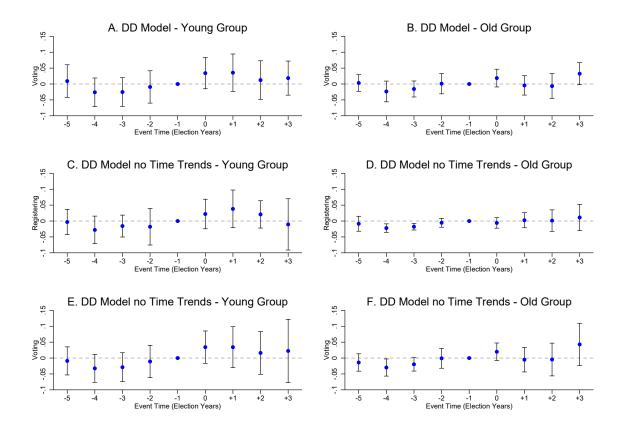Figure A1: The Timeline of Preregistration Legislation in the U.S.

Figure A2: Preregistration and Political Participation - Robustness

Note: The dots represent coefficient estimates and the vertical lines 95 percent confidence intervals for specifications that deviate from the specification reported in Figure 1 as follows: Panels A and B use the voting outcomes for the young and the old as the dependent variable; Panels C and D use the registration outcomes for the young and the old as the dependent variable and remove state-specific time trends; and Panels E and F use the voting outcomes for the young and the old and remove state-specific time trends. See the note to Figure 1 for details on sample size and estimation strategy and Appendix F for details on data sources and variable definitions.
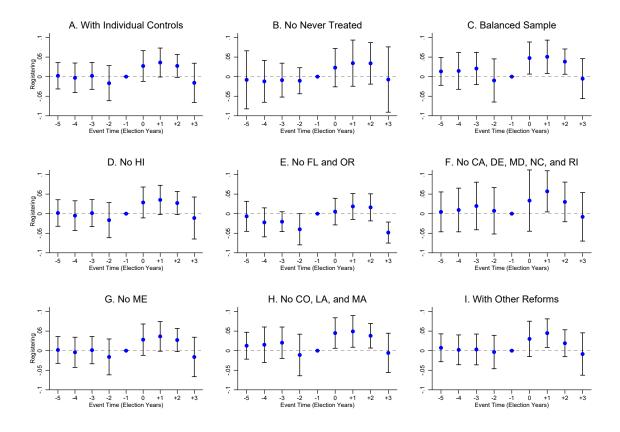
Figure A3: Preregistration and Registration - Robustness

Note: The dependent variable is Registering. The dots represent coefficient estimates and the vertical lines 95 percent confidence intervals for specifications that deviate from the specification reported in Figure 2 as follows: Panel A adds respondents' characteristics (dummies for gender, black, Hispanic, educational attainment, family income, labor force status, metropolitan city status, and self-respondent); Panel B drops never treated states from the sample; Panel C balances the sample by including only eventually treated states with at least two post-treatment elections (CA, DE, FL, HI, MD, NC, OR, and RI); Panel D drops HI; Panel E drops FL and OR; Panel F drops CA, DE, MD, NC, and RI; Panel G drops ME; Panel H drops CO, LA, and MA; and Panel I adds interactions of event time and age-group dummies with indicators for EDR and Online Registration. See the note to Figure 2 for details on sample size and estimation strategy and Appendix F for details on data sources and variable definitions.

Figure A4: Preregistration and Voting - Robustness

Note: The dependent variable is Voting. The dots represent coefficient estimates and the vertical lines 95 percent confidence intervals for specifications that deviate from the specification reported in Figure 2 as follows: Panel A adds respondents' characteristics (dummies for gender, black, Hispanic, educational attainment, family income, labor force status, metropolitan city status, and self-respondent); Panel B drops never treated states from the sample; Panel C balances the sample by including only eventually treated states with at least two post-treatment elections (CA, DE, FL, HI, MD, NC, OR, and RI); Panel D drops HI; Panel E drops FL and OR; Panel F drops CA, DE, MD, NC, and RI; Panel G drops ME; Panel H drops CO, LA, and MA; and Panel I adds interactions of event time and age-group dummies with indicators for EDR and Online Registration. See the note to Figure 2 for details on sample size and estimation strategy and Appendix F for details on data sources and variable definitions.
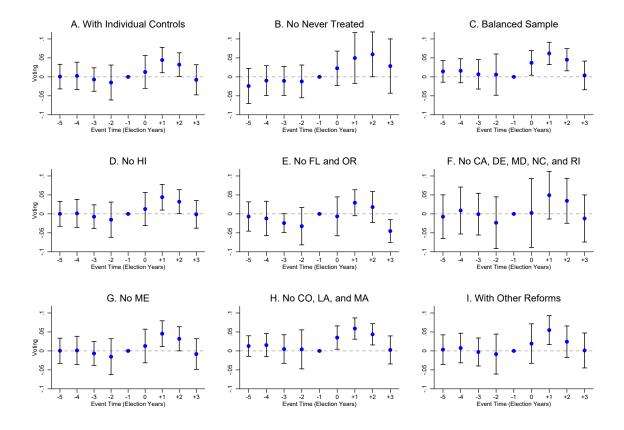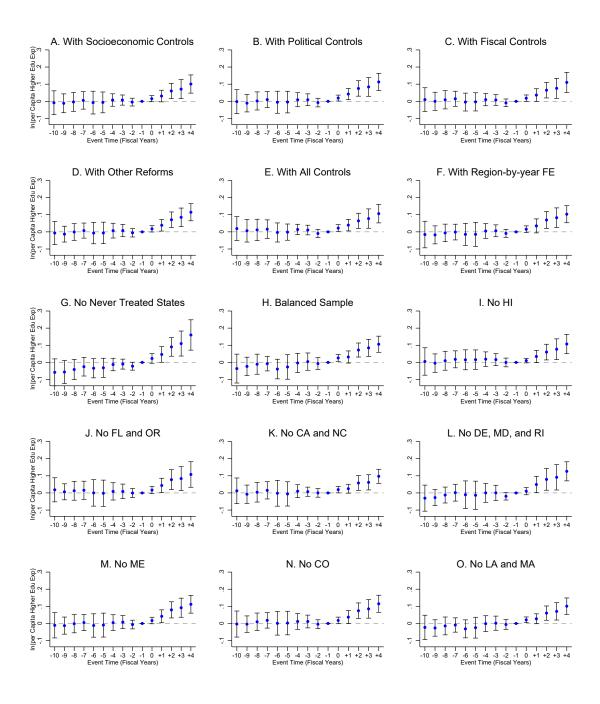
Figure A5: Preregistration and Higher Education Expenditure - Robustness

Note: The dependent variable is per capita current higher education expenditure. The dots represent coefficient estimates and the vertical lines 95 percent confidence intervals for specifications that deviate from the specification reported in Panel B of Figure 3 as follows: Panel A adds socioeconomic variables (population, median age, share of 16-25 age group, post-secondary enrollment, share of blacks, share of whites, inequality, and unemployment rate); Panel B adds political variables (dummies for gubernatorial election year, incumbent, year of term, governor runs in next election, governor not eligible to run again, Democratic governor, previous-term Democratic governor, political competition, and gubernatorial turnout rate); Panel C adds fiscal variables (total expenditure, share of current expenditure, and total taxes); Panel D adds NVRA, EDR, and Online Registration; Panel E adds all previous covariates simultaneously; Panel F adds region-by-year fixed effects; Panel G drops never treated states from the sample; Panel H balances the sample by including only eventually treated states with at least four post-treatment fiscal years (CA, DE, FL, HI, MD, NC, OR, and RI); Panel I drops HI; Panel J drops FL and OR; Panel K drops CA and NC; Panel L drops DE, MD, and RI; Panel M drops ME; Panel N drops CO; and Panel O drops LA and MA. See the note to Figure 3 for details on sample size and estimation strategy and Appendix F for details on data sources and variable definitions.
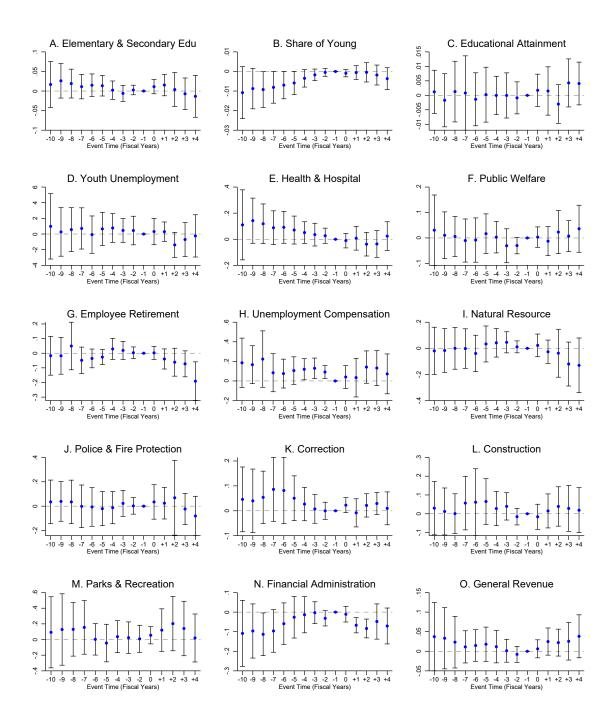
Figure A6: Preregistration and Other Variables

Note: The dependent variables are as follows: Elementary and Secondary Education Expenditure in Panel A; Share of Young in the Population in Panel B; Educational Attainment in Panel C; Youth Unemployment in Panel D; Health & Hospital in Panel E; Public Welfare in Panel F; Employee Retirement in Panel G; Unemployment Compensation in Panel H; Natural Resources in Panel I; Police & Fire Protection in Panel J; Correction in Panel K; Construction in Panel L; Park & Recreation in Panel M; Financial Administration in Panel N; and General Revenue in Panel O. All variables other than share of young, educational attainment, and youth unemployment are expressed in logarithmic form and per capita units. The dots represent coefficient estimates and the vertical lines 95 percent confidence intervals for a specification of regression (3) that includes year fixed effects, state fixed effects, state-specific time trends and all covariates described in Figure A5, other than share of 16-25 in Panel B. See the note to Figure 3 for details on sample size and estimation strategy and Appendix F for details on data sources and variable definitions.

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Figure A7: Preregistration and State Appropriation - Robustness

Note: The dependent variable is per FTE state appropriation. The dots represent coefficient estimates and the vertical lines 95 percent confidence intervals for specifications that deviate from the specification reported in Panel A of Figure 5 as follows: Panel A drops institution-level covariates; Panel B adds region-by-year fixed effects; Panel C adds county-level covariates (the logarithm of population and per capita income of counties p and $p(c)$); and Panel D adds all covariates and region-by-year fixed effects simultaneously. See the note to Figure 5 for details on sample size and estimation strategy and Appendix F for details on data sources and variable definitions.
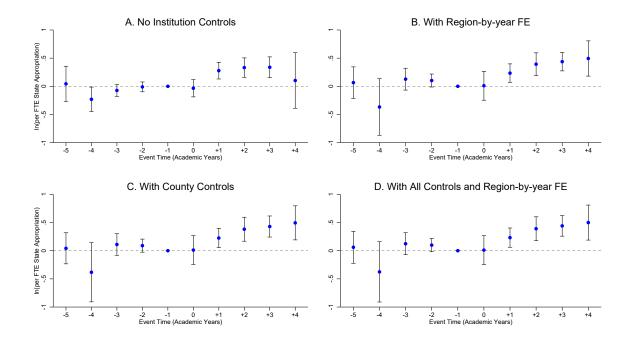
Table A1: Timing of Preregistration Laws

	Coefficient	Standard Error	Observations
	Dependent Variable: $P_s \cdot \mathbb{1}\,(t = T_s)$		
Fiscal Variables			
Total Expenditure	0.017	0.024	1,750
Share of Current Expenditure	-0.400	0.377	1,750
Total Taxes	-0.003	0.009	1,750
Political Variables			
Year of Mandate	0.001	0.002	1,750
Governor not Eligible to Run Again	0.002	0.008	1,750
Democratic Governor	-0.001	0.003	1,750
Previous-term Democratic Governor	0.001	0.004	1,750
Incumbent Governor	0.000	0.005	1,750
Governor Runs Next Election	-0.003	0.004	1,750
Political Competition	-0.011	0.013	1,750
Gubernatorial Turnout Rate	0.016	0.044	1,750
Socioeconomic Variables			
Share of 16-25	0.116	0.245	1,750
Share of Whites	-0.381	0.238	1,750
Post-secondary Enrollment	-0.027	0.020	1,750
Personal Income	0.038	0.048	1,750
Inequality	0.044	0.064	1,750
Unemployment Rate	0.003	0.002	1,750

Note: The dependent variable is an indicator which takes value 1 the year of the law initiation. The regressor of interest is defined by each row. The variables total expenditure, total taxes, personal income are expressed in logarithmic form and per capita units and the variable post-secondary enrollment is expressed in logarithmic form. All regressions control for year fixed effects, state fixed effects, and cluster standard error at the state level. See the note to Figure 3 for details on sample size and Appendix F for details on data sources and variable definitions.

Table A2: Balance Test of Covariates at the State Level

	Regressor Variable: $P_s \cdot \mathbb{1}\left(t \geq T_s\right)$		
	Coefficient	Standard Error	Observations
Fiscal Variables			
Total Expenditure	-0.014	0.026	1,750
Share of Current Expenditure	0.001	0.002	1,750
Total Taxes	-0.053	0.036	1,750
Political Variables			
Year of Mandate	0.077	0.138	1,750
Governor not Eligible to Run Again	-0.165	0.141	1,750
Democratic Governor	0.030	0.158	1,750
Previous-term Democratic Governor	-0.058	0.151	1,750
Incumbent Governor	-0.062	0.144	1,750
Governor Runs Next Election	-0.070	0.122	1,750
Political Competition	0.009	0.039	1,750
Gubernatorial Turnout Rate	0.012	0.011	1,750
Socioeconomic Variables			
Share of 16-25	0.004	0.002	1,750
Share of Whites	-0.002	0.003	1,750
Post-secondary Enrollment	-0.005	0.017	1,750
Personal Income	-0.033	0.012	1,750
Inequality	0.003	0.005	1,750
Unemployment Rate	0.971	0.365	1,750

Note: The dependent variable of interest is defined in each row. The variables total expenditure, total taxes, personal income are expressed in logarithmic form and per capita units and the variable post-secondary enrollment is expressed in logarithmic form. The coefficients are least-square estimates of the β_τ's from a specification of regression (3) that replaces $\mathbb{1}\left(t - T_s = \tau\right)$ with $\mathbb{1}\left(t \geq T_s\right)$, adds state-specific time trend, and clusters standard errors by state. See the note to Figure 3 for details on sample size and estimation strategy, and Appendix F for details on data sources and variable definitions.

Table A3: Preregistration and State Appropriation

	ln(per Capita State Appropriation)	ln(per FTE State Appropriation)	
	(1)	(2)	(3)
P_s Indicator			
$\times$ Indicator for $t \geq T_s$	0.122	0.145	0.188
	(0.064)	(0.068)	(0.081)
State FE	✓	✓	
Year FE	✓	✓	
State Time Trends	✓	✓	
State Controls	✓	✓	
County FE			✓
Border-county Pair-year FE			✓
Institutional Controls			✓
R-squared	0.951	0.955	0.710
Observations	500	500	4,961

Note: The dependent variable is per capita state appropriation in Model 1 and per FTE state appropriation in Model 2. Both variables are obtained from aggregating the institution-level data using the all-county sample by state and year. The coefficients are least-square estimates of the β_τ's for a specification of regression (3) that replaces $\mathbb{1}(t - T_s = \tau)$ with $\mathbb{1}(t \geq T_s)$, adds state-specific time trends and state variables as described in Table 2, and clusters the standard errors by state. The sample includes all 50 states over the period 2005-2014. In Model 3, the dependent variable is per FTE state appropriation. The coefficients are least-square estimates of the β_τ's for a specification of regression (4) that replaces $\mathbb{1}(t - T_s = \tau)$ with $\mathbb{1}(t \geq T_s)$, add institution variables as described in Figure 5, and clusters the standard errors by state and border segment. The sample includes 1,059 institutions located in 336 counties and 255 border-county pairs over the period 2005-2014. See the notes to Figures 3 and 5 for details on estimation strategy and Appendix F for details on data sources and variable definitions.

APPENDIX B. Preregistration Laws

For each state that has enacted preregistration bills, we present information on the legislative process and its sources. We also include information on the gender composition of the state legislature, made available by the Center for American Women and Politics (1975-2016), and its demographic and partisan composition, made available by the National Conference of State Legislatures (2018a, 2018b).[1]

California Assembly Bill 30, concerning the authorization of persons of 17 years of age to preregister to vote, was introduced by Curren Price, a Democratic Assemblyman, on December 1, 2008. The bill was approved with a 22-15 vote in the Senate on September 3, 2009 and with a 50-28 vote in the Assembly on October 9, with Democratic support

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[1]Data on the demographic composition of state legislatures is available only for 2009 by age group and for 2015 for mean age. We thank Karl Kurtz from the National Conference of State Legislatures for sharing the data.

only. On October 11 Republican Governor Arnold Schwarzenegger signed the bill into law that became Chapter 364, Statutes of 2009. Assembly Bill 30 was superseded by Senate Bill 113 of 2014, which allowed 16-year-olds to preregister to vote. The bill was approved with a 54-21 vote in the Senate on August 25 and with a 22-12 vote in the Assembly on August 26. On September 26 Democratic Governor Jerry Brown signed the bill into law that became Chapter 619, Statutes of 2014. This change in the law took effect on January 1, 2017, after VoteCal (a central database) became operational. See leginfo.legislature.ca.gov/AB30 and leginfo.legislature.ca.gov/SB113 for the official sources.

In the year Assembly Bill 30 was approved, the Assembly was composed of 51 Democrats and 29 Republicans, and the Senate of 26 Democrats and 14 Republicans. Of the total of 33 women, 20 were members of the Assembly and 13 of the Senate, and 28 of them were Democrats. Women represented 27.5% of total legislators compared to the corresponding national figure of 24.3% for the same year. The average age of legislators was 54.75 compared to the national average of 55.65. Governor Schwarzenegger was elected for his second and last term in 2006.

Colorado House Bill 1135, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Jonathan Singer, a Democratic Representative, together with a group of Democratic co-sponsors, in 2013. The bill received bipartisan support in the House, where it was approved with a 37-28 vote on March 12, and in the Senate, where it was approved with a 20-15 vote on April 19. On May 10 Democratic Governor John W. Hickenlooper signed the bill into law that became Section 1-2-101, Colorado Revised Statutes of 2013. See leg.state.co.us/HB1135 for the official source.

In the year House Bill 1135 was approved, the House was composed of 36 Democrats and 29 Republicans, and the Senate of 19 Democrats and 16 Republicans. Of the total of 41 women, 28 were members of the House and 13 of the Senate, and 29 of them were Democrats. Women represented 41% of total legislators compared to the corresponding national figure of 24.2% for the same year. Governor Hickenlooper was elected for his first term in 2010.

Delaware House Bill 381, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Valerie Longhurst, a Democratic Representative, together with another Democratic co-sponsor, on April 28, 2010. The bill received bipartisan support in the House, where it was approved with a 27-9 vote on May 6, and in the Senate, where it was approved with a 14-6 vote on July 1. On September 8 Democratic Governor Jack Markell signed the bill into law that became Chapter 473, 77 Delaware Laws of 2009-2010. See legis.delaware.gov/HB381 for the official source.

In the year House Bill 381 was approved, the House was composed of 24 Democrats

and 17 Republicans, and the Senate of 15 Democrats and 6 Republicans. Of the total of 16 women, 8 were members of the House and 8 of the Senate, and 10 of them were Democrats. Women represented 25.8% of total legislators compared to the corresponding national figure of 24.5% for the same year. Governor Markell was elected for his first term in 2008.

District of Columbia Council Bill 18-035, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by the Democratic Chairman of the Council, Vincent C. Gray, on June 16, 2009. The bill was unanimously approved with 13 votes in favor on November 3. On November 30 Democratic Mayor Adrian Fenty signed the bill into law that became L18-0103. See lims.dccouncil.us for the official source.

In the year Council Bill 18-035 was approved, the Council was composed of 11 Democrats and 2 Independents. The 3 women were all Democrats. Mayor Fenty was elected for his only term in 2006.

Florida House Bill 537, concerning the authorization of persons of 17 years of age or with a valid Florida driver's license, i.e., fifteen years of age, whichever occurs earlier, to preregister to vote, was introduced by David Rivera, a Republican Representative, together with a bipartisan group of co-sponsors, on January 23, 2007. The bill received bipartisan support in the Senate, where it was approved with a 37-2 vote on April 27 and was unanimously approved in the House on May 3. On May 21 Republican Governor Charlie Crist signed the bill into law that became Chapter 2007-30. House Bill 537 was superseded by Senate Bill 866 of 2008, which made the preregistration option accessible to all 16-year-olds. The bill was approved with a 36-2 vote in the Senate on April 24 and was unanimously approved in the House on May 2. On June 5 Republican Governor Charlie Crist signed the bill into law that became Chapter 2008-95. See archive.flsenate.gov/HB537 and archive.flsenate.gov/SB866 for the official sources.

In the year House Bill 537 was approved, the House was composed of 42 Democrats and 78 Republicans, and the Senate of 14 Democrats and 26 Republicans. Of the total of 37 women, 27 were members of the House and 10 of the Senate, and 22 of them were Democrats. Women represented 23% of total legislators compared to the corresponding national figure of 23.5% for the same year. Governor Crist was elected for his first term in 2006.

Hawaii Senate Bill 280, concerning the authorization of persons of 16 years of age to preregister to vote, received support from Democratic Lieutenant Governor Benjamin J. Cayetano in 1993. The bill was unanimously approved in the Senate and in the House. On 14 April Democratic Governor John D. Waihee signed the bill into law that became Act 24, Session Laws of Hawaii 1993. See capitol.hawaii.gov/SB537.

In the year Senate Bill 280 was approved, the House was composed of 47 Democrats and 4 Republicans, and the Senate of 22 Democrats and 3 Republicans. Of the total of 18 women, 12 were members of the House and 6 of the Senate, and 16 of them were Democrats. Women represented 23.7% of total legislators compared to the corresponding national figure of 20.5% for the same year. Governor Waihee was elected for his second term in 1990.

Louisiana House Bill 501, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Wesley T. Bishop, a Democratic Representative, on February 27, 2014. The bill received bipartisan support in the House, where it was approved with a 86-11 vote on March 31, and was unanimously approved in the Senate on May 6. On May 22 Republican Governor Piyush Jindal signed the bill into law that became Act 173, Louisiana Revised Statute of 2014. See legis.la.gov/HB501 for the official source.

In the year House Bill 501 was approved, the House was composed of 44 Democrats, 59 Republicans, and 2 Independents, and the Senate of 13 Democrats and 26 Republicans. Of the total of 18 women, 14 were members of the House and 4 of the Senate, and 13 of them were Democrats. Women represented 12.5% of total legislators compared to the corresponding national figure of 24.3% for the same year. Governor Jindal was elected for his first term in 2011.

Maine House Bill 1528, concerning the authorization of persons of 17 years of age to preregister to vote, was introduced by Jarrod S. Crockett, a Republican Representative, on April 28, 2011. The bill was approved by both the House and the Senate on June 7. On June 14 Republican Governor Paul LePage signed the bill into law that became Chapter 342, Laws of State of Maine 2011. See lldc.mainelegislature.org/HB1528 for the official source.

In the year House Bill 1528 was approved, the House was composed of 72 Democrats, 78 Republicans, and 1 Independent, and the Senate of 14 Democrats, 20 Republicans, and 1 Independent. Of the total of 54 women, 46 were members of the House and 8 of the Senate, and 33 of them were Democrats. Women represented 29% of total legislators compared to the corresponding national figure of 23.7% for the same year. Governor LePage won the election in 2010 for his first term.

Maryland House Bill 217, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Jon S. Cardin, a Democratic Representative, together with a bipartisan group of co-sponsors, on January 22, 2010. The bill was approved with a 97-43 vote in the House on March 25 and with a 41-5 bipartisan vote in the Senate on April 7. On May 4 Democratic Governor Martin O'Malley signed the bill into law that became Chapter 271, Laws of Maryland for the 2010 Session. See

mgaleg.maryland.gov/HB217 for the official source.

In the year House Bill 217 was approved, the House was composed of 104 Democrats and 36 Republicans, and the Senate of 33 Democrats and 14 Republicans. Of the total of 59 women, 49 were members of the House and 10 of the Senate, and 47 of them were Democrats. Women represented 31.4% of total legislators compared to the corresponding national figure of 24.5% for the same year. Governor O'Malley was elected for his first term in 2006 and re-elected in 2010.

Massachusetts House Bill 4072, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Aaron Michlewitz, a Democratic Representative, on November 20, 2013. The bill received bipartisan support in the House, where it was approved with a 142-10 vote on November 20, and in the Senate, where it was unanimously approved with a 38-0 vote on May 15, 2014. On May 22 Democratic Governor Deval Patrick signed the bill into law. See malegislature.gov/HB4072 for the official source.

In the year House Bill 4072 was approved, the House was composed of 131 Democrats and 29 Republicans, and the Senate of 36 Democrats and 4 Republicans. Of the total of 50 women, 38 were members of the House and 12 of the Senate, and 43 of them were Democrats. Women represented 25% of total legislators compared to the corresponding national figure of 24.2% for the same year. Governor Patrick won the election for his second term in 2010.

Nevada Senate Bill 144, concerning the authorization of persons of 17 years of age to preregister to vote, was introduced by Pat Spearman, a Democratic Senator, on February 13, 2017. The bill was approved with a 12-9 vote in the Assembly on April 25 and with a 26-15 vote in the Senate on May 26, with bipartisan support. On June 12 Republican Governor Brian Sandoval signed the bill into law that became Chapter 548, Nevada Revised Statutes of 2017. See leg.state.nv.us/SB144 for the official source.

In the year Senate Bill 144 was approved, the House was composed of 27 Democrats and 15 Republicans, and the Senate of 11 Democrats, 8 Republicans, and 1 Independent. Of the total of 25 women, 17 were members of the House and 8 of the Senate, and 18 of them were Democrats. Women represented 39.7% of total legislators compared to the corresponding national figure of 25.1% for the same year. Governor Sandoval was elected for his first term in 2010 and re-elected in 2014.

New Jersey Senate Bill 832, concerning the authorization of persons of 17 years of age to preregister to vote, was introduced by a bipartisan group of primary-sponsors, on January 14, 2014. The bill was unanimously approved in the Senate on March 16, 2015 and in the Assembly on January 11, 2016. On January 16 Republican Governor

Chris Christie signed the bill into law that became Chapter 222, Public Law 2015. See njleg.state.nj.us/SB832 for the official source.

In the year Senate Bill 832 was approved, the House was composed of 51 Democrats and 29 Republicans, and the Senate of 24 Democrats and 11 Republicans. Of the total of 36 women, 25 were members of the House and 11 of the Senate, and 26 of them were Democrats. Women represented 30% of total legislators compared to the corresponding national figure of 24.5% for the same year. Governor Christie was elected for his first term in 2009 and re-elected in 2013.

North Carolina House Bill 908, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Wayne Goodwin, a Democratic Representative, together with a group of Democratic co-sponsors, on March 31, 2009. The bill was approved with a 32-3 vote in the Senate on August 7 and with a 107-6 vote in the House on August 10, with bipartisan support. On August 28 Democratic Governor Beverly Perdue signed the bill into law that became Chapter 541, Session Law 2009. See ncga.state.nc.us/HB908 for the official source.

In July 2013, preregistration was rescinded by House Bill 589. In July 2016, the Fourth Circuit Court of Appeals struck down House Bill 589 on racial discrimination grounds. In December 2016, the State turned to the Supreme Court but it dismissed the petition in February 2017. Members of the State General Assembly objected to the dismissal and moved to be added as a petitioner in the case. On May 15, 2017, the Supreme Court denied review in the case (brennancenter.org/legal-work/north-carolina-naacp-v-mccrory-amicus-brief).

In the year House Bill 908 was approved, the House was composed of 68 Democrats and 52 Republicans, and the Senate of 30 Democrats and 20 Republicans. Of the total of 44 women, 38 were members of the House and 6 of the Senate, and 30 of them were Democrats. Women represented 25.9% of total legislators compared to the corresponding national figure of 24.2% for the same year. The average age of legislators was 62.52 compared to the national average of 55.65. Governor Perdue was elected for her first term in 2008.

Oregon House Bill 2910, concerning the authorization of persons of 17 years of age to preregister to vote, was introduced by Peter Buckley, a Democratic Representative, on June 22, 2007. The bill received bipartisan support in the Assembly, with only one opponent. Democratic Governor Ted Kulongoski signed the bill into law that became Chapter 555, 2007 Oregon Code. House Bill 2910 was superseded by Senate Bill 802 of 2017, which made the preregistration option accessible to 16-year-olds. The bill was approved with a 19-10 vote in the Senate on March 28 and with a 37-12 vote in the House on June 12. On June 22 Democratic Governor Kate Brown signed the bill into

law that became Chapter 468, 2017 Oregon Code. See olis.leg.state.or.us/HB2910. and olis.leg.state.or.us/SB802 for official sources.

In the year House Bill 2910 was approved, the House was composed of 31 Democrats and 29 Republicans, and the Senate of 19 Democrats and 11 Republicans. Of the total of 28 women, 19 were members of the House and 9 of the Senate, and 20 of them were Democrats. Women represented 31.1% of total legislators compared to the corresponding national figure of 23.5% for the same year. Governor Kulongoski was elected for his first term in 2002.

Rhode Island House Bill 5005, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Edwin R. Pacheco, a Democratic Representative, together with a bipartisan group of co-sponsors, on January 6, 2009. The bill received bipartisan support in the House, where it was approved with a 56-10 vote on March 10, and in the Senate, where it was approved with a 31-4 vote on June 30. On July 9 Republican Governor Donald L. Carcieri vetoed the bill and on January 5, 2010 the General Assembly overrode the executive veto with more than a three-fifths majority. On the same day, House Bill 5005 became law Chapter 390 without the Governor's signature. For voting results, see votesmart.org/bill/9879/26810/voter-pre-registration, and see status.rilin.state.ri.us for the official source.

In the year House Bill 5005 was approved, the House was composed of 69 Democrats and 6 Republicans, and the Senate of 33 Democrats, 4 Republicans, and 1 Independent. Of the total of 25 women, 17 were members of the House and 8 of the Senate, and they were all Democrats. Women represented 22% of total legislators compared to the corresponding national figure of 24.5% for the same year. Governor Carcieri won the election in 2006 for his second and last term.

Utah House Bill 340, concerning the authorization of persons of 16 years of age to preregister to vote, was introduced by Jon Cox, a Republican Representative, on February 17, 2015. The bill received bipartisan and unanimous support in the House, where it was approved with a 71-0 vote on March 3, and in the Senate, where it was approved with a 20-0 vote on March 12. On March 24 Republican Governor Gary R. Herbert signed the bill into law that became Chapter 130, Session Law 2015. See le.utah.gov/HB340 for the official source.

In the year House Bill 340 was approved, the House was composed of 12 Democrats and 63 Republicans, and the Senate of 4 Democrats and 23 Republicans. Of the total of 16 women, 10 were members of the House and 6 of the Senate, and 10 of them were Democrats. Women represented 15.4% of total legislators compared to the corresponding national figure of 24.6% for the same year. The average age of legislators was 59 compared to the national average of 55.57. Governor Herbert took office in 2009 following the

resignation of Governor Huntsman, and won the 2010 special election, as well as the 2012 and 2016 elections.

APPENDIX C. The Policy Preferences of the Young

In this appendix, we investigate how the young differ from other age groups in terms of individual policy preference. To do so, we rely on stacked cross-sectional survey data provided biennially by the American National Election Studies (1948-2012). We select all the 14 issues that cover preferences over federal spending in the period 1984-2012. For each spending item, respondents are asked whether it should be increased, kept at the same level, or decreased.

Table C1: The Policy Preferences of the Young

	Regressor Variable: Age 17-25			
	Coefficient	Standard Error	R-squared	Observations
College Financial Aid	-0.255	0.022	0.061	8,132
Child Care	-0.234	0.017	0.043	13,630
AIDS Research	-0.192	0.025	0.053	11,400
Foreign Aid	-0.172	0.024	0.070	7,580
Welfare	-0.167	0.024	0.084	9,797
Public Schools	-0.152	0.011	0.046	15,685
Homeless	-0.123	0.025	0.039	7,944
Poor People	-0.123	0.020	0.056	8,115
Environment	-0.116	0.012	0.059	17,607
Assistance to Blacks	-0.099	0.022	0.037	11,659
Food Stamps	-0.058	0.013	0.041	15,043
Crime	-0.056	0.014	0.030	11,746
Space/Science/Technology	-0.020	0.017	0.130	12,357
Social Security	0.020	0.014	0.051	17,717

Note: Standard errors are clustered at state level. The dependent variables are defined by each row. All regressions include year fixed effects and state/country fixed effects. Source: Biennial cross-sectional individual survey data from the American National Election Studies (1948-2012) over the period 1984-2012.

Table C1 reports estimation results for the regression of responses from individuals aged 17-90 on a dummy for the 17-25 age group, i.e., the young. All specifications include year and state/country fixed effects as controls, where the latter account for the place where the respondent grew up in order to capture the idea that policy preferences are formed in contextual circumstances at an early age and tend to persist over time (see Alesina and Fuchs-Schündeln 2007). A negative (positive) coefficient for the dummy indicates that the young, relative to the other age groups, prefer an increase (decrease)

in spending, while the absolute size of the coefficient represents the strength of the preferences being expressed. Items are ordered according to the strength of the preference among the young. The results indicate that the gap between the preferences of the young and the old is largest in the case of financial aid for college students, followed by spending on child care, AIDS research, foreign aid, welfare programs, public schools, the poor, the homeless, the environment, assistance to blacks, food stamps, dealing with crime, space/science/technology, and social security. For the last item, the young would actually prefer a decrease in spending although the coefficient is not statistically significant.

Similar conclusions emerge from a survey published in 2010 by the Center for American Progress (americanprogress.org/issues/democracy/reports/2010/07/27/8078/the-generation-gap-on-government), a progressive policy research organization. The survey asks people whether they would like to see the federal government become more or less involved in five different domestic arenas. The gap between respondents aged 18 to 32 and older age groups is largest for the issues of improving public schools (21 percentage points) and making college affordable (17 percentage points), for which the young also express the largest majorities in favor, i.e., 75% and 73% respectively. Developing new energy sources, reducing poverty, and ensuring access to affordable health care follow with gaps of 7-12 percentage points and youth majorities in favor less than 66%.

Overall, the results suggest the presence of large differences in the preferences for public goods between young and old voters, with those of the former being tilted toward higher education and away from pensions and health care.

APPENDIX D. Preregistration and Political Selection

In this appendix, we run a set of tests to determine how the characteristics of state legislatures and the identity of elected governors change with the introduction of preregistration laws. Indeed, selection may play an alternative role to reputation formation in achieving policy credibility.[2] It may do so when citizens have disparate interests and, hence, competing views about what the government should do. Models of identity politics predict that young voters help to elect representatives who are more likely to provide more education because of shared ideology. Issues favored by the young receive more support when younger, female, or more liberal candidates are selected.[3] Hence, a testable

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[2]The political economy literature suggests a view alternative to the Downsian paradigm in which selection is fundamental to achieving policy credibility (see Besley and Coate 1997). In this view, competition is modeled between candidates who cannot commit to policies in advance. Election promises become credible because a suitable set of candidates can be found to carry them through after they are elected. Support for this approach in the U.S. Congress comes from Lee, Moretti, and Butler (2004).

[3]Chattopadhyay and Duflo (2004) show that the representatives' personal ideology, proxied by gender, affects the distribution of public goods, that is, elected female representatives are more likely to share liberal views.

implication is whether the introduction of preregistration leads to political selection of candidates belonging to these groups, which in turn may cause the observed increased in public education expenditure.

To test for changes toward a more liberal composition of the state legislatures in the post-reform period, we use data on legislator ideology and polarization drawn from Shor and McCarty (2015) for the period 1993-2014. A legislator's ideology is measured by the pattern of bills she cosponsors with other members. A negative value corresponds to a liberal legislator, and a positive value to a conservative one. Polarization in state legislatures is measured by the distance between the Republican and Democratic median ideologies.

Table D1: Preregistration and State Legislatures

	Ideology						Polarization		Women
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Preregistration	-0.088	0.025	0.044	-0.021	0.075	0.017	0.031	0.038	0.006
	(0.105)	(0.083)	(0.027)	(0.029)	(0.024)	(0.045)	(0.029)	(0.060)	(0.005)
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
State Time Trend	✓	✓	✓	✓	✓	✓	✓	✓	✓
R-squared	0.862	0.855	0.983	0.967	0.985	0.956	0.982	0.962	0.958
Observations	902	914	902	914	902	914	902	914	350

Note: State-level clustered standard errors are in parentheses. The dependent variables are as follows: House Ideology (Model 1); Senate Ideology (Model 2); House Ideology among Democrats (Model 3); Senate Ideology among Democrats (Model 4); House Ideology among Republicans (Model 5); Senate Ideology among Republicans (Model 6); House Polarization (Model 7); Senate Polarization (Model 8); and Share of Women in the Legislature (Model 9). All regressions include year fixed effects, state fixed effects, and state-specific time trend. Sources: Data on legislator ideology and polarization is from Shor and McCarty (2015) for the period 1993-2014; data on gender composition in state legislatures is from the National Conference of State Legislatures (2016) for the period 2009-2015.

In Models 1-6 of Table D1, we regress legislator ideology aggregated at a chamber level on preregistration, controlling for state and year fixed effects as well as a state-specific time trend. In Model 1, we restrict the analysis to the House and in Model 2 to the Senate. Models 3 and 4 are restricted to the legislator ideology among Democrats in each of the two chambers and Models 5 and 6 among Republicans. In none of the cases does preregistration have a significant effect, with the single exception of Model 5, where preregistration shows a statistically significant and positive effect for Republicans in the House. This result suggests that preregistration may have led to a more conservative ideology among Republicans who, on average, are more likely to oppose budget decisions in favor of public education. Hence, if the mechanism of voters electing policies is the

driving one, we would expect a negative impact of preregistration on education expenditure since legislators become more conservative. This result is however not confirmed by the estimates in Section V, which are indeed consistent with Model 1 in which the overall effect of preregistration on legislator ideology in the House is not statistically significant. When in Models 7 and 8 we look at the effect of preregistration on polarization in the House and Senate, respectively, we also find no statistically significant relations.

Second, we estimate the impact of preregistration on the gender composition of the House and Senate using data on the share of women in state legislatures collected by the National Conference of State Legislatures (2016) for the period 2009-2015. After controlling for state and year fixed effects together with a state-specific time trend, the results show no discernible difference in the gender composition of the legislature between states with and without preregistration, as shown in Model 9. Finally, we exploit data on the average age of state legislators for the year 2015 and data on the number of legislators by age group for the year 2009 to test whether preregistration led voters to elect younger representatives. To this end, we regress the average age of legislators in 2015 on the number of legislators within age groups in 2009, while controlling for preregistration. The coefficient associated with the preregistration dummy is 0.005 and not statistically significant. Hence, trend breaks in average age distribution following the implementation of preregistration are not likely to be present.

Table D2: Preregistration and Elected Governors

	Age	Gender	Party Affiliation
	(1)	(2)	(3)
Preregistration	0.364	0.007	-0.057
	(3.716)	(0.118)	(0.216)
State FE	✓	✓	✓
Year FE	✓	✓	✓
State Time Trend	✓	✓	✓
R-squared	0.253	0.150	0.167
Observations	473	473	473

Note: State-level clustered standard errors are in parentheses. The dependent variables are as follows: Age of elected governor in the election year (Model 1); Gender, a categorical variable that takes value 1 if the governor is male (Model 2); Party Affiliation, a categorical variable that takes value 1 if the governor is Democratic (Model 3). All regressions include year fixed effects, state fixed effects, and state-specific time trend. Source: Data on the identity of elected governors is from the National Governors Association (1980-2014).

As argued in Section ID, while state legislatures are primarily responsible for the change in the preregistration legislation, it is the governor who has more influence on the allocation of the state budgets. Motivated by this fact, we test how preregistration affects the identity of the elected governors. Data on age, gender, and party affiliation of elected governors is taken from the National Governors Association (1980-2014) for

the election years over the period 1980-2014. On average, 9% of the elected governors are female, 48.2% Democrats, and their average age is 53.1. In Table D2, we regress the corresponding variables on preregistration after controlling for state and year fixed effects together with a state-specific time trend. We find no evidence that younger (Model 1), female (Model 2), or Democratic governors (Model 3) are more likely to be elected in states that have adopted preregistration laws at various point in time.

Collectively, this suggestive evidence fails to corroborate the hypothesis of voters electing policies in the context of preregistration.

APPENDIX E. The Model

In this appendix, we develop a simple political-economy theory of fiscal policy that formalizes the mechanism that we argue underlies our empirical results. The theory is an adaptation of a probabilistic voting model à la Lindbeck and Weibull (1987) to an environment with individual cost of voting and intergenerational conflict over the allocation of the public budget.

Environment   Consider a jurisdiction, such as a state, populated by a unitary mass of citizens, each of them endowed with a wealth ω.[4] A fraction α of the population is young, denoted as y, whereas the remaining fraction $1 - \alpha$ is old, denoted as o. Public decisions are made by a government that uses its fiscal authority to tax wealth at a rate $\tau \in [0, 1]$. The tax burden is borne by the entire population. Fiscal revenues can be used to finance public education, $e \geq 0$, but can also be diverted to finance an electoral rent, $R \geq 0$. We assume that governments are prevented from borrowing and lending. Thus, the government budget constraint is $(\tau - D(\tau))\omega = e + R$, where $D(\tau)$ is an aggregate cost that captures the deadweight loss of taxation, with $D(0) = 0$, $D_\tau > 0$, and $D_{\tau\tau} > 0$. A fiscal policy platform is then a vector $q := (\tau, e, R)$.

An individual's utility is influenced by government decision making. The utility of a citizen who belongs to age group $i \in \{y, o\}$ is $\mathcal{U}^i(q) := (1 - \tau)\omega + \lambda^i e$, where λ^i measures the marginal benefit from public education. Education is traditionally seen as an expenditure that favors the young, due to its positive effect on future income or human capital, which the old can only partly benefit from. Furthermore, the evidence produced in Appendix C point out how the young have a stronger preference for education spending than the old. It is then natural to assume $\lambda^o < \lambda^y$.[5]

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[4]Bertocchi et al. (2017) show that the results also hold with a different endowment of wealth in each group. If endowments were different across groups, we could conveniently write $\omega^y = \kappa\omega/\alpha$ and $\omega^o = (1 - \kappa)\omega/(1 - \alpha)$, where the parameter $\kappa \in [0, \alpha)$ provides an inverse measure of inequality, i.e., a higher κ indicates less inequality, and then proceed as we do in the paper.

[5]The utility function of the young and the old can be seen as the reduced form of a utility function

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Electoral Competition The government is democratically elected according to a majority rule. The electoral competition takes place between two candidates, an incumbent, denoted as $\mathcal{I}$, and a challenger, denoted as $\mathcal{C}$, who have the ability to non-cooperatively commit to a policy platform q_ς with $\varsigma \in \{\mathcal{I}, \mathcal{C}\}$ before the election in order to maximize the expected rent from being in office. Thus, each candidate's objective function is $p_\varsigma(q_\mathcal{I}, q_\mathcal{C}) \cdot R_\varsigma$, where $p_\varsigma(q_\mathcal{I}, q_\mathcal{C})$ is the probability that candidate ς defeats her opponent by proposing a policy agenda q_ς.

The electoral demand side is characterized by voters who derive benefits from voting regardless of whether they affect the electoral outcome.[6] The individual benefits of voting depend on both the platform of each candidate and a popularity shock δ. Such a shock captures the ex-post average success of candidate $\mathcal{I}$ and is drawn from a uniform distribution on $[-(1/2) + \phi, (1/2) + \phi]$, with $\phi > 0$ measuring an incumbency advantage.[7] Net of the popularity shock, citizens support the candidate whose proposed platform maximizes their utility. Formally, a citizen who belongs to age group i supports candidate $\mathcal{I}$ if $\mathcal{V}^i(q_\mathcal{I}, q_\mathcal{C}) := \mathcal{U}^i(q_\mathcal{I}) + \delta - \mathcal{U}^i(q_\mathcal{C}) \geq 0$ and candidate $\mathcal{C}$ otherwise.

The act of voting imposes a cost c, which differs among individuals and is drawn from a uniform distribution G^i on $[0, \bar{c}^i]$. We assume that $\bar{c}^y > \bar{c}^o$, reflecting the higher cost of voting for the young relative to that of the old. This may, for example, be because they are unfamiliar with registration procedures and voting requirements. Citizens therefore vote when the utility gains from voting outweigh its costs; otherwise they abstain. Formally,

$$\text{if } \begin{cases} c \leq |\mathcal{V}^i(q_\mathcal{I}, q_\mathcal{C})|, \text{ citizens vote for} \begin{cases} \mathcal{I} \text{ when } \mathcal{V}^i(\cdot) \geq 0 \\ \mathcal{C} \text{ when } \mathcal{V}^i(\cdot) < 0 \end{cases}, \\ c > |\mathcal{V}^i(q_\mathcal{I}, q_\mathcal{C})|, \text{ citizens abstain.} \end{cases}$$

Timing Candidates and voters move sequentially. First, candidates simultaneously announce their platform q_ς. Second, the shocks affecting individual voting behavior, i.e., the electoral advantage δ and the individual voting cost c, are realized. Third, the election is held and the citizens decide *whether* to vote and, if so, *for which* candidate. Finally, the winning candidate implements her political proposal. A political economic equilibrium is defined as a vector of policy platforms and voter turnout and is characterized by solving the game via backward induction.

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in a two-period model, where young enjoy present as well as future consumption, which increases with current investment in education, and old benefit from education expenditure indirectly through, for example, pay-as-you-go transfers (see Lancia and Russo 2016).

[6]By assuming that people get utility directly from voting, we are avoiding the issue of why people vote. A justification for this assumption is that voters decide emotionally, rather than based on any estimation of how their vote will influence the electoral outcome (see, e.g., Schuessler 2000).

[7]The fact that the party in power has a larger ex-ante probability of winning the election is confirmed in the empirical literature and can be microfounded (see Besley and Case 1995).

Political Economic Equilibrium Conditional on δ, the share of voters within group i is equal to $\pi^i := G^i(|\mathcal{V}^i(q_{\mathcal{I}}, q_{\mathcal{C}})|)$. Thus, the total number of votes obtained by $\mathcal{I}$ is $\pi_{\mathcal{I}} := \alpha\pi_{\mathcal{I}}^y + (1-\alpha)\pi_{\mathcal{I}}^o$ with $\pi_{\mathcal{I}}^i = \pi^i$ if $\mathcal{V}^i(\cdot) \geq 0$ and 0 otherwise. Similarly for $\mathcal{C}$, $\pi_{\mathcal{C}} := \alpha\pi_{\mathcal{C}}^y + (1-\alpha)\pi_{\mathcal{C}}^o$ with $\pi_{\mathcal{C}}^i = \pi^i$ if $\mathcal{V}^i(\cdot) < 0$ and 0 otherwise. Under a majority rule, a candidate wins the election if and only if the largest number of voters vote for her. The probability of $\mathcal{I}$ winning is $p_{\mathcal{I}}(q_{\mathcal{I}}, q_{\mathcal{C}}) := \Pr(\pi_{\mathcal{I}} \geq \pi_{\mathcal{C}})$, which is equal to:

$$\frac{1}{2} + \phi + \sigma\left(\mathcal{U}^y(q_{\mathcal{I}}) - \mathcal{U}^y(q_{\mathcal{C}})\right) + (1-\sigma)\left(\mathcal{U}^o(q_{\mathcal{I}}) - \mathcal{U}^o(q_{\mathcal{C}})\right),$$

where $\sigma := \alpha/(\alpha + (1-\alpha)(\bar{c}^y/\bar{c}^o))$. By symmetry, the probability of $\mathcal{C}$ winning is $p_{\mathcal{C}}(q_{\mathcal{I}}, q_{\mathcal{C}}) := \Pr(\pi_{\mathcal{I}} < \pi_{\mathcal{C}}) = 1 - p_{\mathcal{I}}(q_{\mathcal{I}}, q_{\mathcal{C}})$. Therefore, each candidate ς's maximization problem consists in $\max_{q_\varsigma} p_\varsigma(q_{\mathcal{I}}, q_{\mathcal{C}}) \cdot R_\varsigma$, subject to the government budget constraint, which implies the following first-order conditions:

$$\frac{1}{\tilde{\sigma}} = 1 - D'(\tau_\varsigma), \tag{1}$$

and

$$p_\varsigma(q_{\mathcal{I}}, q_{\mathcal{C}}) = \tilde{\sigma} R_\varsigma, \tag{2}$$

where $\tilde{\sigma} := \sigma\lambda^y + (1-\sigma)\lambda^o$. Two fundamental forces shape the equilibrium policy platform: (i) an intergenerational conflict over the allocation of the public budget, as highlighted in Eq. (1), and (ii) a political conflict over the size of the electoral rent, as highlighted in Eq. (2).

We let $D(\tau_\varsigma) = \tau_\varsigma^2/2$ without loss of generality. Solving Eqs. (1) and (2), the equilibrium tax rate is $\tau_\varsigma^* = 1 - (1/\tilde{\sigma})$ for each ς, and the equilibrium electoral rents are equal to $R_{\mathcal{I}}^* = (1/\tilde{\sigma})(1/2 + \phi/3)$ and $R_{\mathcal{C}}^* = (1/\tilde{\sigma})(1/2 - \phi/3)$. Plugging τ_ς^* and R_ς^* into the public budget constraint, the equilibrium education expenditures are $e_{\mathcal{I}}^* = (\omega/2)(1 - 1/\tilde{\sigma}^2) - (1/\tilde{\sigma})(1/2 + \phi/3)$ and $e_{\mathcal{C}}^* = (\omega/2)(1 - 1/\tilde{\sigma}^2) - (1/\tilde{\sigma})(1/2 - \phi/3)$. Therefore, the equilibrium probability of $\mathcal{I}$ and $\mathcal{C}$ winning is equal to $p_{\mathcal{I}}(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*) = 1/2 + \phi/3$ and $p_{\mathcal{C}}(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*) = 1 - p_{\mathcal{I}}(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*)$, respectively.

Define $e^* := p_{\mathcal{I}}(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*)e_{\mathcal{I}}^* + p_{\mathcal{C}}(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*)e_{\mathcal{C}}^*$ as the average education expenditure. Replacing e_ς^* and $p_\varsigma(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*)$, we obtain:

$$e^* = \frac{\omega}{2}\left(1 - \frac{1}{\tilde{\sigma}^2}\right) - \frac{1}{\tilde{\sigma}}\left(\frac{1}{2} + \frac{2}{9}\phi^2\right). \tag{3}$$

Using the equilibrium platforms $q_{\mathcal{I}}^*$ and $q_{\mathcal{C}}^*$, we can finally determine the equilibrium turnout rate. The shares of the young and the old who vote are $\pi^i = (1/\bar{c}^i) \cdot |\mathcal{V}^i(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*)|$ with $\mathcal{V}^i(q_{\mathcal{I}}^*, q_{\mathcal{C}}^*) = -2\phi\lambda^i/3\tilde{\sigma} + \delta$ for each i, which implies the following turnout rate for

the young:

$$\mathbb{E}_\delta \left[\pi^y \right] = \frac{\phi}{\overline{c}^y} \left(\frac{1}{2} + \phi \left(1 - \frac{2}{3} \frac{\lambda^y}{\widetilde{\sigma}} \right) \right). \tag{4}$$

Preregistration   What does our model predict about the effects of preregistration on policy and voting outcomes? The enactment of a preregistration law can be modeled as a reduction of $\overline{c}^y$, reflecting a smaller average cost of voting for the young as well as a smaller marginal electoral advantage for the old. Using Eq. (3), the following comparative statics results hold:

$$\frac{\partial e^*}{\partial \overline{c}^y} = - \left(\frac{\omega}{\widetilde{\sigma}} + \left(\frac{1}{2} + \frac{2}{9} \phi^2 \right) \right) \frac{\overline{c}^o \alpha (1 - \alpha) (\lambda^y - \lambda^o)}{(\alpha \overline{c}^o \lambda^y + (1 - \alpha) \overline{c}^y \lambda^o)^2} < 0,$$

$$\frac{\partial^2 e^*}{\partial \phi \partial \overline{c}^y} = - \frac{4}{9} \phi \frac{\overline{c}^o \alpha (1 - \alpha) (\lambda^y - \lambda^o)}{(\alpha \overline{c}^o \lambda^y + (1 - \alpha) \overline{c}^y \lambda^o)^2} < 0,$$

and

$$\frac{\partial^2 e^*}{\partial \alpha \partial \overline{c}^y} = \omega \left(\frac{c^y \alpha (1 - \alpha) (c^o (\lambda^y - \lambda^o))^2}{(\alpha c^o \lambda^y + (1 - \alpha) c^y \lambda^o)^4} \right)$$
$$- \left(\frac{\omega}{\widetilde{\sigma}} + \left(\frac{1}{2} + \frac{2}{9} \phi^2 \right) \right) \frac{c^o (\lambda^y - \lambda^o) (c^y \lambda^o (1 - \alpha) - c^o \alpha \lambda^y)}{(\alpha c^o \lambda^y + (1 - \alpha) c^y \lambda^o)^2},$$

which is smaller than zero if $\alpha < \underline{\alpha}$, where $\underline{\alpha}$ is the level at which $\partial^2 e^* (\underline{\alpha}) / \partial \alpha \partial \overline{c}^y = 0$. Furthermore, using Eq. (4), we obtain that $\partial \mathbb{E}_\delta \left[\pi^y \right] / \partial \overline{c}^y < 0$.

Empirical Predictions   The theoretical framework presented in this appendix provides a set of testable empirical predictions.

Prediction 1:   A decrease in $\overline{c}^y$ increases young voter turnout and average public education expenditure.

In equilibrium, education expenditure policy reflects the share of active voters within each age group and is limited by the size of the public budget. The model predicts that young voter turnout and in turn the level of education expenditure are larger in states with preregistration than in states without. This has a number of empirical implications for the heterogeneity of the effect of preregistration:

Prediction 2:   The negative effect of $\overline{c}^y$ on average public education expenditure increases as political competition weakens, i.e., the larger is ϕ, or as the share of young voters increases, i.e., the larger is α, provided that α is sufficiently small.

Thus, we expect to find a larger increase in education expenditure in reform states where political competition is weaker or the share of the young is larger, provided it is not too large.

APPENDIX F. Data

In this appendix, we describe the data sources and variable definitions and present summary statistics for the main variables.

Registration Reforms

The main source of information is the National Conference of State Legislatures. We complemented this source by collecting information on the legislative histories of registration laws, including contacting elections officials in each state. For each state, we collected data on the year of enactment of NRVA, EDR, OR, and Preregistration. The timing of voter registration reforms is reported in Table F1.

Individual-Level Data

We obtained information on voting and registration records and socioeconomic information at the individual level from the Current Population Survey (CPS) conducted by the U.S. Census Bureau. The CPS is a monthly survey that includes the Voting and Registration Supplement which is carried out biennially after each November election and provides information on respondents' electoral participation. CPS data was downloaded from IPUMS (Flood et al. 2018). The sample period is 1980-2014.

Variable Definition

Electoral Variables: The variables Voting and Registering are dummies for whether an individual in a given state and year has voted and has either registered or voted in the last November election, respectively. Self Respondent is a categorical variable which takes value 1 if the respondent completed the Voting and Registration Supplement by herself and 2 if a proxy provided information on her behalf. To adjust for differential non-response and non-coverage by age, we use the sampling weight WTFINL, which is a 14-digit numeric variable provided by the survey.

Socioeconomic Variables: The variable Young is a dummy for whether a respondent is aged 18-24. Dummy variables are also used to identify individual characteristics, such as Sex, Black, and Hispanic. Family Income, that is, the household's total combined income during the past 12 months, is reported according to 8 brackets (less than $5,000, 5,000 to 9,999, 10,000 to 14,999, 15,000 to 19,999, 20,000 to 24,999, 25,000 to 49,999, 50,000 to 74,999, 75,000 or more). Metropolitan City Status is a categorical variable that takes values from 0 to 4 (0=not identifiable, 1=not in metro area, 2=central city, 3=outside

Table F1: The Timing of Voter Registration Reforms in the U.S.

	NVRA	Election Day Registration	Online Registration	Preregistration
Alabama	1993	–	2016	–
Alaska	1993	–	2015	–
Arizona	1993	–	2002	–
Arkansas	1993	–	–	–
California	1993	2012	2012	2009
Colorado	1993	2013	2010	2013
Connecticut	1993	2013	2014	–
Delaware	1993	–	2006	2010
District of Columbia	1993	2010	2015	2009
Florida	1993	–	2017	2007
Georgia	1993	–	2014	–
Hawaii	1993	2018	2015	1993
Idaho	–	1994	2017	–
Illinois	1993	2014	2014	–
Indiana	1993	–	2010	–
Iowa	1993	2007	2016	–
Kansas	1993	–	2009	–
Kentucky	1993	–	2016	–
Louisiana	1993	–	2010	2014
Maine	–	1973	–	2011
Maryland	1993	2013	2012	2010
Massachusetts	1993	–	2015	2014
Michigan	1993	–	2018	–
Minnesota	–	1974	2013	–
Mississippi	1993	–	–	–
Missouri	1993	–	2013	–
Montana	1993	2005	–	–
Nebraska	1993	–	2015	–
Nevada	1993	–	2012	2017
New Hampshire	–	1996	–	–
New Jersey	1993	–	–	2016
New Me–ico	1993	–	2016	–
New York	1993	–	2012	–
North Carolina	1993	–	–	2009
Ohio	1993	–	2017	–
Oklahoma	1993	–	–	–
Oregon	1993	–	2010	2007
Pennsylvania	1993	–	2015	–
Rhode Island	1993	–	2016	2010
South Carolina	1993	–	2012	–
South Dakota	1993	–	–	–
Tennessee	1993	–	2017	–
Texas	1993	–	–	–
Utah	1993	2018	2010	2015
Vermont	1993	2017	2015	–
Virginia	1993	–	2013	–
Washington	1993	–	2008	–
West Virginia	1993	–	2015	–
Wisconsin	–	1975	2017	–
Wyoming	–	1994	–	–

Note: The sample includes all 50 U.S. states and the District of Columbia, except North Dakota since it is the only state not requiring registration. North Carolina repealed preregistration in 2013.

central city, 4=central city status unknown). Educational Attainment is a categorical variable that takes 4 values (1=no school completed and 1st-11th grade, 2=12th grade - high school graduate or GED, 3=some college - no degree and 1-3 years of college, 4=4 years of college or more). Labor Force Status is a dummy variable that takes value 1 if the respondent is not in the labor force, and 2 otherwise.

Table F2: Summary Statistics - Individual-Level Data

| | (1) | | (2) | | (3) | |
| | Full Sample | | Never Treated Sample | | Eventually Treated Sample | |
	Mean (Std. dev.)	Obs.	Mean (Std. dev.)	Obs.	Mean (Std. dev.)	Obs.
Electoral Variable						
Voting	0.61 (0.49)	1,358,545	0.60 (0.49)	977,049	0.62 (0.48)	381,496
Registering	0.77 (0.42)	1,350,537	0.77 (0.42)	971,329	0.77 (0.42)	379,208
Self Respondent	1.42 (0.49)	1,370,526	1.42 (0.49)	985,800	1.42 (0.49)	384,726
Socioeconomic Variable						
Young	0.12 (0.33)	1,370,526	0.12 (0.33)	985,800	0.12 (0.32)	384,726
Sex	1.53 (0.50)	1,370,526	1.53 (0.50)	985,800	1.53 (0.50)	384,726
Black	0.09 (0.29)	1,370,526	0.09 (0.28)	985,800	0.11 (0.32)	384,726
Hispanic	0.06 (0.23)	1,370,526	0.05 (0.21)	985,800	0.07 (0.26)	384,726
Educational Attainment	1.57 (1.01)	1,370,526	1.54 (1.00)	985,800	1.65 (1.02)	384,726
Family Income	4.36 (2.14)	1,370,526	4.31 (2.14)	985,800	4.49 (2.13)	384,726
Labor Force Status	1.68 (0.47)	1,370,526	1.68 (0.47)	985,800	1.67 (0.47)	384,726
Metropolitan City Status	2.07 (1.16)	1,370,526	2.01 (1.17)	985,800	2.23 (1.12)	384,726

Note: The full sample contains a stacked cross-section of individuals resident in the U.S. aged 18-90, who report whether they have voted or registered.

Descriptive Statistics

Table F2 reports the summary statistics. On average, 61% of the respondents report having voted and 77% having registered. Young respondents aged 18-24 account for 12% of the respondents, while women account for 53%. Average family income is between $20,000 and $24,999, and about 32% of the sample are not participating in the labor force. States that belong to the never treated and eventually treated samples display strong similarities. There are on the other hand some differences, e.g., in the black and Hispanic share of the population, which point to the importance of controlling for background demographic characteristics.

State-Level Data

We constructed a state-level panel of annual data for all 50 U.S. state governments for the period 1980-2014, which includes fiscal, political and socioeconomic variables obtained from the various sources.

Variable Definition

Fiscal Variables: Annual financial data on the activity of state governments is obtained from the Annual Survey of State and Local Government Finances conducted by the U.S. Census Bureau and downloaded from the State & Local Government Finance Data Query System (Tax Policy Center 2016) for the period 1980-2014. We report financial variables at constant 2014 U.S. dollars per capita and variable codes in parentheses. The expenditure data we employ is for direct expenditure, that is, all expenditure other than intergovernmental expenditure. We utilize Total Expenditure (E001), which is the sum of all direct expenditure, and Total Current Expenditure (E004), which includes all direct expenditures other than capital outlays. The ratio of the latter to the former yields the % Current Expenditure variable. The analysis focuses on Current Higher Education Expenditure (E031), which includes payments for current operating expenses of institutions of higher education operated by the state. Other types of expenditure include: Police & Fire Protection (E019); Correction (E021); Financial Administration (E041); Construction (the sum of Total Highways, E065; Housing and Community Development, E074; and General Public Buildings, E049); Natural Resources (E080); Parks & Recreation (E084); Health & Hospital (E052), which includes general public health spending; Public Welfare (the sum of E090 and E009, respectively reflecting support to the needy, such as Old Age Assistance, and cash contribution and subsidies to individuals); Unemployment Compensation (E137), and Employee Retirement (E134). On the revenue side, we use General Revenue (R04) and Total Taxes (R05). Current Elementary & Secondary Education Expenditure (TE5) is obtained from the Annual Survey of School System Finances conducted by the U.S. Census Bureau (1987-2014). It comprises payments for teaching, support services, and other activities of local public school systems.

Political Variables: The variables Year of Mandate (years since the last gubernatorial election) and Democratic Governor (dummy for whether the governor is a Democrat) are obtained from Leip (2016). From the same source, we also obtain data on gubernatorial turnout, which we divide by the voting-eligible population from the United States Elections Project (McDonald 2016) to construct the variable Gubernatorial Turnout Rate. Incumbent (dummy for a governor currently running for a second term), Governor Runs Next Election (dummy for a governor that will run again), Governor Not Eligible to Run Again (dummy for a governor not eligible to run again), and Previous-Term Democratic Governor (dummy for a Democratic governor in the previous term) are obtained from the Center on the American Governor (2014). The variable Political Competition is the electoral margin of victory (votes of the first party minus votes of the second party, over total votes) obtained from the website OurCampaigns (2016). For the case of Louisiana, which is the only state with a jungle primary system for gubernatorial elections, that is,

all candidates appear on the same ballot regardless of political affiliation, we attribute to each party the votes received by its candidate in the runoff election; if no runoff election is held, we instead attribute to each party the sum of votes received by all of its candidates.

Socioeconomic Variables: Data on Population and Personal Income are taken from the Bureau of Economic Analysis (1980-2014). We define the variables Median Age, Share of 16-25, Share of Blacks, and Share of Whites using population data on age and race obtained from the Surveillance, Epidemiology, and End Result (SEER) Program of the National Cancer Institute (1980-2014). Information on Post-secondary Enrollment is taken from the National Center for Education Statistics (1980-2014). The Unemployment Rate for the whole sample period and Youth Unemployment for the period 2000-2014 are published by the Bureau of Labor Statistics (1980-2014). Educational Attainment, which reflects the share of the population with a college degree, and Inequality (defined as Gini Index) are taken from U.S. State-Level Income Inequality Data - Mark W. Frank (Frank 2016).

Descriptive Statistics

Table F3 reports the summary statistics. The key variable is Higher Education Expenditure, which in per capita terms is equal on average to $543.55 and accounts for about 10% of total expenditure. The table also reports statistics for all other categories of expenditure. Total taxes include both state and local taxes and are on average $2420 per capita. The next set of variables consists of state-level political characteristics. On average, 50% of governors belong to the Democratic party, 43% are incumbent, 53% run in the next election, and 27% are not eligible to run again. The table also provides information on political competition, the gubernatorial election turnout rate, and the President's party affiliation. The last set of variables is meant to capture a state's socioeconomic background including, among others, the share of the young and blacks in the population, post-secondary enrollment, personal income, inequality, and unemployment. The states that have implemented preregistration and those that have not are similar in most characteristics, with the exception of population, which is larger in reform states, and governors being Democratic, which is more frequent in reform states—despite the fact that preregistration has been approved in the majority of cases by a Republican governor, as discussed in Section ID.

Higher Education Institution-Level Data

Higher education institution-level information is taken from the Delta Cost Project Database maintained by the National Center for Education Statistics as part of the Integrated Postsecondary Education Data System (IPEDS 1987-2015). IPEDS is a survey of

Table F3: Summary Statistics - State-Level Data

| | (1) | | (2) | | (3) | |
| | Full Sample | | Never Treated Sample | | Eventually Treated Sample | |
	Mean (Std. dev.)	Obs.	Mean (Std. dev.)	Obs.	Mean (Std. dev.)	Obs.
Fiscal Variable						
Higher Education Exp.	543.55 (188.58)	1,750	550.08 (188.13)	1,330	522.87 (188.76)	420
Elem & Sec Education Exp.	1,202.72 (465.22)	1,400	1,210.54 (479.48)	1,064	1,177.95 (416.52)	336
Construction	423.65 (275.54)	1,750	436.15 (298.60)	1,330	384.08 (178.97)	420
Correction	128.12 (65.32)	1,750	121.95 (64.64)	1,330	147.69 (63.65)	420
Financial Administration	163.23 (112.38)	1,750	153.91 (117.24)	1,330	192.76 (89.26)	420
Police & Fire Protection	38.32 (23.57)	1,750	36.84 (23.07)	1,330	43.00 (24.57)	420
Natural Resource	96.78 (98.23)	1,750	100.26 (110.88)	1,330	85.76 (33.47)	420
Parks & Recreation	22.15 (18.77)	1,750	19.85 (13.41)	1,330	29.46 (28.80)	420
Health & Hospital	297.71 (135.13)	1,750	283.67 (123.70)	1,330	342.17 (158.35)	420
Public Welfare	1,119.08 (522.97)	1,750	1,101.90 (507.00)	1,330	1,173.47 (567.83)	420
Employee Retirement	343.27 (225.85)	1,750	330.96 (230.73)	1,330	382.25 (205.10)	420
Unemployment Compensation	167.02 (119.31)	1,750	161.02 (116.84)	1,330	186.02 (125.08)	420
Total Expenditure	5,348.05 (2,204.67)	1,750	5,306.61 (2,349.40)	1,330	5,479.27 (1,660.99)	420
Total Current Exp.	4,915.82 (2,015.69)	1,750	4,868.63 (2,139.56)	1,330	5,065.25 (1,552.63)	420
General Revenues	3,480.12 (2,044.36)	1,750	3,462.44 (2,265.80)	1,330	3,536.13 (1,076.11)	420
Total Taxes	2,420.98 (988.83)	1,750	2,388.73 (1,063.41)	1,330	2,523.11 (693.43)	420
Political Variable						
Year of Mandate	2.45 (1.12)	1,750	2.44 (1.12)	1,330	2.47 (1.13)	420
Democratic Gov.	0.50 (0.50)	1,750	0.47 (0.50)	1,330	0.60 (0.49)	420
Incumbent Gov.	0.43 (0.50)	1,750	0.43 (0.49)	1,330	0.44 (0.50)	420
Gov. Not Eligible to Run Again	0.27 (0.44)	1,750	0.25 (0.43)	1,330	0.33 (0.47)	420
Gov. Runs Next Election	0.53 (0.50)	1,750	0.54 (0.50)	1,330	0.50 (0.50)	420
Previous-term Democratic Gov.	0.53 (0.50)	1,750	0.51 (0.50)	1,330	0.60 (0.49)	420
Political Competition	0.16 (0.14)	1,750	0.16 (0.14)	1,330	0.16 (0.13)	420
Gubernatorial Turnout Rate	0.46 (0.10)	1,750	0.46 (0.10)	1,330	0.48 (0.07)	420
Socioeconomic Variable						
Population	5,433.04 (5,970.86)	1,750	4,983.30 (4,712.67)	1,330	6,857.24 (8,700.37)	420
Median Age	34 (3.20)	1,750	33.80 (3.21)	1,330	34.66 (3.10)	420
Share of 16-25	0.15 (0.02)	1,750	0.15 (0.02)	1,330	0.15 (0.02)	420
Post-secondary Enrollment	310.41 (369.49)	1,750	279.48 (270.32)	1,330	408.37 (570.49)	420
Share of Blacks	0.10 (0.09)	1,750	0.10 (0.09)	1,330	0.12 (0.10)	420
Share of Whites	0.84 (0.13)	1,750	0.86 (0.09)	1,330	0.78 (0.19)	420
Personal Income	26,246.09 (11,529.33)	1,750	25,822.55 (11,462.80)	1,330	27,587.30 (11,649.98)	420
Inequality	0.57 (0.05)	1,750	0.57 (0.05)	1,330	0.56 (0.05)	420
Unemployment Rate	6.08 (2.11)	1,750	6.07 (2.14)	1,330	6.09 (2.01)	420

Note: The full sample consists of an annual state-level panel of all 50 U.S. state governments. Financial variables are in 2014 U.S. dollars. Population and post-secondary enrollment are in thousands.

colleges, universities and vocational institutions conducted annually using a unique longitudinal identifier by the U.S. Department of Education (DOE). The Higher Education Act requires postsecondary institutions to participate in IPEDS in order to maintain eligibility to administer Federal Title IV student aid. The survey consists of three matched datasets covering three different waves: 1987-2015, which includes 2397 institutions; 2005-2015, which includes 3714 institutions; and 2010-2015, which includes 4076 institutions.

We focus on the 2005-2015 wave and limit the sample period to 2014. The USPS county ZIP Codes Crosswalk data to geo-reference the panel of higher education institutions are taken from U.S. Department of Housing and Urban Development's Office of Policy Development and Research (2018) and the selected data year and quarter is 1st Quarter 2010. Data on Population and Personal Income at county level are taken from the Bureau of Economic Analysis (1980-2014).

Variable Definition

Financial Variables: We report financial variables at constant 2015 U.S. dollars and variable codes in parentheses. State Appropriation (STATE03) are revenues received by the institution through acts of a state body for meeting current operating expenses, not for specific projects and programs, which exclude capital appropriations. Per FTE State Appropriation is State Appropriation divided by FTE enrollment.

Institution Variables: FTE enrollment includes full time plus the calculated equivalent of the part-time enrollment and it is obtained using the formula adopted by the U.S. Department of Education published annually in the Digest of Education Statistics (Snyder, de Brey, and Dillow 2019). % Fall Cohort is the percentage of all undergraduates who are first-time, full-time degree/certificate-seeking students. Carnegie Classification (2010 Collapsed Edition) is a categorical variable that takes values from 1 to 6. Flagship Institution is a dummy variable for whether the institution is a flagship. Institution Has Hospital is a dummy variable for whether the institution has a hospital. Institutional Sector is a categorical variable that takes values from 1 to 9 (1=public 4-year or above, 2=private nonprofit 4-year or above, 3=private for-profit 4-year or above, 4=public 2-year, 5=private nonprofit 2-year, 6=private for-profit 2-year, 7=public less-than-2-year, 8=private nonprofit less-than-2-year, 9=private for-profit less-than-2-year). Institutional Level is a categorical variable that takes values from 1 to 3 (1=4-year or above, 2=2-but-less-than 4-year, 3=less than 2-yea).

Descriptive Statistics

Table F4 presents the summary statistics. Panel A presents the summary statistics for the all-county sample, which includes 3,714 institutions located in all 50 U.S. states, plus the District of Columbia, while Panel B presents the summary statistics for the border county-pair sample, which contains 1,059 institutions located in 48 U.S. states (without Alaska and Hawaii), plus the District of Columbia. Throughout the sample period, the never treated and eventually treated states show similar institutional characteristics both in the all-county sample and the border-county pair sample. The mean of per FTE state appropriation in states that have introduced preregistration is 23.6% and 51.7% higher

Table F4: Summary Statistics - Higher Education Institution-Level Data

	(1) Full Sample		(2) Never Treated Sample		(3) Eventually Treated Sample	
	Mean (Std. dev.)	Obs.	Mean (Std. dev.)	Obs.	Mean (Std. dev.)	Obs.
A. All-county Sample						
Financial Variable						
per FTE State Appropriation	6,470.06 (21,489.51)	17,016	6,093.12 (24,510.97)	12,564	7,533.84 (8,250.61)	4,452
Institution Variable						
Carnegie Classification	3.21 (1.19)	15,467	3.19 (1.20)	11,332	3.27 (1.16)	4,135
Institution Has Hospital	1.97 (0.18)	15,480	1.97 (0.18)	11,426	1.97 (0.18)	4,054
Flagship Institution	0.03 (0.17)	17,016	0.03 (0.17)	12,564	0.03 (0.16)	4,452
Institutional Level	1.64 (0.58)	17,016	1.65 (0.59)	12,564	1.64 (0.53)	4,452
Institutional Sector	3.08 (1.65)	17,016	3.08 (1.69)	12,564	3.08 (1.53)	4,452
FTE Enrollment	6,730.55 (10,698.68)	17,016	6,279.44 (11,086.06)	12,564	8,003.65 (9,406.01)	4,452
% Fall Cohort	0.15 (0.09)	15,323	0.16 (0.09)	11,184	0.13 (0.08)	4,139
B. Border County-pair Sample						
Financial Variable						
per FTE State Appropriation	5,236.27 (8,032.02)	6,363	4,621.80 (7,084.53)	4,728	7,013.17 (10,086.39)	1,635
Institution Variable						
Carnegie Classification	3.21 (1.16)	5,934	3.20 (1.17)	4,313	3.23 (1.14)	1,621
Institution Has Hospital	1.96 (0.19)	5,731	1.96 (0.20)	4,255	1.98 (0.13)	1,476
Flagship Institution	0.03 (0.16)	6,363	0.01 (0.12)	4,728	0.06 (0.23)	1,635
Institutional Level	1.58 (0.56)	6,363	1.58 (0.58)	4,728	1.58 (0.50)	1,635
Institutional Sector	2.92 (1.58)	6,363	2.95 (1.62)	4,728	2.85 (1.44)	1,635
FTE Enrollment	6,330.08 (12,665.23)	6,363	6,514.42 (14,295.17)	4,728	5,797.03 (5,744.43)	1,635
% Fall Cohort	0.16 (0.09)	5,874	0.17 (0.10)	4,258	0.14 (0.06)	1,616

Note: Financial variables are in 2015 U.S. dollars. The samples include observations with non-missing per FTE State Appropriation.

than the corresponding mean for never treated states in the all-county sample and the border-county pair sample, respectively.
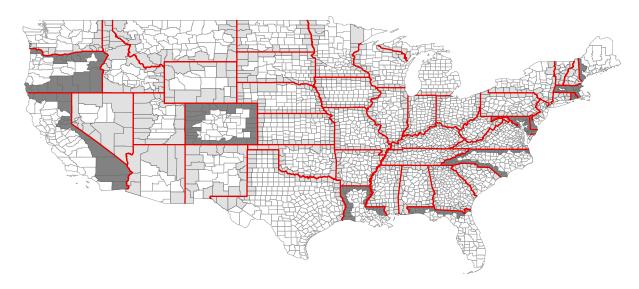
Figure F1: Geographical Distribution of Adjacent Counties along U.S. State Borders as of 2014.

Note: The darker shade indicates counties that straddle a common state border and are located in states with preregistration. Alaska and Hawaii are excluded from the lower 48, since they do not share a border.

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