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

Graziella Bertocchi Arcangelo Dimico Francesco Lancia Alessia Russo

July 2016

Abstract

This paper studies the effect of the introduction of preregistration laws, which allow young citizens to register before being eligible to vote, on public education spending in the United States. Since preregistration laws have been introduced in different states in different years, these events have generated exogenous variation across space and time in the exposure of young voters to the new electoral reforms. First, employing a difference-in-differences regression design, we establish that preregistration shifts state level government spending toward higher education, to the benefit of the newly-enfranchised young voters. The magnitude of the increase is higher when inequality and the share of young are larger. Second, exploiting a county pairs regression design over micro-data on higher education institutions, we confirm a positive effect of preregistration on the share of state grants and their recipients, respectively over total student financial aid and its recipients. Finally, consistent with a political economy model, we show that preregistration laws promote a sizeable de facto enfranchisement effect for young voters, especially from poor families, which represents a channel through which this electoral reform affects economic outcomes.

JEL Classification: D72, H52, P16.

Keywords: Enfranchisement, Preregistration, Public Education Expenditure, Political Responsiveness.

*Graziella Bertocchi, University of Modena and Reggio Emilia, CEPR, DGI and IZA, email: graziella.bertocchi@unimore.it; Arcangelo Dimico, Queen's University Belfast, email: a.dimico@qub.ac.uk; Francesco Lancia, University of Vienna, email: francesco.lancia@univie.ac.at; Alessia Russo, University of Oslo, email: alessia.russo@econ.uio.no. We would like to thank Marc Goñi, Bård Harstad and Anirban Mitra, and seminar participants at IMT-Lucca and the Universities of Oslo and Vienna for helpful comments.

1 Introduction

In all modern states a central activity of governments is the allocation of the public budget in response to the demands from socio-economic groups. The government's choice of how much of public resource to redistribute and of which socio-economic groups to target is embedded in the political system. Ever since the seminal paper of Meltzer and Richard (1981), the political economy literature has developed the analysis of the role of electoral mechanisms for the determination of the size of government spending and the extent of redistribution. The main prediction of this literature is that increased political participation of a group of voters leads to the implementation of policies targeting their needs and aspirations.

Several contributions following Acemoglu and Robinson (2000) have established that conflict between rich and poor lies at the heart of the historical extension of the voting franchise and the consequent expansion of the welfare state. However, the case of conflict arising among different age groups, and its implications for political participation and government spending, has not yet been investigated. In the face of evolving demographic forces, the potential divergence between the interests of young and old generations calls the attention on the political voice of the former, the mechanisms that can help to enhance it, and the consequent impact on specific forms of government spending. The fact that in modern democracies public intervention favours pensions and health care, to the advantage of the old, over education expenditure to the benefit of the young has indeed reached center stage in the policy debate and raised concern about the reluctance of the latter to cast their ballot – still the most effective way to make politicians aware of their demands.[1]

While the tendency to a low and declining level of political participation for the young is widespread throughout all modern democracies, the United States (U.S.) provides an ideal setting for the analysis of the link between youth enfranchisement and policy actions. Despite the fact that the U.S. has been a de jure full democracy with universal suffrage for a long time, restrictions and expansions of political rights – which have often been implemented through state level legal provisions involving changes in the de facto ability to exercise the right to vote – exhibit rich variation along both the time and the space dimension.

In the context of the U.S., this paper provides theory and evidence on how introducing institutions aimed at increasing the political participation of young voters can promote policies targeting them and ultimately affect their outcomes. We focus on the effectiveness of preregistration laws, which allow young citizens to register before being eligible

[1] See The Economist, January 23, 2016, Special Report: The Young (economist.com).

to vote, in reducing an important obstacle to political participation, i.e., the cost of registration as a prerequisite for casting a ballot. We show that those states which enacted preregistration provisions experienced a sizeable increase in public education expenditure – both at the state level and at the level of individual higher education institutions – driven by the de facto enfranchisement of youth voters.

Voter registration entails a cost, in terms of effort, time, and involvement, which is especially large for younger citizens who are supposed to gather information and then show up at the voting stations for the first time. Indeed in the U.S., where registration is required in all states (with the only exception of North Dakota), this prerequisite for voting has often been pointed out as a major explanation of lower turnout as compared to Western democracies. The fact that the associated cost is larger for young voters can also explain why turnout is especially low for them and why a reduction of this cost through preregistration laws can affect youth turnout more strongly.

In order to provide a guide for interpreting our empirical findings, this paper first develops a simple political economy model of fiscal policy. The theory illustrates how preregistration laws can affect the allocation of the public budget. The basic structure is that of a jurisdiction populated by citizens who belong to two different age groups: young and old. In addition to their wealth, citizens differ in their preferences for education expenditure, since young do benefit from education while the old do not. The electoral competition takes place between an incumbent and a challenger who may differ in their degree of political opportunism. The candidates compete by proposing an electoral platform composed of public education expenditure, an income tax rate and a political rent. Voters decide to cast their ballot for the candidate whose promised fiscal platform is more affine to their preferences, while they abstain when the cost of registering and in turn voting is too high. Before the electoral competition, the incumbent may decide whether to keep the status quo or enact a preregistration law. If a preregistration law is enacted, the registration cost of the youth is reduced. The model predicts that the incumbent enacts a preregistration law when her degree of political opportunism is sufficiently lower than the one of the challenger. A lower cost of voting born by the young leads to stronger civic engagement for individuals belonging to this voting age group, who decide to both register and vote in larger numbers. This, in turns, generates a de facto enfranchisement episode. Candidates respond to the larger participation of young voters by addressing their economic needs more and by sacrificing their political rents. Moreover, the political responsiveness to a larger political participation of youth is larger the higher is wealth inequality and the stronger is political competition.

Since preregistration laws have been introduced in different U.S. states in different years, predictions from our model can be tested exploiting a difference-in-differences re-

gression method. The goal is to test whether the introduction of preregistration provisions affects economic and political outcomes by comparing states that have adopted them, i.e., the treated group, with states which have not done so, i.e., the control group.

To accomplish the above goal we develop two parallel and complementary empirical investigations. First we explore the impact of preregistration laws on government spending. Since preregistration laws were enacted at the state level, we focus on state level government spending using annual financial data on the activity of local and state governments, provided by the U.S. Census Bureau. We show that during the period 1977-2013 U.S. states that have adopted preregistration have raised public education expenditure. The effect we find is economically substantial, since per capita education expenditure increases by more than 6%, on average, after the enactment of preregistration. Disentangling among different budget components, we find that it is the higher education current expenditure component that drives our results, rather than spending for elementary and secondary schools and capital outlays.[2] The magnitude of the increase in education expenditure results to be higher in those states where inequality is higher. Moreover, consistent with the theory, the smaller voting margin combined with a larger share of young voters increases the effect of preregistration on expenditure. The effect manifests itself entirely after the first election following the preregistration reform. We also show that the other components of state expenditure which are not specifically benefiting the young, such as pension, health, and unemployment benefits, do not respond to preregistration, while education expenditure does not respond to other reforms aimed at reducing the cost of registration but not specifically targeted to young voters. We are referring to the 1993 National Voter Registration Act (NVRA, or the Motor Voter Act) and other legal provisions introduced by individual states such as Election Day Registration and Online Registration. Taken together, this evidence suggests that the implementation of preregistration is itself likely responsible for the substantial increase in education expenditure we uncover.

We complement the state level analysis with the use of micro-level data from the Integrated Postsecondary Education Data System (IPEDS). The dataset provides information on U.S. colleges, universities, and technical and vocational institutions which can be geographically mapped to assess their distance from state borders. This allows us to focus on higher education institutions in adjacent counties along state borders in order to identify the effect of preregistration across different states. The underlying assumption – corroborated by tests showing that differences in institutional characteristics and the counties' socio-economic characteristics do increase with border distance but not for

[2]In 2009 70% of high school graduates enrolled in higher education programs shortly after graduation. See The Future of Children (2013) (futureofchildren.org).

counties along the border – is that institutions within a short distance from the border show similar characteristics. Results indicate a clear influence of preregistration on state financial aid supporting college education. Namely, over the period 2002-2012, preregistration is associated with an over 3% increase in the fraction of state grants over total student financial aid and an over 6% increase in the recipients of state grants as a fraction of full time first time degree seekers. No such effect is found for the other components of student financial aid, i.e., for federal (Pell) grants and for grants provided by the institutions themselves, while the number of applications, particularly for females, increases as a result. The beneficial effect of youth enfranchisement on education outcomes is therefore confirmed over a very different dataset and estimation strategy.

Turning to the mechanisms linking preregistration to the responsiveness of policy makers, we assess the effect of preregistration laws on political participation. Using data on voter turnout provided by the Current Population Survey (CPS) for the period 1996-2014.we test whether there has been an increase in youth voter turnout in states which have adopted preregistration, as emphasized in the theoretical model as a potential transmission channel. Estimates show that preregistration is associated with a 4% increase in youth turnout rates, as well as a comparable increase in youth registration. Registration in frequent points of contacts such as schools and campuses, where preregistration drives are usually organized, is also positively affected. These findings imply that a large number of young citizens, who otherwise would have been left without political voice, were de facto enfranchised as a consequence of the implementation of preregistration laws. Moreover, estimates show that the positive impact of preregistration on turnout exclusively runs through the increased electoral participation of younger (aged 18-24) voters, which is in turn more noticeable for those coming from poor families. Taken together, these results reinforce the hypothesis that politicians respond to preregistration reforms by increasing the type of expenditures that directly benefits the young.[3] Indeed higher education current expenditure directly affects the college-age electorate, more strongly so in the presence of larger inequality and a larger share of poor youths in need for college financial aid.

This paper is related to several strands of literature. First, it is connected with the analysis of the determinants of democratization and de jure enfranchisement developed for the case of conflict arising between economic elites and poor masses (see, e.g., Acemoglu and Robinson, 2000, 2006; Lizzeri and Persico, 2004; and Llavador and Oxoby, 2005). Related empirical assessments of the enfranchisement effect for public spending include

[3]As reported by the Center for American Progress (2010) (americanprogress.org) Americans aged 18 to 32 are 21 points more likely than older ones to call for more public intervention on school quality, and 17 points more inclined to call for a reduction in the cost of public higher education.

Lindert (1994) and Aidt, Dutta, and Loukoianova (2006).[4] Parallel investigations have addressed conflict arising between alternative socio-economic groups, along the racial and gender dimensions. The implications of voting restrictions such as poll taxes and literacy tests, enacted in U.S. Southern states after the Civil War and aimed at disenfranchising the blacks, have been investigated by Naidu (2012) and Bertocchi and Dimico (2014), who uncover their influence on voter turnout and education outcomes for the black population. The removal of such restrictions with the 1965 Voting Rights Act and its influence on welfare policies are addressed by Husted and Kenny (1997), Besley, Persson, and Sturm (2010), and Cascio and Washington (2014). In a similar vein, the extension of the voting suffrage to women and its impact on the size and composition of government spending is studied by Lott and Kenny (1999) and Miller (2008) across U.S. states and by Aidt and Dallal (2008) and Bertocchi (2011) across Western countries. However, the present paper is the first to address the implications of the enfranchisement of the young in the face of a potential conflict with the older generations. Furthermore, this paper focuses on a de facto enfranchisement episode in a modern democracy within a context where universal suffrage is already established.

The effectiveness of preregistration laws across U.S. states is evaluated also by McDonald and Thornburg (2010) and Holbein and Hillygus (2016). While the latter exploits a difference-in-differences approach using CPS data, similar to ours, neither paper discusses the implications for government spending, which is the focus of the present paper. The impact of alternative provisions aimed at easing the registration burden, such as Election Day Registration and Motor Voter laws, is analyzed by Highton (1997) and Besley and Case (2003). In contexts other than the U.S., the influence of voting technologies on voter turnout and policy outcomes is investigated by Baland and Robinson (2008) with reference to the secret ballot in Chile and Fujiwara (2015) with reference to electronic voting in Brazil. Hoffman, Leon, and Lombardi (2015) study the influence of compulsory voting in Austria.

Our focus on intergenerational conflict as a driver for policy change connects our work to political economic models aimed at studying the responsiveness of public policies to a variation in the balance of political power across generations. The evidence on this, however, is mixed and puzzling. While some theories predict positive effects of the political power of one age group on government responsiveness targeted to the same group (see, e.g., Bassetto, 2008; Gonzalez-Eiras and Niepelt, 2008; Lancia and Russo, 2016; Mateos-Planas, 2010; Song, Storesletten, and Zilibotti, 2012), others have shown that an increase in the political clout of the dependent population, the elderly, leads to

[4]The link between democratization and growth through schooling and public good provision is addressed by Acemoglu, Naidu, Restrepo, and Robinson (2014).

smaller pensions (see, e.g., Razin, Sadka, and Swagel, 2002) and that per capita public expenditure depends negatively on the cohort size of the young and, in turn, their political clout (see, e.g., Levy, 2005). Tabellini (1991) relates the politics of intergenerational redistribution to public debt. The current paper provides an empirical corroboration for findings suggesting a positive link between the increase in the political power of a specific group of voters, the young, and the political responsiveness of the elected government, using a neat institutional setting and empirical strategy.

The rest of the paper is organized as follows. Section 2 reports stylized facts on the U.S. electoral and budgeting processes, youth political participation, and the introduction of preregistration laws across U.S. states. Section 3 provides the theoretical background for the analysis of youth enfranchisement. Section 4 reports results regarding the impact of preregistration laws on education expenditure at the state level. Section 5 is devoted to the analysis of the data on individual higher education institutions with the use of a county pair regression design. The implications of preregistration for youth political participation are presented in Section 6. Section 7 contains our conclusions. The Appendix contains the figures and tables that are not in the text (A), proofs (B), and a description of the data (C).

2 Institutional Setting and Historical Background

2.1 The Electoral and Budgeting Processes in the U.S.

The United States of America is a federal republic composed of 50 states, the district of Columbia, five major territories, and various possessions. The states themselves comprise 3144 counties. Officials are elected at the federal, state, and local levels. While the U.S. Constitution establishes rules for federal elections, state laws regulate most aspects of state and local elections. In each state, voters directly elect the governors, who is responsible for implementing state laws and overseeing the operation of the state executive branch.[5] State laws determine the length of gubernatorial mandate and its term limits. U.S. governors serve four-year terms except those in New Hampshire and Vermont, who serve two-year terms. In most states, governors cannot be elected for more than two or even one term.[6]

[5]Federal elections are held in even-numbered years in November. Many state and local government officers are elected on Election Day, that is the day in which federal elections are held, i.e., in even-numbered years in November, as as a matter of cost saving. The states of Kentucky, Louisiana, Mississippi, New Jersey, and Virginia, however, elect their respective governors during odd-numbered years.

[6]Gubernatorial term limits are determined by state constitutions, with the exception of Wyoming, whose limits are found in its statute. In 36 states governors are subject to various term limits, while the governors of 14 states may serve an unlimited number of times.

Government spending in the U.S. occurs at all three levels of government. The U.S. Treasury divides federal spending into mandatory spending, whose biggest category is spending related to military programs, discretionary spending, which is dominated by social security and Medicare programs, and interest on debt. All spending is financed by tax revenues and public debt. Federal spending is complemented by state and local spending. Fiscal federalism is embodied in the 10th Amendment to the Constitution, which recognizes that "*The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.*"

In all states, governors have considerable control over the budgeting process. The budget is the most important policy statement that each governor makes as she allocates state resources for programs and services. Such resources are distinguished between the following sources: (i) general state funds, which are the predominant means for financing state operations and are received from broad-based state taxes; (ii) other state funds, which is funding restricted by law for specific governmental functions and are received from taxes, fees, donations, assessments, and local funds; (iii) federal funds, which are intergovernmental revenues received directly from the federal government; and (iv) bonds. In recent years, following the 2009 *American Recovery and Reinvestment Act* (ARRA), state spending has been deeply affected by a rapid increase in federal funds, while its growth in general as well as other state funds has remained relatively stable.[7] How funds and bonds are used to finance different functions of state spending varies across states. According to the National Association of State Budget Officers (2015), the main functions funded at the state level in 2014 were: Medicaid (representing 25.6% of total state spending), elementary and secondary education (19.8%), higher education (10.5%), transportation (7.9%), public assistance (1.5%), and other expenditures including economic development, environmental projects, housing, parks, and state police (31.5%).[8]

The two state functions related to education expenditure, i.e., elementary and secondary education and higher education, are financed with different sources of funding. In many states, elementary and secondary education is considered a local function and is financed by the local property tax.[9] Higher education spending, which includes financial

[7]In recent years, policymakers have largely discarded federalism. Indeed, the U.S. Congress has undertaken many activities that were traditionally reserved to the states. Federal funds, which have became the third largest item in the federal budget after social security and military programs, are a fiscal tool for the federal government to extend its power into state and local affairs.

[8]See nasbo.org.

[9]In 2013 45% of the revenues for elementary and secondary schooling came from local sources (of which, property taxes represented 65%), while 46% came from state sources, and 9% from federal sources. Overall, property taxes covered 29% of the budget (see U.S. Census Bureau, Public Education Finances 2013, census.gov). For the same year, only 6% of the general operating expenses of the higher education public system came from local sources, while 51% came from state sources and 43% came from tuition (see State Higher Education Executive Officers, sheeo.org). The relevance of local property taxes varies

support for public universities, community colleges, and vocational education institutions, is mostly financed by state funding. In 2014 total spending in higher education amounted to $182.4 billion and was financed for 38.1% by general state funds, 47.4% by other state funds, 11.8% by federal funds, and 2.7% by bonds. In recent years state funds for higher education financing have declined, while federal funds have sharply increased in connection with the implementation of the ARRA. Furthermore, other sources of state funding have surpassed the general state fund as the largest contributors for state spending on higher education program. As a consequence, a larger share of the burden for higher education has been transferred from taxpayers to students through an increase in tuition rates.[10]

2.2 Youth Voter Turnout in the U.S.

Voting is the most effective way to influence government decision making, as an expression of individual preference for a candidate for office. Voter turnout in the U.S., however, has always been much lower than in most established democracies.[11] In the 2012 Presidential election, only 54.9% of Americans cast a ballot. Since the 1960s, turnout has experienced a persistent downward trend, decreasing by over 14 percentage points from the 1964 high of 69.3%. Remarkably, there has always been a wide gap in voting turnout between different age groups. When in the 1972 Presidential election 18-year-olds were first given the right to vote as the consequence of the 26th Amendment to the Constitution, voter turnout was 52% for citizens from age 18 to 24, against 68% for citizens older than 25.[12] Ever since then, youth turnout persistently remained lower than turnout for other age groups. By the 2012 Presidential elections, the corresponding figures were 41 and 65%.[13]

The lack of participation in the voting process by young Americans has been the object of increasing attention, especially since low civic engagement in youth tends to lead to

across states. The states with the highest percentage of revenues from property taxes, 50% or more, are Connecticut, Illinois, Massachusetts, Nebraska, New Hampshire, New Jersey, and Rhode Island. Vermont and Hawaii show the lowest percentages, i.e., 0.1 and 0%, respectively. See the National Center for Education Statistics (2015) (nces.ed.gov).

[10]Tuition has risen very rapidly in recent years. Based on the Consumer Price Index, overall prices increased by an annual average of 2.4% between 2001 and 2011, while college tuition and fees grew by an annual average of 6.8% - the highest among all major expenditure categories, including energy (6.6%) and medical care services (4.3%). See The Future of Children (2013) (futureofchildren.org).

[11]In 2012, among OECD countries, the highest turnout rates were in Belgium (87.2%), Turkey (86.4%), and Sweden (82.6%).

[12]In 1970 President Nixon signed an extension of the Voting Rights Act which lowered the voting age from 21 to 18 for all federal, state, and local elections. In 1971 the consequent 26th Amendment to the Constitution, preventing states from denying suffrage to 18-year-olds, won congressional backing and was then ratified by the required majority of the states, to be finally signed into law.

[13]See CIRCLE's tabulations from the CPS November Voting and Registration Supplement, 1972-2012 (civicyouth.org/quick-facts/youth-voting).

permanently limited participation later in life.[14] Several explanations for the persistence of low civic engagement in youth have been advanced. Relevant factors include the limited level of resources available to the young, as well as their inadequate knowledge of voting procedures and mechanisms. Taken together, these factors imply a substantial information cost which is especially high for younger citizens that are approaching the political decision-making process for the first time. Others potential motives are linked to specific features of the U.S. political context, such as the presence of a two-party system that curtails the chances of third-party candidates, who are in turn increasingly supported by young people. The funding system for electoral campaigns, which relies heavily on large donors, also tends to exclude the young. Younger people are also more likely to move frequently for education and employment reasons, which amplifies the difficulty of collecting information and establishing connections that can reduce the cost of voting.[15]

In addition to the aforementioned factors, there is a peculiar feature of the U.S. political system that has been held responsible for low youth turnout: the voting process involves two subsequent steps, since each eligible voter must first register to vote in order to be able to actually cast the ballot. Most states introduced registration laws in the nineteenth century with the purpose of ensuring the integrity of the electoral process by fighting fraud and corruption. In other cases, the purpose was to curb the political power of blacks or immigrants.[16] The voter registration process is regulated by each individual state, with North Dakota currently being the only state that does not require registration. States differ significantly in their rules governing voter registration for matters concerning the deadlines for registration, the proof required to register, or restrictions imposed on registration by private entities. Standard registration procedures typically occur between two and four weeks before each election and are held at the county level.[17] Registration in more than one place at a time is not allowed. Therefore, moving out permanently of the county of legal residence requires a new registration.

The 1965 Voting Rights Act abolished the legal registration prerequisites, involving poll taxes and literacy tests, adopted by Southern states following the abolition of slavery in 1865. Hence, the cost of registration presently involves the effort and time required in order to become familiar with the electoral process, which is especially large for young citizens who show up at the voting stations for the first time. Indeed, many newly eligible voters are unfamiliar with the registration system, including how and where to register

[14] According to Strate, Parrish, Elder, and Ford, (1989), the accumulation of political experience that comes with age leads to increasing levels of civic competence and, in turn, to greater voting participation.

[15] On the demographics of voter turnout, see the classic text by Wolfinger and Rosenstone (1980) and the more recent account by Holbein and Hillygus (2015).

[16] On the introduction of voter registration see, for example, Ansolabehere and Konisky (2006).

[17] On voter eligibility requirements and how to register see USA.gov (usa.gov/register-to-vote).

to vote, so that they can more frequently miss voter registration deadlines. However, while youth voter participation typically lags behind that of older age cohorts, the share of young people who, once registered, do actually vote is quite high (see, e.g., Cherry, 2011). Thus, the correlation between registration and actual voter participation suggests that when given greater opportunities to register, young citizens are actually more likely to vote.[18]

2.3 Voter Registration Reforms in the U.S.

To ease the burden of registration and encourage civic engagement among citizens, particularly those belonging to social groups that typically show lower turnout, several reforms have won largely bipartisan support and have been introduced at different stages at the federal and state level. The *National Voter Registration Act* (NVRA, or Motor Voter Act) is the most extensive federal intervention on the state and local registration systems in history. The act was signed into law by President Clinton in 1993 and became effective in 1995. Although the act was initially proposed in order to regulate only federal elections (under Article I, Section 4 of the Constitution), it effectively changed the registration process for all elections, by removing the inefficiency of maintaining separate voting lists for federal and state elections.[19] The NRVA gives the opportunity to register to any eligible voter at state motor vehicle agencies, as part of the application for or renewal of a driver's license, and at public assistance offices for those requiring public assistance. The effectiveness of the NVRA in increasing voting turnout is still controversial. While Knack (1995) estimates a positive effect of the NVRA on voter turnout, Besley and Case (2003) find no significant effect.

In addition to the NRVA, several other voter registration reforms have been enacted by state governments to promote greater participation of eligible citizens.[20] The three main state legislative interventions are: (i) *Election Day Registration* (EDR), a provision that allows eligible people to register on the same day of the election. Starting with Maine in 1973, twelve states plus the District of Columbia presently offer EDR;[21] (ii) *Online*

[18]The percentages of registered voters under 30 who cast ballots in the 2000, 2004, and 2008 Presidential elections were 74, 82, and 84, respectively. See the 2010 Legislative Brief: Expanding the Youth Electorate through Preregistration (projectvote.org/wp-content/uploads/2010/03).

[19]The NVRA is currently enforced in 44 states and the District of Columbia. Idaho, Maine, Minnesota, New Hampshire, Wisconsin, and Wyoming were exempt from the NVRA because by 1994 they had introduced Election Day Registration. North Dakota was also exempt since it has no registration requirements.

[20]However, since the 2010 midterm election, 22 states have introduced new restrictive voting requirements making it harder to vote, as part of a broader movement to curtail voting rights. See the Brennan Center for Justice (brennancenter.org/sites/default/files/analysis) for details of those restrictive laws.

[21]Beside the District of Columbia, EDR has been implement by California, Colorado, Connecticut, Idaho, Illinois, Iowa, Maine, Minnesota, Montana, New Hampshire, Wisconsin, and Wyoming. Hawaii

Registration, which allows voters to submit their application over the Internet. Starting with Arizona in 2002, thirty states plus the District of Columbia presently offer online registration procedures, while two more states have enacted but not yet implemented them;[22] (iii) *Preregistration*, which enables citizens which are not yet 18 to register, so that they will be already on the registration rolls and automatically ready to vote when they turn 18.[23]

The declared goal of preregistration is to encourage voting among youths. Introducing the *Gateway to Democracy Act* in the House of Representatives in 2004, Congressman Markey appealed for a national preregistration law by declaring:

> *"People need to exercise their right to vote. Unfortunately, young people consistently fail to turn out to the polls on voting day (...). It is in the best interest of the country to make it as easy as possible for the youth of our nation to go to the polls for the first time."*

Although attempts have been made to expand preregistration nationally, preregistration laws remain a state provision.[24] States that have enacted this reform vary in terms of minimum age for registering, ranging from 15-year-old to any time before 18, and the requirement to turn eligible by the next election. Preregistration drives for youths are organized at customary and frequent points of contact such as schools, campuses, or motor vehicle bureaus. Together with implementing preregistration laws, many states have signed bills into laws to promote follow-up voter education and outreach programs in public high schools and college campuses, with the aim of increasing youth civic engagement and, in turn, amplifying the success of the reform. Focusing on Hawaii and Florida, McDonald and Thornburg (2010) show that the effectiveness of preregistration is enhanced in those counties that have coupled it with mandatory high school civics education.[25]

---

and Vermont have enacted EDR but will implement it in 2018 and 2017, respectively. Highton (1997) and Besley and Case (2003) find evidence of an effect of ERD on turnout and, for the latter, on policy responses.

[22]The Brennan Center for Justice (2015) (brennancenter.org/publication/voter-registration-digital-age-2015-update) documents a positive reaction by voters to online registration even though quantitative investigations regarding both its influence on political participation and the associated policy responsiveness are still lacking.

[23]The latest development in registration reforms consists in automatic registration, introduced by Oregon in 2015 together with an opt-out choice. When applying for driver licenses and ID cards, eligible voters will be automatically registered unless they decline. California adopted the same system shortly afterwards. Similar bills have been proposed in several other states and at the federal level.

[24]In 2008 Senator Nelson proposed the Voting Opportunities and Integrity in the *Conduct of Elections Act*, an expansive election reform bill which included provisions and funding for states to adopt preregistration. In 2015 Congressmen Beyer and Ellison proposed the *Preregistration of Voters Everywhere Act* in order to give 16- and 17-year-olds the opportunity to preregister to vote.

[25]The Florida Divisions of Elections Rule 1*S*-2.033, F.A.C. requires supervisors of elections to conduct

Preregistration laws have been introduced in different states in different years. Florida was the first state that implemented preregistration in 1971 by decreasing the age requirement for registration to one year before voting age. In fact, it had allowed registration for youths reaching voting age by the next election even before the introduction of 26th Amendment. In 2007, Florida extended the preregistration option to individuals aged 15 or older and with a driver's license and in 2008 it made it accessible to all 16-year-olds.[26] Like Florida, Hawaii adopted preregistration as early as 1977 but only for youths reaching voting age by the next election and extended it to all individuals older than 16 in 1993. Other states followed suit later, also as a reaction to national campaigns conducted by non-profit organizations (more prominently, FairVote) in order to promote youth civic engagement. Oregon implemented preregistration in 2007, California, North Carolina, and the District of Columbia in 2009, Maryland and Rhode Island in 2010, Delaware and Maine in 2011, Colorado in 2013, Louisiana in 2014, and Utah in 2015. North Carolina later repealed the law in 2013.[27] The timeline of the introduction of preregistration reforms across U.S. states, as of today, is reported in Figure A1 in Appendix A.[28]

A closer look at preregistration states reveals that these states differ along several dimensions. First, they are sparsely located over the entire territory (six are located in the South, five in the West, and two in the Northeast). Second, they present a very different demographic structure: Maine is the state with the oldest population with a median age of 43 while Hawaii, with a median of 33, displays the youngest. Finally, preregistration laws have been enacted both by Democratic and Republican governments (seven over 13 preregistration states had a Democratic governor the year of the enactment of the reform). A feature that instead is common to most states that have implemented preregistration is that this law has been generally enacted by the incumbent governor at his second mandate (this occurred in 11 cases over 13).

outreach activities in each college campus within their county. Supervisors are then required to report their activities to the Florida Department of State. In California two bills, which have recently been signed into law (Assembly Bill 700, 2013; Assembly Bill 1817, 2014), provide avenues through which communities and advocates can work with schools to increase youth voter participation.

[26] McDonald and Thornburg (2010) clarify that the 2007 law was probably meant to fill a gap in the NVRA, since 15-year-olds were able to receive a driver's license with a six-year validity, which would have implied for them the ineffectiveness of the registration option through the NVRA.

[27] In the past few years, several preregistration bills were proposed, but failed to pass, in Arizona, Arkansas, and Connecticut, while legislation is still pending in Illinois.

[28] As in Hawaii before 1993 and Florida before 2007, several other states (such as Massachusetts and Kansas) still apply a milder preregistration option for 17-year-olds conditionally on the fact that they turn 18 by the next election, thus tying eligibility to reaching voting age before the next election. On the other hand, in 2014 California lowered preregistration age to 15. Currently the majority of the preregistration states (Colorado, Delaware, Florida, Hawaii, Louisiana, Maryland, Rhode Island, and Utah, plus the District of Columbia) allow preregistration for youths aged 16, while two (Maine and Oregon) allow it for 17-year-olds and California for 15-year-olds.

3 The Model

In order to motivate the estimation strategy and interpret the results, we provide a simple political economy theory of fiscal policy. The theory illustrates how preregistration laws can affect the allocation of the public budget. The basic structure is that of a jurisdiction, such as a state, populated by citizens who belong to two different age groups: young and old, denoted by $i \in \{y, o\}$. The electoral competition takes place between two candidates: an incumbent and a challenger, denoted by $\kappa \in \{\mathcal{I}, \mathcal{C}\}$, who can commit to a policy platform q_κ in order to maximize the expected utility of being in office.

Candidates and voters move sequentially. First, the incumbent during her tenure decides whether to enact the preregistration law or keep the status quo. Lack of the preregistration law is defined as an electoral advantage of the old-age group. This electoral advantage gives candidates fewer incentives to appeal to young voters and provide public expenditures targeted to them. Second, both candidates announce their political platforms, q_κ, before an idiosyncratic and aggregate shock, which will affect voters' preferences, realize. The realizations of both shocks become known after the political platforms have been announced. Finally, voters observe the announced platforms and cast their ballot. The candidate which gains the largest number of votes wins the election and implements the promised policy platform.

In order to characterize the political economic equilibrium, we proceed by backward induction. We start by analyzing the economic environment. Then, we consider voters' preferences over policies and their aggregation through the political process. Finally, we study the incentives of the incumbent to enact the preregistration law.

3.1 The Economic Environment

There is a unitary mass of j citizens in the society. Different citizens have different wealth levels, indexed by ω_j. The parameter ω_j is drawn from a cohort-specific distribution $F^i(\omega_j)$ on the support $[\underline{\omega}, \overline{\omega}]$. We assume that $F^o(\omega_j)$ has first-order stochastic dominance over $F^y(\omega_j)$ for any ω_j. This assumption implies that the young are on average poorer than the old, i.e., $\widehat{\omega}^y < \widehat{\omega}^o$, reflecting either lower capital or property. Let θ be the fraction of the population that is young and $1-\theta$ be the fraction of the population that is old. Thus, average wealth in the society is $\widehat{\omega} = \theta\widehat{\omega}^y + (1-\theta)\widehat{\omega}^o$.

The intergenerational conflict over the allocation of the public budget is the focal point of the paper. Government uses its fiscal authority to tax wealth at the rate $\tau \in [0, 1]$. The fiscal burden is borne by the whole population. Tax revenues can finance both public education expenditure, $e > 0$, which is targeted to the young-age group, and a political rent, $R > 0$, which the policy maker grabs from being in power. We assume that

governments are prevented from borrowing and lending. Thus, the public sector operates under the following balanced budget constraint:

$$(\tau - D(\tau))\,\widehat{\omega} = \theta e + R \tag{1}$$

with $D(\tau)$ being an aggregate cost that captures the distortions created by taxation, where $D(0) = 0$, $D_\tau > 0$ and $D_{\tau\tau} > 0$. A fiscal policy platform is then a vector $q = (\tau, e, R)$.

The utility of a citizen j who belongs to the young or old cohort is respectively given by:

$$\mathcal{U}^y(q;\omega_j) = (1-\tau)\,\omega_j + \lambda e \tag{2}$$

and

$$\mathcal{U}^o(q;\omega_j) = (1-\tau)\,\omega_j, \tag{3}$$

where $\lambda > 0$ measures the marginal benefit of public education for the young. This formulation is flexible enough to capture, for example, the idea that the amount of education consumed when young affects future income in the amount λe. Education is traditionally seen as a spending item which favors the young, due to its positive effect on future income or human capital, which the old cannot capture. The utility function of the young therefore can be interpreted as a reduced form of a utility function in a two-period model, where agents enjoy present income as well as future income, which increases with the present consumption of education. To keep matters simple, we analyze a static model. The results are however robust to a dynamic extension (see Lancia and Russo, 2016).

3.2 The Political Environment

Government is democratically elected to office through election according to a majority rule. We model electoral competition as a probabilistic voting model à la Lindbeck and Weibull (1987). In this voting model, individuals' voting behavior depends both on how the policy platform q_κ affects voters' utility and shocks. We assume that voters' preferences are affected by two types of shocks: A popularity shock, δ, and a random individual cost of casting the ballot, c_j^i. The parameter δ is an aggregate shock capturing the ex-post average success of candidate $\mathcal{I}$. It is drawn from a uniform distribution on $[-(1/2\psi) + \chi/\psi, (1/2\psi) + \chi/\psi]$ where χ captures the incumbency advantage. Everything else equal, voters prefer candidate $\mathcal{I}$ over $\mathcal{C}$ when $\chi > 0$.[29]

The parameter c_j^i is an individual cost drawn from a cohort-specific uniform distribu-

[29]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).

tion on $\left[\underline{c}, \overline{c}^{i}(\gamma)\right]$ with the parameter γ denoting the resources spent by the incumbent to enact a preregistration law. We assume that $\overline{c}^{y}(\gamma) \geq \overline{c}^{o}(\gamma)$ for any γ with $\partial \overline{c}^{y}(\gamma)/\partial\gamma < 0$ and $\partial \overline{c}^{o}(\gamma)/\partial\gamma = 0$. It implies that young citizens on average sustain a cost of casting a ballot that is higher than for the old, reflecting the idea that newly eligible voters may be unfamiliar with the registration system and must sustain a higher cost to become aware of the election requirements. The enactment of a preregistration law is then interpreted as a reduction in $\overline{c}^{y}(\gamma)$, which increases on average the degree of civic engagement of young citizens.

Formally, a voter j belonging to cohort i supports candidate $\mathcal{I}$ as long as $c_j^i \leq \mathbf{c}_{\mathcal{I}}^{i}(q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j) \equiv \mathcal{U}^{i}(q_{\mathcal{I}}; \omega_j) - \mathcal{U}^{i}(q_{\mathcal{C}}; \omega_j) + \delta$ or candidate $\mathcal{C}$ as long as $c_j^i \leq \mathbf{c}_{\mathcal{C}}^{i}(q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j) \equiv \mathcal{U}^{i}(q_{\mathcal{C}}; \omega_j) - \mathcal{U}^{i}(q_{\mathcal{I}}; \omega_j) - \delta$, while she abstains when $c_j^i > \max\{\mathbf{c}_{\mathcal{I}}^{i}(q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j), \mathbf{c}_{\mathcal{C}}^{i}(q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j)\}$. Therefore, only voters whose benefits from supporting a certain candidate are greater than their cost of voting decide to cast their ballots. The expected voter turnout then is $\pi \equiv \theta \sum_{\kappa} \pi_{\kappa}^{y} + (1-\theta) \sum_{\kappa} \pi_{\kappa}^{o}$ with $\pi_{\kappa}^{y} \equiv \int_{\underline{\omega}}^{\overline{\omega}} \mathbf{c}_{\kappa}^{y}(q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j)\, dF^{y}(\omega_j)$ and $\pi_{\kappa}^{o} \equiv \int_{\underline{\omega}}^{\overline{\omega}} \mathbf{c}_{\kappa}^{o}(q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j)\, dF^{o}(\omega_j)$ being the share of young and old voters, respectively, supporting candidate κ.

In this model of political competition, candidate κ sets a political platform to maximize the expected utility of being in power. Formally, the political objective function of the two candidates are, respectively, as follows:

$$\text{Candidate } \mathcal{I} : p_{\mathcal{I}}(q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma) \cdot (\alpha_{\mathcal{I}} + (1 - \alpha_{\mathcal{I}}) R_{\mathcal{I}}(\gamma)), \tag{4}$$

$$\text{Candidate } \mathcal{C} : p_{\mathcal{C}}(q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma) \cdot (\alpha_{\mathcal{C}} + (1 - \alpha_{\mathcal{C}}) R_{\mathcal{C}}(\gamma)), \tag{5}$$

where $p_{\kappa}(q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma)$ is the probability that candidate κ wins against her opponent by proposing the policy platform q_{κ}. The parameter $\alpha_{\kappa} \in (0, 1)$ captures the degree of opportunism of candidate κ: the larger is α_{κ}, the less rent-seeking or the more welfare-oriented is candidate κ. This can capture the idea that candidates may have different term-limit horizons and career concerns or respond to lobbying efforts of interest groups to different extents.

We now describe the reform process. Let $\mathcal{V}_{\kappa}(\gamma)$ be the indirect utility of candidate κ after solving the maximization programs (4) and (5) simultaneously. During her tenure and before election takes place, the incumbent may decide to modify the status quo. She enacts the preregistration law if and only if her expected payoff when $\gamma > 0$ is strictly larger than her expected payoff when $\gamma = 0$, i.e., $\mathcal{V}_{\mathcal{I}}(\gamma) \geq \mathcal{V}_{\mathcal{I}}(0)$. Clearly, if the candidates share the same degree of opportunism, i.e., $\alpha_{\mathcal{I}} = \alpha_{\mathcal{C}}$, then the incumbent would never implement the law. This is because the benefits from enacting the law would be equally appropriable by the challenger.

3.3 Equilibrium

We now turn to characterizing the equilibrium policy rules.[30]

Proposition 1 *Given γ, an interior political economic equilibrium exists when $\chi \in \left[\underline{\chi}, \overline{\chi}\right]$ and $\lambda > \max\left(\overline{\lambda}_{\mathcal{I}}(\gamma), \overline{\lambda}_{\mathcal{C}}(\gamma)\right)$. The resulting policy platform $\left(q^*_{\mathcal{I}}(\gamma), q^*_{\mathcal{C}}(\gamma)\right)$ is the* arg max *of the political objective functions (4) and (5), subject to the budget constraint (1) and the feasibility conditions for fiscal policies.*

The result of Proposition 1 fundamentally hinges on three tenets that capture the conflicts arising between different groups of interest in the society: (i) a distributional conflict between rich and poor over the size of government; (ii) an intergenerational conflict between young and old over the allocation of the public budget; and (iii) a political conflict between the incumbent and the challenger over the size of the political rent.

The intuition behind candidates' optimal trade-offs between the costs and benefits of public expenditure is straightforward. Candidates must be attentive to the well-being of young and old since individuals in both groups can vote. Young are motivated to support high taxation to finance the provision of public education. The richer among the young, however, are less prone to a larger size of government because, being taxation proportional to income, they face a higher fiscal burden. The old dislike taxes since they reduce private consumption and derive no benefits from them. Candidates, therefore, set taxes in order to balance the marginal benefit of public education for the young against the marginal cost of public funds, which is increasing and convex in the corresponding tax rate.

Furthermore, candidates face an additional trade-off. Although a platform with a higher rent is attractive per se, it also decreases the probability of coming to power. Conditionally on the incumbency advantage, voters in each group do indeed consider candidates as substitute and punish the rent-seeking candidate by immediately shifting their vote. Thus, the candidates grab an amount of public resources such that the return on an additional unit of political rent equates the return of public spending in terms of a larger share of supporting voters. In summary, candidates propose an equilibrium policy platform $q^*_\kappa(\gamma)$ in order to address the economic needs of their constituencies as well as their political needs.[31]

[30] The levels of $\underline{\chi}$, $\overline{\chi}$, $\overline{\lambda}_{\mathcal{I}}(\gamma)$, and $\overline{\lambda}_{\mathcal{C}}(\gamma)$ are defined in the proof of Proposition 1 in Appendix B.

[31] The parameter χ cannot be larger than a threshold level $\overline{\chi}$, otherwise candidate $\mathcal{C}$ must commit to a negative political rent in order to win the election. Similarly, the incumbency advantage cannot be smaller than a threshold level $\underline{\chi}$, otherwise candidate $\mathcal{I}$ wins the election only by promising a negative political rent. Moreover, the parameter λ must be sufficiently large, i.e., $\lambda > \max\left(\overline{\lambda}_{\mathcal{I}}(\gamma), \overline{\lambda}_{\mathcal{C}}(\gamma)\right)$,

Having characterized a political economic equilibrium, we now turn to studying the reform process. Apart from their ex-ante advantages of winning the election, candidates differ in their degree of political opportunism. The following proposition shows that the incumbent enacts a preregistration law when her degree of political opportunism is sufficiently lower compared to the one of the challenger, for example, because she is in his last mandate and has stronger career concerns or because powerful groups of interest reduce her motivation for extracting a large political rent.

Proposition 2 *Candidate $\mathcal{I}$ enacts a preregistration reform when $\alpha_{\mathcal{I}} > \tilde{\alpha}_{\mathcal{I}}$ with $\tilde{\alpha}_{\mathcal{I}} \in (\alpha_{\mathcal{C}}, 1)$. In this case, the equilibrium policy platform is $\tau^*_{\mathcal{I}}(\gamma) = \tau^*_{\mathcal{C}}(\gamma)$, $e^*_{\mathcal{I}}(\gamma) > e^*_{\mathcal{C}}(\gamma)$, $R^*_{\mathcal{I}}(\gamma) < R^*_{\mathcal{C}}(\gamma)$, and the equilibrium probabilities of winning the elections are $p^*_{\mathcal{I}}(\gamma) > p^*_{\mathcal{C}}(\gamma)$.*

The intuition of Proposition 2 is simple.[32] When the incumbent is less rent-seeking than his opponent, she can commit to allocate a larger share of public budget to finance public education targeted to the young-age group, as compared to the challenger. Then she enacts a preregistration law in order to increase the share of new registered voters that belong to the pool of young eligible citizens and, in turn, increase the probability of winning the election.

What does our model predict about the effects of a preregistration law on political participation and fiscal expenditures? The following proposition describes the main effect of the voting reform on these variables, where $e^*(\gamma) = p^*_{\mathcal{I}}(\gamma)\, e^*_{\mathcal{I}}(\gamma) + p^*_{\mathcal{C}}(\gamma)\, e^*_{\mathcal{C}}(\gamma)$ denotes the expected public education expenditure.

Proposition 3 *Consider the case of $\alpha_{\mathcal{I}} > \tilde{\alpha}_{\mathcal{I}}$. The following comparative statics results then hold:*

1 *If $\overline{c}^y(\gamma)$ decreases, then the political participation of the young, π^y, increases, while leaving π^o unaltered;*

2 *If $\overline{c}^y(\gamma)/\overline{c}^o(\gamma)$ decreases, then the expected public education expenditure, $e^*(\gamma)$, increases;*

2.*a* *The stronger is political competition, i.e., the lower is χ, or the higher is inequality, i.e., the lower is $\widehat{\omega}^y/\widehat{\omega}$, the stronger is the impact of preregistration law on $e^*(\gamma)$;*

in order to guarantee a positive amount of education expenditure in equilibrium. Otherwise, if $\lambda \leq \max\left(\overline{\lambda}_{\mathcal{I}}(\gamma), \overline{\lambda}_{\mathcal{C}}(\gamma)\right)$, then at least one of the two candidates does not provide public education and uses the entire budget to finance the political rent.

[32] A complete characterization of $\tilde{\alpha}_{\mathcal{I}}$ is reported in the proof of Proposition 2 in Appendix B.

2.*b* *The larger is the share of young, i.e., the higher is θ, the stronger is the impact of political competition on the effect of preregistration laws on $e^*(\gamma)$.*

Proposition 3 provides a set of testable empirical predictions. As $\overline{c}^y(\gamma)$ drops, as implied by the enactment of a preregistration law with $\gamma > 0$, π^y as well as $e^*(\gamma)$ increase: A lower cost of voting born by the young leads to a stronger civic engagement of individuals belonging to this voting age group, who decide to both register and vote in larger numbers. This, in turns, generates a de facto enfranchisement episode. Candidates respond to the larger participation of young voters by addressing their economic needs more and sacrificing their political rents. Therefore, larger public education expenditure is associated with larger political participation of young voters (Parts 1 and 2 of Proposition 3).

As $\widehat{\omega}^y$ drops relatively to $\widehat{\omega}^o$, $e^*(\gamma)$ reacts more to a lower $\overline{c}^y(\gamma)$: A relatively poorer young prefers a larger provision of public spending compared to a richer young when taxes generate a deadweight loss, which implies a stronger responsiveness of candidates to preregistration laws when the gap between average wealth of young and old voters increases. Moreover, the lower is the political advantage of the incumbent, the more exacerbated is the impact of the electoral reform on education provisions (Part 2.a of Proposition 3). Finally, political responsiveness to a reduction of $\overline{c}^y(\gamma)$ is stronger where political competition is tighter in the presence of a larger share of young voters. Indeed, young voters are more likely to be pivotal in the presence of a smaller margin of victory between the two competing parties (Part 2.b of Proposition 3).

4 Preregistration and Education Expenditure

4.1 Data

In this section we focus on the empirical impact of preregistration on government spending at the state level, with the goal of establishing a causal link. Annual financial data on the activity of local and state governments are provided by the Annual Surveys of State and Local Government Finances for the period 1977-2013. The population of interest for this survey contains the 50 state governments and 89,004 local governments (including counties, municipalities, townships, special districts, and school districts). We merge these data with information we collected from various sources regarding the timing of the implementation of the relevant voter registration reforms across U.S. states and with a number of other political and socio-economic political variables at the state level. Appendix C provides details on variable definitions and sources.

Summary statistics for our data are provided in Table A1 in Appendix A. We first present information on the registration laws in place in different states in different years

within the 1977-2013 sample under consideration. Preregistration, which by 2013 had been introduced in ten states, is present in 3% of the sample.[33] Online Registration, EDR and the NVRA are present in 3, 10, and 45% of the sample, respectively. The second set of variables refer to state level political characteristics. The governor is an incumbent (i.e., now at her second term) in 64% of the sample. On average the governor is running again and belongs to the Democratic party in 45 and 53% of the sample, respectively while, at the national level, the President belongs to the Democratic party in 46% of the sample. We also report statistics on the voting margin and gubernatorial turnout rate. The third set reports state level, per capita fiscal variables (at constant 2013 U.S. dollars). Our focus is on public education expenditure. Real per capita direct education expenditure is equal on average to $732 per year, which represents over 13% of total state and local government revenues. Education expenditure is classified by character, as current vs. capital outlays, and by function, as elementary and secondary vs. higher education. Disentangling education expenditure shows that on average almost 79% of education expenditure is allocated to higher education rather than elementary and secondary education combined, and that almost 84% is represented by its current component, rather than capital outlays. In other words, the current, higher education component, at $512, represents the larger share, while average elementary and secondary education expenditure is only $46. The table reports statistics also for other relevant outlays including public welfare, unemployment compensation, health, assistance and subsidies. Total state tax revenue reflects state and local taxes and charges, including the local property tax, and average out to $2.296 per capita per year. The outstanding level of state debt and total federal intergovernmental revenue are also reported. The fourth set of variables in Table A1 are meant to capture the socio-economic background of each state including, among others, the share of young in the population (21% on average for the age 16-25 share), post-secondary enrolment and secondary attainment, black and white shares, income, inequality, and unemployment.

4.2 Empirical Strategy and Identification Issues

In order to evaluate the effect of preregistration we compare states which at different stages have implemented preregistration with states which have never implemented it. Since preregistration laws have been introduced in different states in different years, these

[33]The ten preregistraton states in the sample are California, Colorado, Delaware, Florida, Hawaii, Maine, Maryland, North Carolina, Oregon, and Rhode Island. The District of Columbia also had preregistration but it is not in the sample since it is not covered by the financial data. We do not count as preregistration the "conditional preregistration" option, which allows preregistration for 17-year-olds conditionally on the fact that they turn 18 by the next election, thus tying eligibility to reaching voting age before the next election.

events have generated enough variation across space and time in the exposure of young voters to the new electoral reforms. Therefore the theoretical conjecture stemming from our model can be tested using a difference-in-differences regression design. Formally, the empirical model to be tested can be spelled out as follows:

$$Edu_{s,t} = \delta_s + \delta_s \cdot t + \delta_y + \beta \cdot Preg_{s,t} + \pi \cdot X_{s,t} + \varepsilon_{s,t}$$

where $Edu_{s,t}$ is real per capita education expenditure in state s in year t; δ_s denotes state fixed effects; $\delta_s \cdot t$ represents state linear time trends; δ_y denotes year fixed effects; $Preg_{s,t}$ is a dummy variable which takes value 1 if a given state s has adopted preregistration in a given year t; $X_{s,t}$ are individual time varying state characteristics; and $\varepsilon_{s,t}$ is the error term which we cluster at the state level to capture serial correlation within states.[34] State fixed effects can account for permanent characteristics of the state such as persistent electoral and fiscal institutions, social norms, or other historical factors. Year fixed effects can control for the business cycle and other macroeconomic transitory shocks. State linear time trends can capture differences in time trend across states. The vector $X_{s,t}$ includes potential confounders reflecting the political and socio-economic characteristics listed in Table A1. Therefore fixed differences across states, common shocks varying nonlinearly over time (such as the 2008 financial crisis), observable confounding variables, and state-specific differences that vary linearly over time are all purged from the estimated effect of preregistration. As a result β should capture trend breaks in the outcomes of interest that coincide precisely with the timing of its implementation.

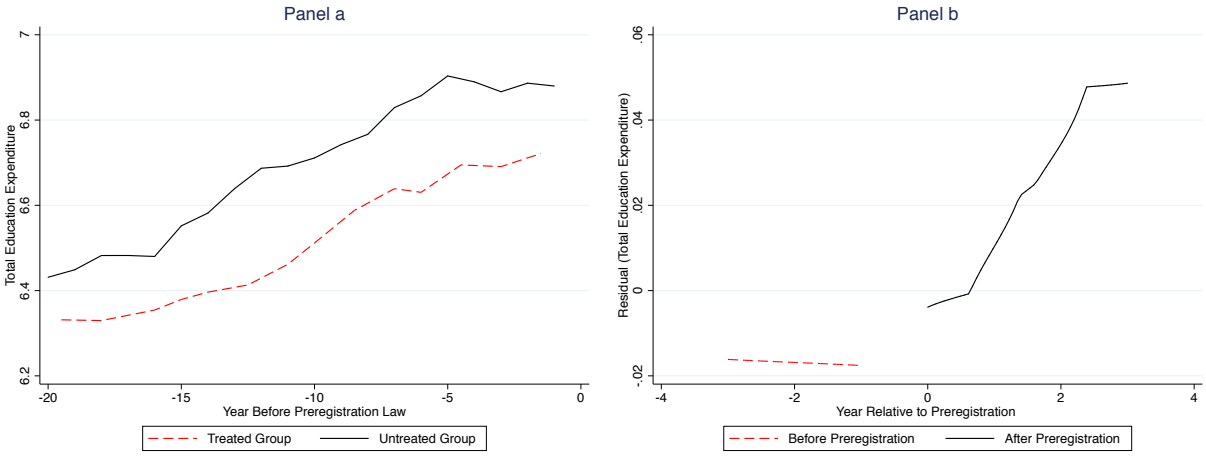


Figure 1: Parallel Trend (Panel a) and Residuals from Regressing Education Expenditure against Fixed Effects (Panel b)

The fact that the timing of preregistration laws varies quite significantly across treated

[34] Kèzdi (2004) shows that 50 clusters (with roughly equal cluster sizes) is often close enough to infinity for accurate inference.

states should strengthen our approach. However there are still potential threats to identification. The first arises in the presence of pre-treatment differences between the trends observed for the treated and the control group, i.e., when the parallel trends assumption is violated. Figure 1 (Panel a) shows the trend in education expenditure before the adoption of preregistration. The year of adoption is normalized to zero to account for differences in its timing. The figure shows quite clearly that before the introduction of the treatment there is no significant difference in trends for the treated and the control group, which reassures us about the validity of the parallel trends assumption.

A second potential threat to identification comes from potential selection into treatment. Table 1 reports differences in mean between the treated and the untreated group for the pre-treatment period. Reassuringly, across a large number of fiscal, political, and socio-economic dimensions, starting with education expenditure, differences in mean between the two groups are not statistically significant, which is consistent with the hypothesis of absence of selection bias. The only significant difference is related to the fact that preregistration bills are more likely to be passed in states with a history of Democratic governors (although it is not necessarily the case that the governor introducing the reform is Democratic).

A further threat to identification may come from mean reversion at the onset of the preregistration reform (i.e., an Ashenfelter Dip). Therefore, we need to check for shocks to education expenditure that may have hit the treated group just before the adoption of preregistration. Figure 1 (Panel b) shows the residuals from estimating our empirical model without the control for preregistration for the three years preceding and following the enactment of the reform (where the enactment year in each state is defined as year zero). The idea is that any shock affecting education expenditure just before preregistration should show in a systematic pattern in the residuals. If residuals do not show any considerable change before preregistration, then the probability of shocks occurring at the same time as registration should be minimal. Any systematic pattern should emerge soon after preregistration given that residuals should be affected by this omitted variable. Consistent with the hypothesis the figure shows no significant relative increase or decrease in education expenditure prior to preregistration followed by a sharp increase that coincides precisely with the enactment of the new laws. We can therefore conclude that shocks occurring approximately at the same time of preregistration should be unlikely.

4.3 Results

To examine changes in education expenditure at the state level throughout the period 1977-2013 we estimate variants of our empirical model with total expenditure in education

Table 1: Test of Equality of Means in Treated and Untreated Group

	Full Sample		Untreated Group		Treated Group		Difference
	Obs.	Mean	Obs.	Mean	Obs.	Mean	(P-values)
Fiscal Variables (per capita at constant 2013 US dollars)							
Total Education Expenditure	1850	731.60	1480	714.21	310	693.94	20.26
		(339.01)		(1470.11)		(1366.67)	(0.82)
Public Welfare Expenditure	1850	894.15	1480	891	310	814.94	76.07
		(473.45)		(1387.93)		(1297.95)	(0.36)
Health Expenditure	1850	122.84	1480	113.13	310	142.66	-29.53
		(83.74)		(318.17)		(296.21)	(0.12)
Total Assistance and Subsidies	1800	130.46	1440	129.7	310	131.45	-1.75
		(69.24)		(339.79)		(320.19)	(0.93)
Unemployment Compensation Expenditure	1850	163.63	1480	160.11	310	155.73	4.39
		(118.34)		(452.62)		(421.6)	(0.87)
Total Tax Revenue	1850	2295.56	1480	2269.52	310	2284.85	-15.33
		(955.35)		(4312.41)		(4011.87)	(0.95)
Total Debt Outstanding	1800	2962.39	1440	2801.22	310	3417.16	-615.93
		(2519.85)		(13239.81)		(12471.21)	(0.44)
Total Federal Intergovernmental Revenue	1800	1241.51	1440	1256.28	310	1103.13	153.15
		(581.44)		(2290.36)		(2161.4)	(0.27)
Electoral Variables							
Incumbent	1769	0.64	1413	0.62	296	0.7	-0.08
		(0.48)		(0.91)		(0.86)	(0.17)
Democratic Governor	1827	0.53	1467	0.5	300	0.65	-0.15**
		(0.50)		(1.06)		(0.99)	(0.02)
Political Competition	1741	16.09	1394	16.08	287	17.3	-1.22
		(13.42)		(28.32)		(26.6)	(0.49)
Gubernatorial Turnout Rate	1592	0.46	1276	0.45	256	0.47	-0.01
		(0.10)		(0.51)		(0.46)	(0.66)
Socio-economic Variables							
Median Age	1850	33.42	1480	33.24	310	33.46	-0.22
		(3.43)		(10.39)		(9.71)	(0.72)
Post-secondary Enrolment (in thousands)	1850	301.04	1480	273.48	310	395.85	-122.37
		(360.80)		(2022.26)		(1979.07)	(0.31)
Education Attainment (High School Diploma)	1850	0.58	1480	0.58	310	0.58	0.00
		(0.07)		(0.21)		(0.2)	(0.78)
Personal Income	1850	24255.76	1480	23963.62	310	22804.35	1159.27
		(11715.73)		(21338.77)		(20241.11)	(0.37)
Inequality (Theil Index)	1850	0.66	1480	0.66	310	0.65	0.01
		(0.23)		(0.75)		(0.7)	(0.77)
Unemployment Rate	1850	6.07	1480	6.08	310	5.81	0.27
		(2.09)		(6.95)		(6.49)	(0.51)

Note: Standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.

per capita at constant prices as the dependent variable. Because the dependent variable is in logarithmic form, the coefficient estimates can be interpreted roughly as percentage changes.[35] The variable of interest is the dummy for whether the state has adopted pre-

[35]We take the log of $(1 + x)$ in order to retain observations for which expenditure x is equal to zero. This will occur mainly for elementary and secondary education expenditure.

registration, which enters the model together with other observable confounding variables which in some way may impact on the estimated effect.[36]

Table 2: Preregistration and Education Expenditure

	Total Education Expenditure		
	(1)	(2)	(3)
Preregistration	0.062***	0.023	0.055***
	(0.020)	(0.020)	(0.015)
L(1)Preregistration		0.026	
		(0.016)	
L(2)Preregistration		0.059***	
		(0.015)	
F(1)Preregistration			-0.012
			(0.018)
F(2)Preregistration			0.002
			(0.016)
State Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes
R-squared	0.975	0.975	0.975
Observations	1508	1508	1459

Note: State level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for: 1) Registration Reforms: Online Registration, Election Day Registration, NVRA; 2) Electoral variables: Dummies for gubernatorial election year and years to the next gubernatorial election, Incumbent, Year of Mandate, Governor Runs Next Elections, Democratic Governor, Democratic President, Democratic Governor and President, Political Competition, Gubernatorial Turnout Rate; 3) Fiscal variables: Total Tax Revenue, Total Debt Outstanding, Total Federal Intergovernmental Revenue; 4) Socio-economic variables: Population, Median Age, Share of 16-25, Post-secondary Enrolment, Education Attainment, Share of Blacks, Share of Whites, Personal Income, Inequality, Unemployment Rate.

Table 2 reports estimates. As controls we enter all the state level variables listed in Table A1, including the dummies for the other registration reforms. In particular, we control for potential confounders, such as post-secondary enrolment and secondary attainment, as well as fiscal variables, which may affect education expenditure through other channels, other than the ease of voter registration. In Model 1 we test for a direct effect of preregistration on total per capita education expenditure and we find a significant and positive coefficient indicating an over 6% increase in education expenditure for states which at some point have adopted preregistration. At the mean, this percentage increase corresponds to an increase of about $40 per capita in education expenditure. If an equivalent increase were fully financed by a raise in the income tax, it would require an

[36]Preliminarily we test the potential effect on education expenditure of other registration reforms which were not specifically targeted to young voters and may have therefore reduced the cost of registration for all age groups. Table A2 shows that the introduction of the NRVA, EDR, and Online Registration exerts no influence on the dependent variable. This is consistent with our theoretical prediction, according to which education expenditure should be affected only when a reform alters the cost for the young relative to the old.

average raise of 0.16 in the income tax rate (evaluated at mean income over the period 1977-2013).[37] In Model 2 we include lags in order to evaluate an incremental effect over time. The change in education expenditure increases over time. In the year in which preregistration is implemented the increase in education expenditure is equal to 2% but not significant. One year after implementation the effect increases to 2.6% but is not significant, while two years later it is close to 6% and significant at a 1% level. This lagged impact is reasonable since preregistration laws influence the participation costs of the young, who may turn out at the elections one or two years later. In Model 3 we control for leads to test for potential changes in education expenditure which precede preregistration, which would question the hypothesis of a causal relationship running from preregistration to education expenditure. Reassuringly we do not find any significant effects.[38]

Figure A2 (Panel a) in Appendix A shows predicted changes in education expenditure for the treated and untreated groups. The solid line represents the predicted change in the absence of preregistration while the dashed line depicts the predicted change in the presence of preregistration. The plot to the left shows that education expenditure for the treated group increases starting from 2007, when Florida and Oregon implement preregistration, followed by several other states.[39]

While so far we have focused on education expenditure since it is more likely to affect the youths directly, we also check the potential impact of preregistration reforms on other types of public finance variables at the state and local level. Table 3 presents results for public welfare, health, assistance and subsidies, and unemployment compensation, and shows that preregistration does not significantly affect any other items other than education, even though the sign of the coefficients suggests a reshuffling in the allocation of the public budget from those kinds of expenditures to education financing.

4.4 Decomposing the Education Budget

While the above results indicate that preregistration laws shift state level government spending toward education, state and local education expenditure include different com-

[37]The increase in the income tax would be smaller than 0.1% if evaluated at mean income after 2007.

[38]In Table A3 we perform a falsification test by changing the date of adoption of preregistration to a random date and we do not find any effects.

[39]Since Hawaii and Florida have considerably different history with respect to the implementation of preregistration, in Figure A2 (Panel b) we show that its effect is even more pronounced if we drop them from the sample. In Table A4 we perform further robustness checks to test whether the effect is determined by these two states. We first drop Hawaii from the sample, then Florida, then both. Finally we change the year of implementation for Florida setting it in 1971, when the state decreased the age requirement for registration to one year before voting age. Consistent with Figure A2 (Panel b), the coefficient always remains highly significant and close in size to the one reported in Table 2.

Table 3: Preregistration and Other Expenditures

	Other Expenditures			
	Public Welfare	Health Exp.	Assist. and Subs.	Unemp. Comp.
	(1)	(2)	(3)	(4)
Preregistration	-0.015	-0.122	0.012	-0.047
	(0.045)	(0.106)	(0.086)	(0.087)
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes	Yes
R-squared	0.965	0.894	0.860	0.929
Observations	1508	1508	1508	1508

Note: State level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for: 1) Registration Reforms: Online Registration, Election Day Registration, NVRA; 2) Electoral variables: Dummies for gubernatorial election year and years to the next gubernatorial election, Incumbent, Year of Mandate, Governor Runs Next Elections, Democratic Governor, Democratic President, Democratic Governor and President, Political Competition, Gubernatorial Turnout Rate; 3) Fiscal variables: Total Tax Revenue, Total Debt Outstanding, Total Federal Intergovernmental Revenue; 4) Socio-economic variables: Population, Median Age, Share of 16-25, Post-secondary Enrolment, Education Attainment, Share of Blacks, Share of Whites, Personal Income, Inequality, Unemployment Rate.

ponents which may be affected more or less strongly by the implementation of the reform.

Table 4 disentangles education expenditure by function and character. In Models 1 and 2 we divide education expenditure by function, i.e., we distinguish between elementary and secondary school expenditure vs. higher education expenditure, to show that the effect of preregistration on education expenditure runs entirely through its effect on higher education, that is, the kind of education expenditure which directly benefits voters who are currently in their youth. In Model 1 the coefficient of preregistration on elementary and secondary education is statistically insignificant, consistent with the facts that it is mainly financed through the local property tax and that it represents a small share of total education expenditure. In Model 2 we find an average increase in higher education expenditure equal to 5.6% for states which adopt preregistration.[40] In the following models we disentangle education expenditure by character. In Models 3 and 4 we distinguish between current and capital outlays. The effect of preregistration we previously highlighted mainly runs through the current component (a marginally significant effect, at a 10% level, is also present for capital outlays). Given that the effect of preregistration is only on higher education in Models 5 and 6 we divide higher education expenditure between the current and capital component, to find that only the current component is significantly affected by preregistration, with a coefficient equal to 5.2% which is in line with previous findings. To sum up, preregistration predominantly affects education expenditure through current higher education outlays, those that immediately

[40]The effect of preregistration on residual and non classified education expenditure (NEC) is not significant and not reported for brevity.

Table 4: Preregistration and Education Expenditure by Function and Character

	Education by Function		Education by Character			
	Elem. and Sec.	Higher Ed.	Total Cur.	Total Cap.	Higher Cur.	Higher Cap.
	(1)	(2)	(3)	(4)	(5)	(6)
Preregistration	-0.273	0.056**	0.054**	0.180*	0.052**	0.128
	(0.217)	(0.025)	(0.022)	(0.096)	(0.026)	(0.097)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.843	0.967	0.978	0.699	0.974	0.618
Observations	1508	1508	1508	1508	1508	1508

Note: State level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for: 1) Registration Reforms: Online Registration, Election Day Registration, NVRA; 2) Electoral variables: Dummies for gubernatorial election year and years to the next gubernatorial election, Incumbent, Year of Mandate, Governor Runs Next Elections, Democratic Governor, Democratic President, Democratic Governor and President, Political Competition, Gubernatorial Turnout Rate; 3) Fiscal variables: Total Tax Revenue, Total Debt Outstanding, Total Federal Intergovernmental Revenue; 4) Socio-economic variables: Population, Median Age, Share of 16-25, Post-secondary Enrolment, Education Attainment, Share of Blacks, Share of Whites, Personal Income, Inequality, Unemployment Rate.

affect the prospects of young voters who are about to enroll or are already enrolled in college.

4.5 Heterogeneous Effects

The comparative statics of our theoretical model point to additional predictions which we test in Table 5, by exploring the heterogeneity of the preregistration effect through a series of interactions.

Model 1 shows that the effect of preregistration on education expenditure is larger in states where inequality is larger, i.e., in states where there is a relatively larger share of poor youths that need financial support in order to attend college. The share of individuals aged 16-25 in the voting age population, i.e., the potential target for higher education policies, does not exert any significant influence per se (Model 2). A significant influence (at a 10% level) emerges in Model 3 for the measure of political competition represented by the voting margin, i.e., the difference in the vote share between Democrats and Republicans. Moreover, when in Model 4 we interact preregistration both with the share of young and the voting margin, in order to understand whether the young can play the role of swing voters conditional on the voting margin, we also find a significant positive effect for this triple interaction. This suggests that a smaller voting margin increases the effect of preregistration on education expenditure and that, conditional on the voting margin, the effect of preregistration is particularly large in states where the share of young voters is larger. In other words, evaluated at the mean voting margin

Table 5: Preregistration and Education Expenditure - Heterogeneity of the Effect

	Total Education Expenditure								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Prereg · Inequality	0.177**								
	(0.075)								
Prereg · Share of 16-25		1.401		-0.814					
		(1.070)		(1.776)					
Prereg · Political Competition			0.001*	-0.053*					
			(0.001)	(0.030)					
Prereg · Political Competition · Share of 16-25				0.294*					
				(0.162)					
Prereg · Year of Election					0.000				
					(0.016)				
Prereg · First Year of Mandate						-0.015			
						(0.016)			
Prereg · Second Year of Mandate							0.011		
							(0.015)		
Prereg · Third Year of Mandate								0.005	
								(0.017)	
Prereg · Post-First Election Period									0.062***
									(0.020)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Time Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975	0.975
Observations	1508	1508	1508	1508	1508	1508	1508	1508	1508

Note: State level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for: 1) Registration Reforms: Online Registration, Election Day Registration, NVRA; 2) Electoral variables: Dummies for gubernatorial election year and years to the next gubernatorial election, Incumbent, Year of Mandate, Governor Runs Next Elections, Democratic Governor, Democratic President, Democratic Governor and President, Political Competition, Gubernatorial Turnout Rate; 3) Fiscal variables: Total Tax Revenue, Total Debt Outstanding, Total Federal Intergovernmental Revenue; 4) Socio-economic variables: Population, Median Age, Share of 16-25, Post-secondary Enrolment, Education Attainment, Share of Blacks, Share of Whites, Personal Income, Inequality, Unemployment Rate.

the change in education expenditure associated with preregistration, when the share of the young who are eligible to register increases by one standard deviation, is close to a further 1%. Consistent with the political economy model, this implies that young voters are more likely to become decisive in the presence of a small margin between the main political parties. In the next set of models (Models 5-8) we test for the presence of a political cycle.[41] We interact preregistration with the year of election, and with the first, second, and third year of mandate of the governor, to find no statistically significant evidence of a sort of political cycle. In Model 9 we interact preregistration with a dummy variable capturing the period following the first election after the introduction of preregistration. The coefficient, 6.2%, is identical to the coefficient of preregistration in Model 1 of Table 2, which confirms that the whole effect of preregistration on education expenditure manifests itself after the actual implementation of the reform. This is again consistent with the political economy model, where turnout is identified as the channel of transmission between the reform and the outcome of interest.[42]

[41] While a dynamic analysis of policy choices is beyond the scope of the present political economy model, we refer to Besley and Case (1995) for a reputation-based political model and evidence on the relationship between gubernatorial term limits and policy decisions. For policy convergence in a two-party system see Alesina (1988).

[42] We also explore additional sources of heterogeneity: for instance the share of blacks, the fact that

5 Preregistration and College Level Financial Aid

5.1 Data

To complement previous results on the impact of preregistration on education outcomes, in this section we rely on an alternative dataset and identification strategy. We use micro-level data at an education institution level to test whether predictions for the provider of funding, i.e., a state, are mirrored by results from a receiver, i.e., a higher education institution, viewpoint. To this end we employ the Integrated Postsecondary Education Data System (IPEDS), which provides data on individual higher education institutions. Using information on the location by county of the latter, we can compare county pairs belonging to states that differ about having adopted preregistration laws.

From the academic years 1987-1988 through 2011-2012, IPEDS reports student financial aid, enrolment, and institutional and financial characteristics for U.S. colleges, universities, and technical and vocational institutions, both public and private, for profit and not for profit. We focus on the sample from 2002 to 2012. Appendix C provides details on variable definitions and sources.

Summary statistics for our IPEDS sample are presented in Table A5 in Appendix A. Student financial aid includes three components, i.e., state, institutional, and federal (Pell) grants. They represent respectively 16, 15, and 60% of the total. Receivers represent respectively about 25, 30, and 50% out of the total number of full time first time degree seekers.[43] Almost 95% of the enrolment consists of residents of a state. Information is provided also on enrolment by race, the nature of the institutions along several dimensions, among which their qualitative ranking in the Carnegie Classification, the levels of the degrees being offered, and the public vs. private nature of control. We also report information on the structure of tuition.

5.2 Empirical Strategy

When estimating the effect of preregistration on education institutions funding using a difference-in-differences approach, where we exploit variation over time and across states, problems can arise because of the relatively large degree of heterogeneity across institutions. As a result institutions in the untreated group may not represent a good control for institutions which have been treated. For this reason rather than using the entire sample of education institutions we focus on institutions located in neighboring counties

the governor is a Democrat, and the fact that both the governor and the president are Democrat: results are not reported for brevity since are never significant.

[43] Percentages do not add up to 100% since the number of observations differs.

that belong to different states. In particular, we are interested in comparing county pairs belonging to states that differ about having adopted preregistration laws, as illustrated by Figure A3, where shaded areas represent border counties and a darker shade indicates counties located in preregistration states.[44] To be noticed is that counties can belong to multiple pairs. The assumption underlying our identification strategy is that institutions which are geographically close are much more likely to be similar than any two random institutions, because of the presence of spillover effects and much tougher competition between neighboring institutions, which should make two institutions more comparable. As a result this approach should therefore minimize several sources of bias.[45]

In order to have a general idea of whether our identification assumption is corroborated by the data in Table A6 over the full sample of counties we test whether there are characteristics which tend to vary between education institutions with their distance from the border, where the latter is a proxy of the distance between institutions. In Table A7 we use instead the sample of adjacent counties to test whether there are significant differences in characteristics between treated and untreated institutions. The two tables together show that several dimensions, including institutional characteristics but also income per capita, do change as border distance is amplified, while no significant differences emerge for counties at the border. Since our county pairs estimator is based on the assumption that neighboring institutions should be comparable, these results corroborate our identification strategy.

Given that this initial evidence does support our hypothesis the county pairs model to be estimated can be written as follows:

$$G_{i,j,s,t} = \delta_s + \delta_{p_{i(j)t}} + \beta \cdot Preg_{s,t} + \pi \cdot X_{i,j,s,t} + \lambda \cdot Z_{j,i,s,t} + \varepsilon_{p_{i(j)st}}$$

where $G_{i,j,s,t}$ represents the outcome of interest for an education institution in a county i in state s and time t, which is matched with an institution in an adjacent county j in a different state. The term δ_s denotes state fixed effects. The key to identification is given by the term $\delta_{p_{i(j)t}}$, which captures adjacent counties fixed year effects, i.e., all possible spatially distributed shocks which may affect neighboring institutions. $X_{i,j,s,t}$ are institutional individual controls and $Z_{j,i,s,t}$ are individual controls for the average institution in the matched county. The inclusion of individual controls in the matched county should account for local shocks which may only affect a potentially different institutions in the matched county. The error is doubly clustered at a state and county pair level.

[44] Hawaii, a preregistration state, is not portrayed since it does not share any border.

[45] A county pair identification strategy has been used among others by Dube, Lester, and Reich (2010) and Naidu (2012).

From a more general point of view the estimator we propose controls for spatially distributed yearly shocks which may affect adjacent counties (e.g., cross border movements of students) and for local shocks which may affect the neighboring education institution. For instance, assuming that state grants depend on the quality of the institution, number of students, ethnic minority representation, etc., if there is a shock in the neighboring institution which affects one of these features, failure to control for these effects may lead to biased estimates. Individual characteristics of institutions in matching counties are introduced in order to avoid such sources of bias.

Of course there are drawbacks to this approach. In particular, the estimator is based on the assumption that there are spillover and competition effects across neighboring institutions which make them quite similar. If this assumption is violated then untreated institutions in adjacent counties may not represent a good control for treated ones, but our results in Tables A6 and A7 do support its validity. Finally, beside local and geographically distributed shocks, there may be other specific individual shocks, correlated with preregistration and state grants, which we have not controlled for and which may still affect estimates. We shall address this concern through a number of robustness checks.

5.3 Results

In Table 6 we present results from difference-in-differences estimates over the county pairs sample. The three dependent variables are proxies for the relevance of state grants. In Model 1 we enter the fraction of state grants over total student financial aid, in Model 2 the number of receivers of state grants, and in Model 3 the fraction of state grants receivers over the total number of grant receivers.

After controlling for a large number of institutional and socio-economic characteristics, in Model 1 we observe a large and significant impact of preregistration on the fraction of state grants, with a coefficient equal to 3.2%.[46] For the same source of funding, the number of recipients increases by 30% and the fraction of recipients over full time first time degree seekers by 6%. In other words, the fraction of state grant recipients is 6% larger in an institution located in a preregistration state if compared with an institution in a county adjacent to the first one but located in a state without preregistration. The effect of preregistration is therefore highly significant, both economically and statistically.[47]

[46]Information on SAT scores are not included among controls because of the limited number of observations.

[47]In Table A8 we check the robustness of the main findings in Table 6 to an alternative specification (similar to Dube, Lester, and Reich, 2010) where we replace state fixed effects with county fixed effects. Results are largely confirmed, which is not surprising given that the sample is confined to adjacent counties on state borders.

Table 6: Preregistration and State Grants

	% State Grants	Receivers	% Receivers
	(1)	(2)	(3)
Preregistration	0.032***	0.300**	6.063**
	(0.011)	(0.144)	(2.727)
State Fixed Effects	Yes	Yes	Yes
County-Pairs Year Effects	Yes	Yes	Yes
R-squared	0.449	0.749	0.425
Observations	14018	16892	16699

Note: State and county level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%. All regressions control for: 1) Education Institutions Variables: Total, Female, and Male Applications, Full Time and Non Resident Enrolment, White, Hispanic, Black, Asian, and American Indian Enrolment, Carnegie Classification, Institutional Control, Level, and Sector, Medical Degree, Land Grant, and Hispanic Serving Institution, Historically Black College, Tuition Reliance, Total Expenditures, In-State and Out-of-State Tuition; 2) Socio-economic variables: Population, Personal Income.

For the sake of comparison, in Table A9 we present results from a standard difference-in-differences model where we compare all education institutions located in all counties in preregistration and no-preregistration states, rather than focusing on the county pairs sample. The impact of preregistration remains significant but reduces to 1.2% and 4.6% for the fraction of state grants and of recipients of state grants, respectively.

Table 7: Preregistration and Other Grants

	Federal			Institutional		
	% Fed. Grants	Receivers	% Receivers	% Inst. Grants	Receivers	% Receivers
	(1)	(2)	(3)	(4)	(5)	(6)
Preregistration	-0.033**	0.004	-0.432	-0.035**	-0.196	-3.433*
	(0.013)	(0.045)	(1.568)	(0.016)	(0.139)	(1.958)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
County-Pairs Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.820	0.873	0.625	0.314	0.777	0.711
Observations	16669	16896	16693	11101	16892	16699

Note: State and county level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%. All regressions control for: 1) Education Institutions Variables: Total, Female, and Male Applications, Full Time and Non Resident Enrolment, White, Hispanic, Black, Asian, and American Indian Enrolment, Carnegie Classification, Institutional Control, Level, and Sector, Medical Degree, Land Grant, and Hispanic Serving Institution, Historically Black College, Tuition Reliance, Total Expenditures, In-State and Out-of-State Tuition; 2) Socio-economic variables: Population, Personal Income.

As a falsification test in Table 7 we check the effect of preregistration on other kinds of grants which in principle should not be affected by preregistration since they are not related to state finance and politics. For federal (Pell) grants (Models 1-3), which represent the principal source of federal financial aid for college, preregistration actually shows a negative effect on the share over total aid, which can be attributed to the increase

of the denominator, which includes state grants. No effect is found for the number and fraction of recipients. In Models 4-6 we consider grants provided by the institutions themselves. In Model 4 we find a negative effect, again driven by the increase in total aid. The share of recipients now also decreases significantly, through channels having to do once again with the increased number of recipients. Finally, Table A10 looks at the number of applications for admission and shows an increase following preregistration, with a stronger effect for females.[48]

Summing up, the responsiveness of policy variables, and in particular state financial aid supporting college education, to political measures that can potentially enfranchise the young is confirmed over a sample of higher education institutions that allows the application of an identification strategy based on county pairs. In addition, we also highlight an influence on youth decisions to apply for college.

5.4 Robustness Checks

In this section we perform a series of robustness tests. First we form pairs of counties along the border within the same state. Therefore each bordering county is matched with another bordering county within the same state. For each pair of counties one is randomly treated and the other is not. The idea is that in absence of specific shocks counties along the border belonging to the same state should not differ in terms of education expenditure. As a second robustness check we pair institutions within the same county and for pairs of institutions within a county which has passed preregistration we assign a random policy.[49] Therefore, for each pair of institutions in a county belonging to a state which has adopted preregistration, one will be treated and the other will be untreated. Again the idea behind this test is to check for institutional shocks correlated with preregistration. If there are no institutional shocks then we should observe no effect of preregistration for pairs of institutions within the same county.

Table 8 reports results from the falsification test. Even when we consider pairs of counties along the border within the same states (Models 1-3) we do not find any significant effect of preregistration on state grants, which should rule out problems related to confounding variables over the same time period of the introduction of preregistration. Models 4-6 show results from the second test: again for each dependent variable we do not find any significant effect of preregistration on state grants, which is consistent with

[48] Within simulated general equilibrium models, Epple, Romano, Sarpça, and Sieg (2013) show that cuts in state aid result in reduced attendance mainly by poor students, while Abbott, Gallipoli, Meghir, and Violante (2016) show that additional aid would benefit high-ability children from poor families, especially girls. These results are broadly consistent with ours.

[49] In some counties there are more than two institutions, so that multiple pairs are formed. If within the county there is only one institution, it is dropped from the sample.

Table 8: Preregistration and State Grants - Robustness

	Within-State County Pairs			Within-County Institution Pairs		
	% State Grants	Receivers	% Receivers	% State Grants	Receivers	% Receivers
	(1)	(2)	(3)	(4)	(5)	(6)
Preregistration	0.006	-0.030	0.870	0.026	-0.093	-0.213
	(0.017)	(0.067)	(1.164)	(0.016)	(0.272)	(5.028)
County Fixed Effects	Yes	Yes	Yes	No	No	No
County Institution-Pairs Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	-0.020	0.758	0.474	0.397	0.764	0.407
Observations	76178	94664	93545	39713	50540	50044

Note: State and county level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%. All regressions control for: 1) Education Institutions Variables: Total, Female, and Male Applications, Full Time and Non Resident Enrolment, White, Hispanic, Black, Asian, and American Indian Enrolment, Carnegie Classification, Institutional Control, Level, and Sector, Medical Degree, Land Grant, and Hispanic Serving Institution, Historically Black College, Tuition Reliance, Total Expenditures, In-State and Out-of-State Tuition; 2) Socio-economic variables: Population, Personal Income.

the conclusion that there are no other institutional shocks which may occur at the same time of preregistration in states which have passed the reform. To sum up, the results from these tests lend plausibility to the hypothesis that there are neither local or institutional shocks, which may impinge on our identification strategy, occurring at the same time of the introduction of preregistration.

6 Political Participation as a Transmission Channel

6.1 Data

We now turn to the analysis of the mechanisms that can drive the responsiveness of education spending to preregistration laws. We focus on the direct effect of the latter on youth political participation. We obtain information on voting and registration at the individual level from the Current Population Survey (CPS), in particular from the Voting and Registration Supplement. Data are described in Appendix C. Our sample covers the period 1996-2014.

Summary statistics for our CPS sample are presented in Table A11 in Appendix A. Data are confined to individuals who report voting and/or registering. Preregistration is available for 3% of the individuals in the sample, i.e., 3% of the survey participants were residents of a state which at some point has implemented preregistration provisions. At the previous November election 55% of the individuals cast a vote, while 79% were registered, and 20% reported to have registered either at school, or on campus, or in a hospital. These locations represent frequent points of contact, where preregistration

drives are often organized. Young voters aged 18-24 are 12%, females are 52%, blacks are 10%. The average individual in the sample has 9.81 years of schooling. The share of individuals who are not in the labor force (where working age is 16) is 35%. Average family income is between $\$35,000$ and $\$39,999$.

6.2 Empirical Strategy

We exploit a difference-in-differences regression method over CPS data. The treated group consists of individuals who are residents of those states that have adopted preregistration for 15- to 17-year-olds, the control group consists of the remaining individuals. The model we estimate to test the causal effect of preregistration on political participation can be written as:

$$V_{i,s,t} = \delta_s + \delta_s \cdot t + \delta_y + \beta \cdot Preg_{s,t} + \pi \cdot X_{i,s,t} + \varepsilon_{i,s,t}$$

where $V_{i,s,t}$ is a dummy for whether individual i, in state s at time t has preregistered or voted; δ_s denotes state fixed effects; $\delta_s \cdot t$ represents individual time trends; δ_y denotes year fixed effects; $X_{i,s,t}$ are individual respondent characteristics; and $\varepsilon_{i,s,t}$ is the error term which is clustered at a state and year level. As in previous models, $Preg_{s,t}$ is a dummy variable which takes value 1 if a state has adopted such provision in a given year.

6.3 Results

Table 9 presents our regression results. The dependent variable is a dummy which takes value 1 if the individual has voted in the last November election, 0 otherwise.

In Model 1 the presence of preregistration laws increases voter turnout by 2% but the effect is not statistically significant. Dummies for each age group (where the group over 65 years of age is the omitted reference group) show that voter turnout linearly increases in age, with the 18-24 age group showing the lowest level as expected. The reason why the effect of preregistration in Model 1 is not statistically significant is related to the fact that preregistration only increases turnout among the young. In fact in Model 2 the probability of voting for individuals aged 18-24 increases by 4% with preregistration, while the effect for individuals in the other age cohorts is not statistically significant (Model 3).[50] Since individuals aged 18-24 represent a small share of total eligible voters (around 10% in the estimated sample), the overall effect on the probability of voting among all

[50]We obtain similar results, which we do not report for brevity, when we recode the preregistration dummy taking into account the first election after its enactment. The alternative dummy involves a shift for Maryland and Rhode Island and shows a slighter larger coefficient (4.3%) for the interaction of interest.

Table 9: Preregistration and Voter Turnout

	Voter Turnout			
	(1)	(2)	(3)	(4)
Preregistration	0.020	0.015	0.022	0.045**
	(0.015)	(0.015)	(0.016)	(0.019)
Age 18-24	-0.362***	-0.367***	-0.362***	-0.367***
	(0.005)	(0.005)	(0.005)	(0.005)
Age 25-44	-0.275***	-0.275***	-0.275***	-0.275***
	(0.004)	(0.004)	(0.004)	(0.004)
Age 45-64	-0.135***	-0.136***	-0.135***	-0.136***
	(0.003)	(0.003)	(0.003)	(0.003)
Preregistration · Age 18-24		0.040***		0.038***
		(0.011)		(0.011)
Preregistration · Age 24-44			0.004	
			(0.013)	
Preregistration · Age 45-64			-0.008	
			(0.005)	
Preregistration · Family Income				-0.003***
				(0.001)
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes	Yes
R-squared	0.191	0.191	0.191	0.192
Observations	701310	701310	701310	701310

Note: State and year level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for socio-economic variables: Sex, Black, Hispanic, Citizenship, Marital Status, Metropolitan Area, Years of Schooling, Family Income, Housing Tenure, Employment Status, Labor Force Participation.

potential electors is not statistically significant. Model 4 adds to Model 2 an interaction between preregistration and family income, for which we find a significant and negative coefficient suggesting that the effect of preregistration is particularly strong among voters belonging to poor families.[51] At the mean, the effect of preregistration on the probability of voting in Model 4 is still close to 2% (that is, 4.5% + 3.8% · 0.12 - 0.3% · 10.4) and is now statistically significant. These findings are in line with those obtained by Holbein and Hillygus (2016) over a sample of citizens aged 18-22 and with reference to 2000-2012 CPS data: over their sample, they report an effect of preregistration on youth voting between 2 and 13%.[52]

[51]Family income, which is entered as a control in all models, significantly increases the likelihood that an individual votes. A triple interaction involving preregistration, the 18-24 age group, and family income is not significant, which is not surprising given that we impute family income to all family members independently of age. Results are not reported for brevity.

[52]Further unreported results indicate that the effect of preregistration on the probability that blacks vote is positive and decreasing in income, i.e., stronger for poor blacks. The interaction between preregistration and the share of blacks is negative but not significant, while a triple interaction involving also the 18-24 age group is positive but again not significant.

Table 10: Preregistration and Registration

	Registered	Registered at School, on Campus or at Hospital
	(1)	(2)
Preregistration	0.002	0.124***
	(0.008)	(0.036)
Age 18-24	-0.242***	-0.073***
	(0.005)	(0.012)
Age 25-44	-0.155***	-0.066***
	(0.003)	(0.008)
Age 45-64	-0.064***	-0.025***
	(0.002)	(0.004)
Preregistration · Age 18-24	0.041***	0.136***
	(0.012)	(0.024)
State Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
State Time Trends	Yes	Yes
R-squared	0.381	0.127
Observations	729234	286475

Note: State and year level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%. Model 1 controls for: Sex, Marital Status, White, Black, Years of Schooling, Employment Status (IPUM CPS). Model 2 controls for: Sex, Black, Hispanic, Citizenship, Marital Status, Metropolitan Area, Years of Schooling, Family Income, Housing Tenure, Employment Status, Labor Force Participation (NBER CPS).

To further investigate the channels of transmission from preregistration to policy outcomes, through an increase in political participation, in Table 10, Model 1 we enter as the dependent variable a dummy which takes value 1 if the individual was registered to vote in the previous November election, 0 otherwise.[53] To be noticed is that the correlation between registration and turnout is 66% in the CPS sample. As for voter turnout, the presence of preregistration laws per se has no impact on the likelihood that individuals are registered. The likelihood to be registered increases in age and the interaction term shows that registration is more likely for the youngest age group when preregistration is an option, since the likelihood to register for individuals aged 18-24 increases by 4.1% with preregistration. Model 2 verifies the influence of preregistration on the probability of registering at a frequent point of contact, such as at school or on campus, which is where preregistration drives are hosted. The fact that preregistration increases the probability of registering at such points of contact by 12.4%, with a 13.6% coefficient for the interaction with the youngest, suggests that the effectiveness of registration is enhanced because it can reach young perspective voters in places of frequent and habitual socialization, thus making it easier for them to gather information and overcome the cost of

[53]While all models in this section are estimated using CPS data as provided by the NBER, this model is estimated using the IPUMS version.

participation.

Overall, this section shows a significant effect of preregistration on voting that is driven by the increased political participation of youths, particularly from poor families, confirming that political participation is a relevant channel linking youth enfranchisement and policy choices regarding education expenditure.

7 Conclusions

In the context of the U.S., we have investigated the effect on public education spending, both at the state level and the higher education institution level, of the introduction of preregistration laws that allow young citizens to register before being eligible to vote. Voter registration entails a cost, in terms of information, effort, time, and involvement, which is especially large for younger citizens that are approaching the voting process for the first time. Since preregistration laws have been introduced in different U.S. states in different years, they have generated variation across space and time in the exposure of voters to the new electoral reforms. We have exploited such variation to test with a difference-in-differences regression method the predictions from a political economy model.

Consistent with the model, our empirical findings show that preregistration causes an increase of approximately 6% in state spending for higher education, i.e., the expenditure component that more directly benefits the newly-enfranchised young voters, while leaving unaffected other types of state expenditure. Using micro-level data on higher education institutions which allow us to implement a county pairs identification strategy we also show that preregistration increases by approximately 3% the share of state grants over total student financial aid and by 6% the fraction of state grant recipients over full time first time degree seekers. Turning to the channel through which preregistration manifests its influence, we show that it increases the political participation of youths by approximately 4%, thus provoking a de facto enfranchisement for young Americans.

The progressive disenfranchisement and the consequent disempowerment of youths is a growing phenomenon across all modern democracies. Our results are therefore potentially relevant not only for the U.S. but also for other countries. In many of the latter, the issue is made even more serious because of the declining demographic weight of the young. These considerations lie at the core of the current policy debate in many European countries (such as Austria, Germany, the UK, and Norway) as to whether lowering the voting age from 18 to 16, following a secular process of previous reductions, in the effort to promote a more active social and political participation of the young.

References

[1] Abbott, B., G. Gallipoli, C. Meghir, and G. L. Violante, 2016. Education Policy and Intergenerations Transfers. Cowles Foundation Discussion Paper No. 1887.

[2] Acemoglu, D., S. Naidu, P. Restrepo, and J. A. Robinson, 2014. Democracy Does Cause Growth. NBER Working Paper No. 20004.

[3] Acemoglu, D., and J. A. Robinson, 2000. Why Did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective. *Quarterly Journal of Economics* 115, 1167-1199.

[4] Acemoglu, D., and J. A. Robinson, 2006. *Economic Origins of Dictatorship and Democracy*. New York: Cambridge University Press.

[5] Aidt, T. S., and B. Dallal, 2008. Female Voting Power: The Contribution of Women's Suffrage to the Growth of Social Spending in Western Europe (1869-1960). *Public Choice* 134, 391-417.

[6] Aidt, T. S., J. Dutta, and E. Loukoianova, 2006. Democracy Comes to Europe: Franchise Extension and Fiscal Outcomes. *European Economic Review* 50, 249-283.

[7] Alesina, A., 1988. Credibility and Policy Convergence in a Two-Party System with Rational Voters. *American Economic Review* 78, 796-805.

[8] Ansolabehere, S., and D. Konisky, 2006. The Introduction of Voter Registration and Its Effect on Turnout. *Political Analysis* 14, 83-100.

[9] Baland, J. M., and J. A. Robinson, 2008. Land and Power: Theory and Evidence from Chile. *American Economic Review* 98, 1737-1765.

[10] Bassetto, M., 2008. Political Economy of Taxation in an Overlapping-Generations Economy. *Review of Economic Dynamics* 11, 18-43.

[11] Bertocchi, G., 2011. The Enfranchisement of Women and the Welfare State. *European Economic Review* 55, 535-553.

[12] Bertocchi, G., and A. Dimico, 2014. De Jure and de Facto Determinants of Power: Evidence from Mississippi. CEPR Discussion Paper No. 9064.

[13] Besley, T., and A. Case, 1995. Does Electoral Accountability Affect Economic Policy Choices? Evidence from Gubernatorial Term Limits. *Quarterly Journal of Economics* 110, 769-798.

[14] Besley, T., and A. Case, 2003. Political Institutions and Policy Choices: Evidence from the United States. *Journal of Economic Literature* 41, 7-73.

[15] Besley, T., T. Persson, and D. M. Sturm, 2010. Political Competition, Policy and Growth: Theory and Evidence from the United States, *Review of Economic Studies* 77, 1329-1352.

[16] Cascio, E. U., and E. Washington, 2014. Valuing the Vote: The Redistribution of Voting Rights and State Funds Following the Voting Rights Act of 1965. *Quarterly Journal of Economics* 129, 379-433.

[17] Cherry, C., 2011. Increasing Youth Participation: The Case for a National Voter Preregistration Law. *University of Michigan Journal of Law Reform* 45, 481-515.

[18] Dube, A., T. W. Lester, and M. Reich, 2010. Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties. *Review of Economics and Statistics* 92, 945-964.

[19] Epple, D., R. Romano, S. Sarpça, and H. Sieg, 2013. The U.S. Market for Higher Education: A General Equilibrium Analysis of State and Private Colleges. NBER Working Paper No. 19298.

[20] Fujiwara, T., 2015. Voting Technology, Political Responsiveness, and Infant Health: Evidence from Brazil. *Econometrica* 83, 423-464.

[21] Gonzales-Eiras, M., and D. Niepelt, 2008. The Future of Social Security. *Journal of Monetary Economics* 55, 197-218.

[22] Highton, B., 1997. Easy Registration and Voter Turnout. *Journal of Politics* 59, 565-575.

[23] Hoffman, M., G. Leon, and M. Lombardi, 2016. Compulsory Voting, Turnout, and Government Spending: Evidence from Austria. NBER Working Paper No. 22221.

[24] Holbein, J. B., and D. S. Hillygus, 2016. Making Young Voters: The Impact of Preregistration on Youth Turnout. *American Journal of Political Science*, forthcoming.

[25] Husted, T., and L. Kenny, 1997. The Effect of Expanding the Vote Franchise on the Size of Government. *Journal of Political Economy* 105, 54-82.

[26] Kezdi, G., 2004. Robust Standard Error Estimation in Fixed-Effects Panel Models. *Hungarian Statistical Review* 9, 96-116.

[27] Knack, S., 1995. Does 'Motor-Voter' Work? Evidence from State-level Data. *Journal of Politics* 57, 796-811.

[28] Lancia, F., and A. Russo, 2016. Public Education and Pensions in Democracy: A Political Economy Theory. *Journal of the European Economic Association*, forthcoming.

[29] Levy, G., 2005. The Politics of Public Provision of Education. *Quarterly Journal of Economics* 120, 1507-1534.

[30] Lindbeck, A., and J. W Weibull, 1987. Balanced-budget Redistribution as the Outcome of Political Competition. *Public Choice*52, 273-297.

[31] Lindert, P., 1994. The Rise in Social Spending 1880-1930. *Explorations in Economic History* 31, 1-37.

[32] Lizzeri, A., and N. Persico, 2004. Why Did the Elites Extend the Suffrage? Democracy and the Scope of Government, with an Application to Britain's 'Age of Reform'. *Quarterly Journal of Economics* 119, 707-765.

[33] Llavador, H., and R. J. Oxoby, 2005. Partisan Competition, Growth and the Franchise. *Quarterly Journal of Economics* 120, 1155-1189.

[34] Lott, J., and L. Kenny, 1999. Did Women's Suffrage Change the Size and Scope of Government? *Journal of Political Economy* 107, 1163-1198.

[35] Mateos-Planas, X., 2008. A Quantitative Theory of Social Security without Commitment. *Journal of Public Economics* 92, 652-671.

[36] McDonald, M. P., and M. Thornburg, 2010. Registering the Youth through Voter Preregistration. *Legislation and Public Policy* 13, 551-572.

[37] Meltzer, A. H., and S. F. Richard, 1981. A Rational Theory of the Size of Government. *Journal of Political Economy* 89, 914-927.

[38] Miller, G., 2008. Women's Suffrage, Political Responsiveness, and Child Survival in American History. *Quarterly Journal of Economics* 123, 1287-1327.

[39] Naidu, S., 2012. Suffrage, Schooling, and Sorting in the Post-Bellum US South. NBER Working Paper No. 18129.

[40] Razin, A., E. Sadka, and P. Swagel, 2002. The Ageing Population and the Size of the Welfare State. *Journal of Political Economy* 110, 900-918.

[41] Song, Z., K. Storesletten, and F. Zilibotti, 2012. Rotten Parents and Disciplined Children: A Politico-Economic Theory of Public Expenditure and Debt. *Econometrica* 80, 2785-2804.

[42] Strate J. M., C. J. Parrish, C. D. Elder, and C. Ford, 1989. Life Span Civic Development and Voting Participation. *American Political Science Review* 83, 443-464.

[43] Tabellini, G., 1991. The Politics of Intergenerational Redistribution. *Journal of Political Economy* 99, 335-357.

[44] Wolfinger, R. E., and S. I. Rosenstone, 1980. *Who Votes?* New Haven: Yale University Press.

8 Appendix

This appendix presents the figures and tables that were referred to in the main text (Appendix A), the proofs (Appendix B), and the description of the data (Appendix C).

8.1 Appendix A: Figures and Tables

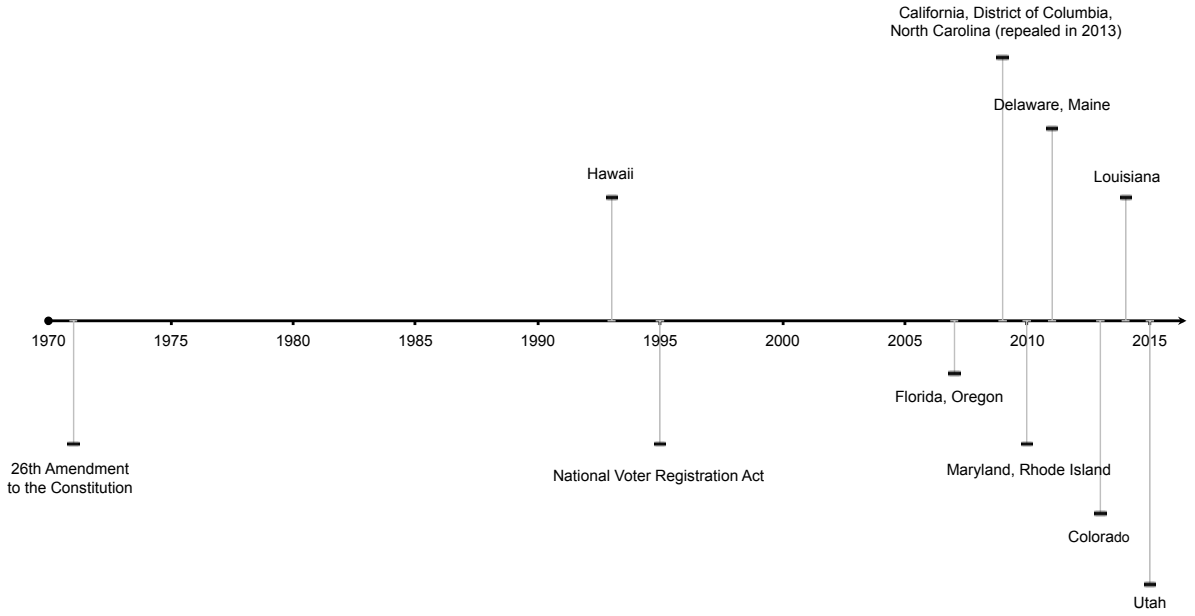


Figure A1: The Timeline of Preregistration Legislation in the U.S.

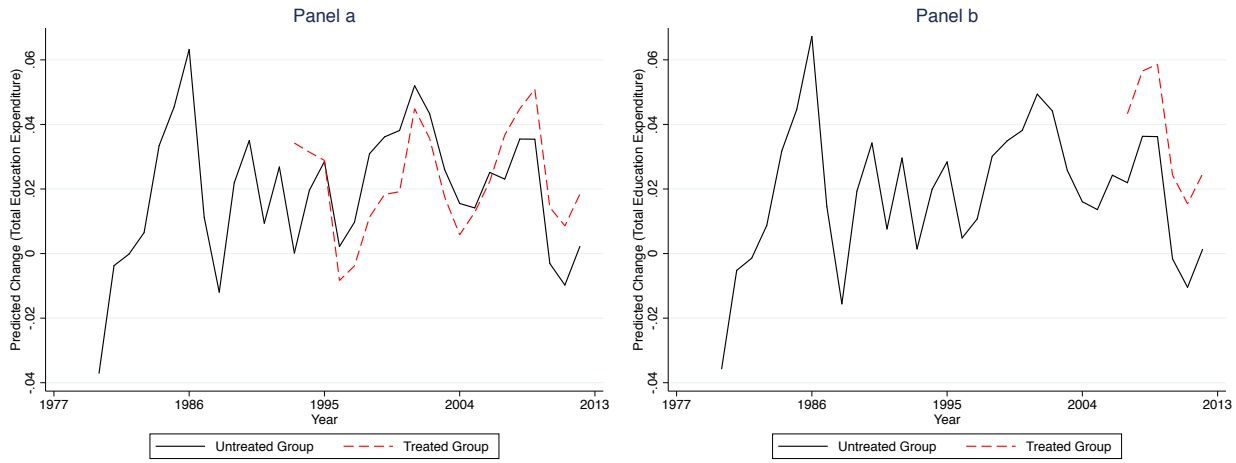


Figure A2: Predicted Changes in Education Expenditure with and without Preregistration for the Full Sample (Panel a) and Excluding Hawaii and Florida (Panel b).

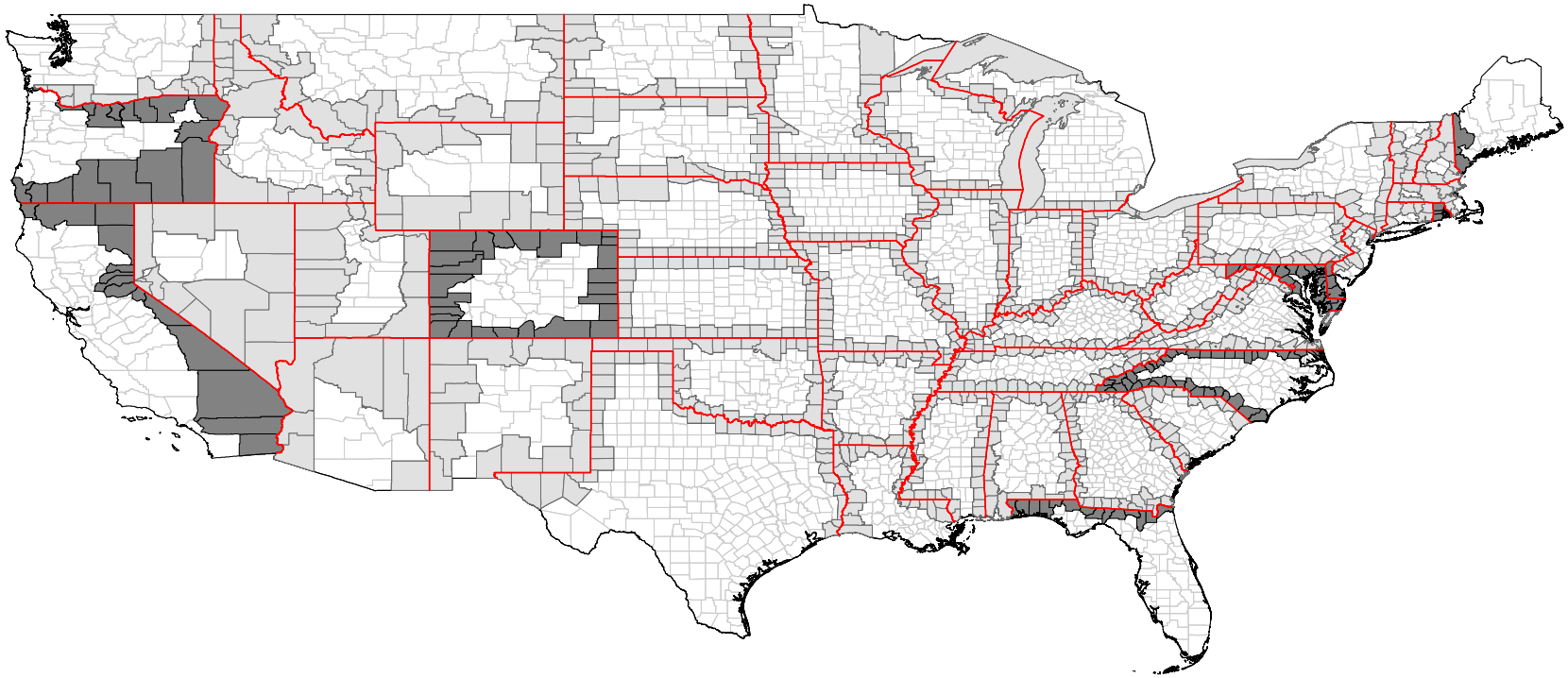


Figure A3: Adjacent Counties along U.S. State Borders
(darker shade indicates preregistration states).

Table A1: Summary Statistics - State Level Data

	Mean	Std. dev.	Obs.	Min.	Max.
Registration Reforms					
Preregistration	0.03	0.18	1850	0	1
Online Registration	0.03	0.17	1850	0	1
Election Day Registration	0.10	0.30	1850	0	1
NRVA	0.45	0.50	1850	0	1
Electoral Variables					
Incumbent	0.64	0.48	1769	0	1
Year of Mandate	2.47	1.13	1850	1	4
Governor Runs Next Elections	0.45	0.50	1768	0	1
Democratic Governor	0.53	0.50	1827	0	1
Democratic President	0.46	0.50	1850	0	1
Political Competition	16.3	13.47	1645	0	65
Gubernatorial Turnout Rate	0.46	0.10	1592	0.17	0.86
Fiscal Variables (per capita at constant 2013 US dollars)					
Total Education Expenditure	731.60	339.01	1850	223	2826
Total Education - Current Operating Expenditure	611.45	286.44	1850	192	2543
Total Education - Capital Outlay	73.98	58.39	1850	5	820
Higher Education Expenditure	575.02	208.47	1850	163	1355
Higher Education - Current Operating Expenditure	511.85	180.77	1850	138	1239
Higher Education - Capital Outlay	63.15	39.12	1850	1	403
Elementary and Secondary Education Expenditure	46.38	202.16	1850	0	1867
NEC Education Expenditure	64.02	37.07	1850	5	304
Public Welfare Expenditure	894.15	473.45	1850	24	2705
Health Expenditure	122.84	83.74	1850	17	566
Total Assistance and Subsidies	130.46	69.24	1800	12	421
Unemployment Compensation Expenditure	163.63	118.34	1850	14	937
Total Tax Revenue	2295.56	955.35	1850	725	13983
Total Debt Outstanding	2962.39	2519.85	1800	96	26793
Total Federal Intergovernmental Revenue	1241.51	581.44	1800	382	4359
Socio-economic Variables					
Population (in thousands)	5326.67	5841.23	1850	397.36	38431.39
Median Age	33.42	3.43	1850	23	43
Share of 16-25	0.21	0.04	1850	0.16	0.35
Post-secondary Enrolment (in thousands)	301.04	360.80	1850	19.49	2732.15
Education Attainment (High School Diploma)	0.58	0.07	1850	0.34	0.73
Share of Blacks	0.1	0.09	1850	0	0.38
Share of Whites	0.85	0.12	1850	0.24	0.99
Personal Income	24255.76	11715.73	1850	5347	62738
Inequality (Theil Index)	0.66	0.23	1850	0.29	2.58
Unemployment Rate	6.07	2.09	1850	2.3	17.79

Table A2: Registration Reforms and Education Expenditure

	Total Education Expenditure		
	(1)	(2)	(3)
NRVA	0.026		
	(0.034)		
Online Registration		0.023	
		(0.020)	
Election Day Registration			-0.054
			(0.048)
State Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes
R-squared	0.975	0.975	0.975
Observations	1508	1508	1508

Note: State-level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for: 1) Electoral variables: Dummies for gubernatorial election year and years to the next gubernatorial election, Incumbent, Year of Mandate, Governor Runs Next Elections, Democratic Governor, Democratic President, Democratic Governor and President, Political Competition, Gubernatorial Turnout Rate; 2) Fiscal variables: Total Tax Revenue, Total Debt Outstanding, Total Federal Intergovernmental Revenue; 3) Socio-economic variables: Population, Median Age, Share of 16-25, Post-secondary Enrolment, Education Attainment, Share of Blacks, Share of Whites, Personal Income, Inequality, Unemployment Rate.

Table A3: Preponing Preregistration

	Total Education Expenditure			
	(1)	(2)	(3)	(4)
F(3)Preregistration	0.008			
	(0.018)			
F(4)Preregistration		0.008		
		(0.020)		
F(5)Preregistration			0.020	
			(0.023)	
F(6)Preregistration				0.017
				(0.022)
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes	Yes
R-squared	0.975	0.976	0.976	0.975
Observations	1410	1361	1312	1263

Note: State-level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for: 1) Registration Reforms: Online Registration, Election Day Registration, NVRA; 2) Electoral variables: Dummies for gubernatorial election year and years to the next gubernatorial election, Incumbent, Year of Mandate, Governor Runs Next Elections, Democratic Governor, Democratic President, Democratic Governor and President, Political Competition, Gubernatorial Turnout Rate; 3) Fiscal variables: Total Tax Revenue, Total Debt Outstanding, Total Federal Intergovernmental Revenue; 4) Socio-economic variables: Population, Median Age, Share of 16-25, Post-secondary Enrolment, Education Attainment, Share of Blacks, Share of Whites, Personal Income, Inequality, Unemployment Rate.

Table A4: Robustness to Florida and Hawaii

	Total Education Expenditure			
	No Hawaii	No Florida	No HI and FL	FL from 1971
	(1)	(2)	(3)	(4)
Preregistration	0.057***	0.059***	0.053**	0.057**
	(0.021)	(0.022)	(0.023)	(0.021)
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes	Yes
R-squared	0.970	0.973	0.968	0.975
Observations	1477	1475	1444	1508

Note: State-level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for: 1) Registration Reforms: Online Registration, Election Day Registration, NVRA; 2) Electoral variables: Dummies for gubernatorial election year and years to the next gubernatorial election, Incumbent, Year of Mandate, Governor Runs Next Elections, Democratic Governor, Democratic President, Democratic Governor and President, Political Competition, Gubernatorial Turnout Rate; 3) Fiscal variables: Total Tax Revenue, Total Debt Outstanding, Total Federal Intergovernmental Revenue; 4) Socio-economic variables: Population, Median Age, Share of 16-25, Post-secondary Enrolment, Education Attainment, Share of Blacks, Share of Whites, Personal Income, Inequality, Unemployment Rate.

Table A5: Summary Statistics - Education Institutions Data

	Mean	Std. dev.	County	Min.	Max.
Preregistration	0.09	0.28	43345	0	1
Education Institutions Variables					
% State Grants	0.16	0.16	29116	0	1
Nr. of Receivers State Grants	177.87	524.96	40514	0	23570
% Receivers State Grants	25.07	25.20	40083	0	100
% Institutional Grants	0.15	0.23	20496	0	1
Nr. of Receivers Institutional Grants	189.50	482.91	40520	0	28598
% Receivers Institutional Grants	29.66	34.58	40093	0	100
% Federal Grants	0.60	0.33	40957	0	1
Nr. of Receivers Federal Grants	248.60	779.18	40528	0	85068
% Receivers Federal Grants	49.71	24.13	39983	0	100
Total Applications	2747.07	5268.49	19707	0	61545
Female Applications	1694.99	2974.31	19127	0	33256
Male Applications	1334.82	2479.72	19066	0	28289
Full Time Enrolment	2497.64	6738.70	43239	1	380232
White Enrolment	2392.18	5034.73	43337	0	149864
Hispanic Enrolment	451.16	2323.16	43337	0	83818
Black Enrolment	474.55	1589.25	43337	0	67888
Asian Enrolment	242.39	1096.94	43337	0	40648
American Indian Enrolment	40.23	160.23	43337	0	5558
Non Resident Enrolment	141.54	618.24	43337	0	22823
Carnegie Classification	3.41	1.20	31976	1	6
Medical Degree Institution	1.97	0.18	43135	1	2
Institutional Control	1.95	0.82	43345	1	3
Institutional Level	1.73	0.76	43345	1	3
Institutional Sector	4.17	2.60	43345	1	9
Land Grant Institution	1.98	0.15	43345	1	2
Historically Black College	1.98	0.14	43345	1	2
Hispanic Serving Institution	0.01	0.09	43345	0	1
Tuition Reliance	0.65	0.33	43137	0	2.08
Total Expenditures	82502604.31	3.28e+08	42376	571	9.97e+09
In-State Tuition	10003.67	8902.96	30092	0	56530
Out-of-State Tuition	12772.47	8053.23	30126	0	62550
Share of Students with SAT	55.71	36.36	12148	0	100
SAT Math 25th Percentile Score	477.86	72.99	10569	100	799
SAT Critical Reading 25th Percentile Score	474.35	68.63	10507	100	799
Socio-economic Variables (at the county level)					
Population	895217.12	1707470.83	42587	2418	9951690
Personal Income	37406.86	9970.33	42587	13249	96428

Table A6: Heterogeneity of Institutions and Distance from the Border

	Coeff.	Std. Dev.	Obs.
First Time First Year Undergraduate	0.194**	0.080	40539
Full Time Enrolment	0.121	0.109	43338
Non Resident Enrolment	-0.120	0.150	43336
Carnegie Classification	-0.140**	0.069	29342
Medical Degree Institution	0.006	0.010	43134
Institutional Control	-0.036	0.063	43344
Institutional Level	0.027	0.053	43344
Institutional Sector	0.038	0.180	43344
Land Grant Institution	-0.018*	0.010	43344
Historically Black College	-0.024***	0.008	43344
Hispanic Serving Institution	-0.003	0.011	43344
Tuition Reliance	-0.004	0.020	43136
Total Expenditures	0.090	0.119	42375
In-State Tuition	0.114	0.102	30091
Out-of-State Tuition	0.106*	0.056	30125
Share of Students with SAT	-2.579	2.019	12148
SAT Math 25th Percentile Score	8.707	8.660	10569
SAT Critical Reading 25th Percentile Score	7.174	8.480	10507
Personal Income	-0.079**	0.037	42587

Note: Standard errors are clustered at county-level. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for state fixed effects.

Table A7: Homogeneity of Institutions on the Border

	Coeff.	Std. Dev.	Obs.
First Time First Year Undergraduate	0.063	0.071	27075
Full Time Enrolment	0.045	0.074	28889
Non Resident Enrolment	0.105	0.107	28889
Carnegie Classification	0.009	0.072	20011
Medical Degree Institution	-0.005	0.005	28752
Institutional Control	-0.029	0.042	28891
Institutional Level	-0.027	0.039	28891
Institutional Sector	-0.083	0.129	28891
Land Grant Institution	-0.001	0.008	28891
Historically Black College	0.002	0.006	28891
Hispanic Serving Institution	-0.000	0.001	28891
Tuition Reliance	0.013	0.014	28764
Total Expenditures	0.051	0.080	28366
In-State Tuition	0.047	0.079	20462
Out-of-State Tuition	-0.003	0.032	20488
Share of Students with SAT	2.182	1.926	8834
SAT Math 25th Percentile Score	5.523	10.218	7887
SAT Critical Reading 25th Percentile Score	6.994	9.576	7851
Personal Income	0.019	0.022	28737

Note: Standard errors are clustered at year and county-level. Significance levels: * 10%, ** 5%, *** 1%.
All regressions control for state fixed effects.

Table A8: Preregistration and State Grants - With County Fixed Effects

	% State Grants	Receivers	% Receivers
	(1)	(2)	(3)
Preregistration	0.036***	0.337***	6.128**
	(0.012)	(0.126)	(2.503)
County Fixed Effecs	Yes	Yes	Yes
County-Pairs Year Effects	Yes	Yes	Yes
R-squared	0.490	0.762	0.468
Observations	14018	16892	16699

Note: State and county-level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%. All regressions control for: 1) Education Institutions Variables: Total, Female, and Male Applications, Full Time and Non Resident Enrolment, White, Hispanic, Black, Asian, and American Indian Enrolment, Carnegie Classification, Institutional Control, Level, and Sector, Medical Degree, Land Grant, and Hispanic Serving Institution, Historically Black College, Tuition Reliance, Total Expenditures, In-State and Out-of-State Tuition; 2) Socio-economic variables: Population, Personal Income.

Table A9: Preregistration and State Grants - All Education Institutions

	% State Grants	Receivers	% Receivers
	(1)	(2)	(3)
Preregistration	0.012**	0.113***	4.571***
	(0.006)	(0.032)	(0.749)
State Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Time Trends	Yes	Yes	Yes
R-squared	0.393	0.735	0.369
Observations	22221	26750	26362

Note: State and county-level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%. All regressions control for: 1) Education Institutions Variables: Total, Female, and Male Applications, Full Time and Non Resident Enrolment, White, Hispanic, Black, Asian, and American Indian Enrolment, Carnegie Classification, Institutional Control, Level, and Sector, Medical Degree, Land Grant, and Hispanic Serving Institution, Historically Black College, Tuition Reliance, Total Expenditures, In-State and Out-of-State Tuition; 2) Socio-economic variables: Population, Personal Income.

Table A10: Preregistration and Applications - County Pairs

	Applications		
	Total	Female	Male
	(1)	(2)	(3)
Preregistration	0.352*	0.248**	0.183*
	(0.204)	(0.096)	(0.100)
State Fixed Effects	Yes	Yes	Yes
County-Pairs Year Effects	Yes	Yes	Yes
R-squared	0.620	0.644	0.523
Observations	10676	10849	10817

Note: State and county-level clustered standard errors are in parentheses. Significance levels: * 10%, ** 5%, *** 1%. All regressions control for: 1) Education Institutions Variables: Total, Female, and Male Applications, Full Time and Non Resident Enrolment, White, Hispanic, Black, Asian, and American Indian Enrolment, Carnegie Classification, Institutional Control, Level, and Sector, Medical Degree, Land Grant, and Hispanic Serving Institution, Historically Black College, Tuition Reliance, Total Expenditures, In-State and Out-of-State Tuition; 2) Socio-economic variables: Population, Personal Income.

Table A11: Summary Statistics - CPS Data

	Mean	Std. dev.	Obs.	Min.	Max.
Preregistration	0.09	0.28	790837	0	1
Electoral Variables					
Voter Turnout	0.55	0.50	790837	0	1
Registered	0.79	0.41	810419	0	1
Registered at School, on Campus or at Hospital	0.20	0.40	306967	0	1
Socio-economic Variables					
Age 18-24	0.12	0.32	790837	0	1
Age 25-44	0.35	0.48	790837	0	1
Age 45-64	0.34	0.47	790837	0	1
Age 65+	0.184	0.389	790837	0	1
Sex	1.53	0.50	790837	1	2
Black	0.10	0.30	790837	0	1
Hispanic	1.93	0.25	790837	1	2
Citizenship	1.19	0.72	790837	1	4
Marital Status	2.72	2.12	790837	1	6
Metropolitan Area	1.25	0.45	790837	1	3
Years of Schooling	10.18	2.57	790837	1	16
Family Income	10.43	3.92	701663	1	16
Housing Tenure	1.26	0.47	790837	1	3
Employment Status	2.02	1.40	790464	1	4
Labor Force Partecipation	1.33	0.47	790464	1	2

Note: Sample confined to those who report registration/voting.

8.2 Appendix B: Proofs

Proof of Proposition 1 **and Proposition** 2**.** The political equilibrium discussed in the paper is based on the voting model in Lindbeck and Weibull (1987) as applied to an environment with intergenerational transfers. A voter j who belongs to group $i \in \{y, o\}$ prefers candidate $\kappa \in \{\mathcal{I}, \mathcal{C}\}$ as long as the cost of voting c_j^i is smaller than the difference in the indirect utility achieved from voting for one of the two candidates, net of an aggregate shock. Formally, she supports candidate $\mathcal{I}$ as long as $c_j^i \leq \mathbf{c}_{\mathcal{I}}^i (q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j) \equiv \mathcal{U}^i (q_{\mathcal{I}}; \omega_j) - \mathcal{U}^i (q_{\mathcal{C}}; \omega_j) + \delta$ or candidate $\mathcal{C}$ as long as $c_j^i \leq \mathbf{c}_{\mathcal{C}}^i (q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j) \equiv \mathcal{U}^i (q_{\mathcal{C}}; \omega_j) - \mathcal{U}^i (q_{\mathcal{I}}; \omega_j) - \delta$, while she abstains when $c_j^i > \max \{\mathbf{c}_{\mathcal{I}}^i (q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j), \mathbf{c}_{\mathcal{C}}^i (q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j)\}$. Hence, $\mathbf{c}_{\kappa}^i (q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j)$ identifies the swing voter within group i, who is indifferent between the two candidates. Without loss of generality, we assume that the parameter c_j^i is drawn from a cohort-specific uniform distribution G^i on $\left[\underline{c}, \overline{c}^i (\gamma)\right]$ where $\overline{c}^y (\gamma) \geq \overline{c}^o (\gamma)$ with $\partial \overline{c}^y (\gamma) / \partial \gamma < 0$ and $\overline{c}^o (\gamma) = \overline{c}^o$ since $\partial \overline{c}^o (\gamma) / \partial \gamma = 0$.

Conditional on δ, the expected voter share of candidate κ is $\pi_\kappa = \theta \pi_\kappa^y + (1 - \theta) \pi_\kappa^o$ with $\pi_\kappa^y \equiv \int_{\underline{\omega}}^{\overline{\omega}} G^y (\mathbf{c}_\kappa^y (q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j)) \, dF^y (\omega_j)$ and $\pi_\kappa^o \equiv \int_{\underline{\omega}}^{\overline{\omega}} G^o (\mathbf{c}_\kappa^o (q_{\mathcal{I}}, q_{\mathcal{C}}; \omega_j)) \, dF^o (\omega_j)$. It follows that the shares of voters supporting candidates $\mathcal{I}$ and $\mathcal{C}$ are, respectively:

$$\pi_{\mathcal{I}} \equiv \frac{\theta}{\overline{c}^y (\gamma) - \underline{c}} \int_{\underline{\omega}}^{\overline{\omega}} \left(\mathcal{U}^y (q_{\mathcal{I}}, \omega_j) - \mathcal{U}^y (q_{\mathcal{C}}, \omega_j)\right) dF^y (\omega_j) + \frac{1 - \theta}{\overline{c}^o - \underline{c}} \int_{\underline{\omega}}^{\overline{\omega}} \left(\mathcal{U}^o (q_{\mathcal{I}}, \omega_j) - \mathcal{U}^o (q_{\mathcal{C}}, \omega_j)\right) dF^o (\omega_j) + (\delta - \underline{c}) \left(\frac{\theta}{\overline{c}^y (\gamma) - \underline{c}} + \frac{1 - \theta}{\overline{c}^o - \underline{c}}\right).$$

and

$$\pi_{\mathcal{C}} \equiv \frac{\theta}{\overline{c}^y (\gamma) - \underline{c}} \int_{\underline{\omega}}^{\overline{\omega}} \left(\mathcal{U}^y (q_{\mathcal{C}}, \omega_j) - \mathcal{U}^y (q_{\mathcal{I}}, \omega_j)\right) dF^y (\omega_j) + \frac{1 - \theta}{\overline{c}^o - \underline{c}} \int_{\underline{\omega}}^{\overline{\omega}} \left(\mathcal{U}^o (q_{\mathcal{C}}, \omega_j) - \mathcal{U}^o (q_{\mathcal{I}}, \omega_j)\right) dF^o (\omega_j) - (\delta + \underline{c}) \left(\frac{\theta}{\overline{c}^y (\gamma) - \underline{c}} + \frac{1 - \theta}{\overline{c}^o - \underline{c}}\right).$$

Under a majority rule, candidate $\mathcal{I}$ wins the election if and only if she obtains the largest share of votes. Since δ is uniformly distributed on $[-(1/2\psi) + \chi/\psi, (1/2\psi) + \chi/\psi]$, the probability of winning the election for candidate $\mathcal{I}$, i.e., $p_{\mathcal{I}} (q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma) \equiv \Pr (\pi_{\mathcal{I}} > \pi_{\mathcal{C}})$, is equal to

$$\frac{1}{2} + \chi - \left(\begin{array}{c} \frac{\theta(\overline{c}^o - \underline{c})}{\theta(\overline{c}^o - \underline{c}) + (1-\theta)(\overline{c}^y(\gamma) - \underline{c})} \int_{\underline{\omega}}^{\overline{\omega}} \left(\mathcal{U}^y (q_{\mathcal{C}}, \omega_j) - \mathcal{U}^y (q_{\mathcal{I}}, \omega_j)\right) dF^y (\omega_j) \\ + \frac{(1-\theta)(\overline{c}^y(\gamma) - \underline{c})}{\theta(\overline{c}^o - \underline{c}) + (1-\theta)(\overline{c}^y(\gamma) - \underline{c})} \int_{\underline{\omega}}^{\overline{\omega}} \left(\mathcal{U}^o (q_{\mathcal{C}}, \omega_j) - \mathcal{U}^o (q_{\mathcal{I}}, \omega_j)\right) dF^o (\omega_j) \end{array} \right) \cdot \psi.$$

By symmetry, the winning probability of candidate $\mathcal{C}$ is $p_{\mathcal{C}} (q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma) \equiv \Pr (\pi_{\mathcal{C}} > \pi_{\mathcal{I}}) = 1 - p_{\mathcal{I}} (q_{\mathcal{I}}, q_{\mathcal{C}})$. Candidates simultaneously choose policy platforms q_κ in order to maximize

the expected rent from being in office. Formally,

$$\text{Candidate } \mathcal{I} : \max_{q_{\mathcal{I}}} p_{\mathcal{I}}\left(q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma\right) \cdot \left(\alpha_{\mathcal{I}} + \left(1 - \alpha_{\mathcal{I}}\right) R_{\mathcal{I}}\right),$$
$$\text{Candidate } \mathcal{C} : \max_{q_{\mathcal{C}}} p_{\mathcal{C}}\left(q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma\right) \cdot \left(\alpha_{\mathcal{C}} + \left(1 - \alpha_{\mathcal{C}}\right) R_{\mathcal{C}}\right),$$

subject to the budget constraint $\left(\tau_\kappa - D\left(\tau_\kappa\right)\right)\widehat{\omega} \geq \theta e_\kappa + R_\kappa$. We denote by ς_κ the Lagrangian multiplier associated with the public budget. Using Eqs. (2) and (3) yields the following first-order conditions with respect to τ_κ, e_κ, and R_κ, respectively:

$$\tau_\kappa : 0 = -\frac{\theta\left(\overline{c}^o - \underline{c}\right)\widehat{\omega}^y + \left(1-\theta\right)\left(\overline{c}^y\left(\gamma\right) - \underline{c}\right)\widehat{\omega}^o}{\theta\left(\overline{c}^o - \underline{c}\right) + \left(1-\theta\right)\left(\overline{c}^y\left(\gamma\right) - \underline{c}\right)}\left(\alpha_\kappa + \left(1-\alpha_\kappa\right)R_\kappa\right)\psi + \varsigma_\kappa\left(1 - D'\left(\tau_\kappa\right)\right)\widehat{\omega},$$
$$e_\kappa : 0 = \frac{\psi\lambda\theta\left(\overline{c}^o - \underline{c}\right)}{\theta\left(\overline{c}^o - \underline{c}\right) + \left(1-\theta\right)\left(\overline{c}^y\left(\gamma\right) - \underline{c}\right)}\left(\alpha_\kappa + \left(1-\alpha_\kappa\right)R_\kappa\right) - \varsigma_\kappa\theta,$$
$$R_\kappa : p_\kappa\left(q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma\right)\left(1 - \alpha_\kappa\right) - \varsigma_\kappa = 0.$$

Eliminating the multiplier from the first-order conditions, i.e.,

$$\varsigma_\kappa = \frac{\psi\lambda\left(\overline{c}^o - \underline{c}\right)}{\theta\left(\overline{c}^o - \underline{c}\right) + \left(1-\theta\right)\left(\overline{c}^y\left(\gamma\right) - \underline{c}\right)}\left(\alpha_\kappa + \left(1-\alpha_\kappa\right)R_\kappa\right),$$

yields the following Euler conditions for fiscal policies:

$$\lambda = \frac{1}{1 - D'\left(\tau_\kappa\right)}\left(\theta\frac{\widehat{\omega}^y}{\widehat{\omega}} + \left(1-\theta\right)\frac{\overline{c}^y\left(\gamma\right) - \underline{c}}{\overline{c}^o - \underline{c}}\frac{\widehat{\omega}^o}{\widehat{\omega}}\right) \tag{6}$$

and

$$p_\kappa\left(q_{\mathcal{I}}, q_{\mathcal{C}}; \gamma\right) = \frac{\psi\lambda\left(\overline{c}^o - \underline{c}\right)}{\theta\left(\overline{c}^o - \underline{c}\right) + \left(1-\theta\right)\left(\overline{c}^y\left(\gamma\right) - \underline{c}\right)}\left(\frac{\alpha_\kappa}{1-\alpha_\kappa} + R_\kappa\right), \tag{7}$$

where Eqs. (6) and (7) describe respectively the distributional conflict and the political conflict, as discussed in the text. We note that the equilibrium condition (6) holds true for both candidates. Assuming that $D\left(\tau_\kappa\right) = \tau_\kappa^2/2$, we obtain:

$$\tau_\kappa = \tau^*\left(\gamma\right) = \begin{cases} 1 - \frac{1}{\lambda}\left(\theta\frac{\widehat{\omega}^y}{\widehat{\omega}} + \left(1-\theta\right)\frac{\overline{c}^y(\gamma) - \underline{c}}{\overline{c}^o - \underline{c}}\frac{\widehat{\omega}^o}{\widehat{\omega}}\right) & \text{if} \quad \lambda > \theta\frac{\widehat{\omega}^y}{\widehat{\omega}} + \left(1-\theta\right)\frac{\overline{c}^y(\gamma) - \underline{c}}{\overline{c}^o - \underline{c}}\frac{\widehat{\omega}^o}{\widehat{\omega}}, \\ 0 & \text{if} \quad \text{o/w.} \end{cases} \tag{8}$$

In order to determine the equilibrium level of $R_{\mathcal{I}}$ and $R_{\mathcal{C}}$, we must solve the system of Eqs. (7) for $\kappa \in \{\mathcal{I}, \mathcal{C}\}$. Using Eq. (8) and replacing e_κ by the budget constraint yields:

$$R_{\mathcal{I}}: R_{\mathcal{I}} = \frac{1}{2\lambda\psi}\left(\frac{1}{2}+\chi\right)\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)+\frac{R_{\mathcal{C}}}{2}-\frac{\alpha_{\mathcal{I}}}{2(1-\alpha_{\mathcal{I}})},$$
$$R_{\mathcal{C}}: R_{\mathcal{C}} = \frac{1}{2\lambda\psi}\left(\frac{1}{2}-\chi\right)\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)+\frac{R_{\mathcal{I}}}{2}-\frac{\alpha_{\mathcal{C}}}{2(1-\alpha_{\mathcal{C}})}.$$

Algebraic manipulation yields:

$$R^{*}_{\mathcal{I}}(\gamma) = \frac{1}{\lambda\psi}\left(\frac{1}{2}+\frac{1}{3}\chi\right)\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)-\left(\frac{2}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{1}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right), \tag{9}$$
$$R^{*}_{\mathcal{C}}(\gamma) = \frac{1}{\lambda\psi}\left(\frac{1}{2}-\frac{1}{3}\chi\right)\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)-\left(\frac{1}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{2}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right). \tag{10}$$

For any given γ, $R^{*}_{\kappa}(\gamma)\geq 0$ if and only if $\chi\in\left[\underline{\chi},\overline{\chi}\right]$ where:

$$\underline{\chi}\equiv-\frac{3}{2}+3\lambda\psi\frac{\overline{c}^{o}-\underline{c}}{\theta(\overline{c}^{o}-\underline{c})+(1-\theta)(\overline{c}^{y}(\gamma)-\underline{c})}\left(\frac{2}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{1}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right),$$
$$\overline{\chi}\equiv\frac{3}{2}-3\lambda\psi\frac{\overline{c}^{o}-\underline{c}}{\theta(\overline{c}^{o}-\underline{c})+(1-\theta)(\overline{c}^{y}(\gamma)-\underline{c})}\left(\frac{1}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{2}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right).$$

For reasonable values of parameters, $\overline{\chi}>\underline{\chi}$. Plugging $\tau^{*}(\gamma)$, $R^{*}_{\mathcal{I}}(\gamma)$ and $R^{*}_{\mathcal{C}}(\gamma)$ into constraint (1), the equilibrium levels of education expenditure for candidates $\mathcal{I}$ and $\mathcal{C}$ are, respectively, as follows:

$$e^{*}_{\mathcal{I}}(\gamma) = \frac{\widehat{\omega}}{2\theta}\left(1-\left(\frac{1}{\lambda}\left(\theta\frac{\widehat{\omega}^{y}}{\widehat{\omega}}+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\frac{\widehat{\omega}^{o}}{\widehat{\omega}}\right)\right)^{2}\right) \tag{11}$$
$$-\frac{1}{\lambda\psi\theta}\left(\frac{1}{2}+\frac{1}{3}\chi\right)\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)+\frac{1}{\theta}\left(\frac{2}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{1}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right)$$

and

$$e^{*}_{\mathcal{C}}(\gamma) = \frac{\widehat{\omega}}{2\theta}\left(1-\left(\frac{1}{\lambda}\left(\theta\frac{\widehat{\omega}^{y}}{\widehat{\omega}}+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\frac{\widehat{\omega}^{o}}{\widehat{\omega}}\right)\right)^{2}\right) \tag{12}$$
$$-\frac{1}{\lambda\psi\theta}\left(\frac{1}{2}-\frac{1}{3}\chi\right)\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)+\frac{1}{\theta}\left(\frac{1}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{2}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right).$$

For any given γ, $e^{*}_{\kappa}(\gamma)>0$ if and only if $\lambda>\overline{\lambda}_{\kappa}(\gamma)$ with $\overline{\lambda}_{\kappa}(\gamma)=\frac{-\phi_{1,\kappa}+\sqrt{\phi^{2}_{1,\kappa}+4\phi_{0}\phi_{2,\kappa}}}{2\phi_{0}}$ being the positive solution of the nonlinear equation $e^{*}_{\kappa}(\gamma)=0$, where $\phi_{1,\mathcal{I}}\equiv\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)\frac{1}{\psi\theta}\left(\frac{1}{2}+\frac{1}{3}\chi\right)$, $\phi_{2,\mathcal{I}}\equiv-\frac{\widehat{\omega}}{2\theta}-\frac{1}{\theta}\left(\frac{2}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{1}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right)$, $\phi_{1,\mathcal{C}}\equiv\left(\theta+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\right)\frac{1}{\psi\theta}\left(\frac{1}{2}-\frac{1}{3}\chi\right)$, $\phi_{2,\mathcal{C}}\equiv-\frac{\widehat{\omega}}{2\theta}-\frac{1}{\theta}\left(\frac{1}{3}\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}+\frac{2}{3}\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right)$, and $\phi_{0}\equiv\frac{\widehat{\omega}}{2\theta}\left(\theta\frac{\widehat{\omega}^{y}}{\widehat{\omega}}+(1-\theta)\frac{\overline{c}^{y}(\gamma)-\underline{c}}{\overline{c}^{o}-\underline{c}}\frac{\widehat{\omega}^{o}}{\widehat{\omega}}\right)^{2}$. Hence, if

$\lambda > \max\left(\overline{\lambda}_{\mathcal{I}}(\gamma), \overline{\lambda}_{\mathcal{C}}(\gamma)\right)$, then $e^*_\kappa(\gamma) > 0$ for each κ. Finally, the equilibrium probability for party $\mathcal{I}$ to win the election is equal to

$$p^*_{\mathcal{I}}(\gamma) = \frac{1}{2} + \frac{1}{3}\chi + \frac{\lambda\psi}{3}\frac{\overline{c}^o - \underline{c}}{\theta(\overline{c}^o - \underline{c}) + (1-\theta)(\overline{c}^y(\gamma) - \underline{c})}\left(\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}} - \frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right) \tag{13}$$

and $p^*_{\mathcal{C}}(\gamma) = 1 - p^*_{\mathcal{I}}(\gamma)$.

Having characterized the equilibrium fiscal policies, now we turn to determine the total turnout rate. The share of young voters who abstain is $1 - \pi^{y*}(\gamma)$ which is equal to

$$\mathbb{E}_\delta \int_{\underline{\omega}}^{\overline{\omega}} \Pr\left(c^y_j > \max\left\{\mathbf{c}^y_{\mathcal{I}}(q^*_{\mathcal{I}}, q^*_{\mathcal{C}}; \omega_j), \mathbf{c}^y_{\mathcal{C}}(q^*_{\mathcal{I}}, q^*_{\mathcal{C}}; \omega_j)\right\}\right) dF^y(\omega_j),$$

where $\mathbb{E}_\delta$ denotes the expectation operator with respect to the random variable δ and

$$\mathbf{c}^y_{\mathcal{I}}(\cdot) = -\frac{2\chi}{3\theta\psi}\left(\theta + (1-\theta)\frac{\overline{c}^y(\gamma) - \underline{c}}{\overline{c}^o - \underline{c}}\right) + \frac{\lambda}{3\theta}\left(\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}} - \frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right) + \delta$$

and $\mathbf{c}^y_{\mathcal{C}}(\cdot) = -\mathbf{c}^y_{\mathcal{I}}(\cdot)$. Hence,

$$1 - \pi^{y*}(\gamma) = \frac{\overline{c}^y(\gamma)}{\overline{c}^y(\gamma) - \underline{c}} - \frac{1}{\overline{c}^y(\gamma) - \underline{c}}\left|\begin{array}{c} \frac{\chi}{\psi}\left(1 - \frac{2}{3\theta}\left(\theta + (1-\theta)\frac{\overline{c}^y(\gamma) - \underline{c}}{\overline{c}^o - \underline{c}}\right)\right) \\ + \frac{\lambda}{3\theta}\left(\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}} - \frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right) \end{array}\right|.$$

Similarly, the share of old who abstain is $1 - \pi^{o*}(\gamma)$ which is equal to:

$$\mathbb{E}_\delta \int_{\underline{\omega}}^{\overline{\omega}} \Pr(c^o_j > \max\{\mathbf{c}^o_{\mathcal{I}}(q^*_{\mathcal{I}}, q^*_{\mathcal{C}}; \omega_j), \mathbf{c}^o_{\mathcal{C}}(q^*_{\mathcal{I}}, q^*_{\mathcal{C}}; \omega_j)\}) dF^o(\omega_j),$$

where $\mathbf{c}^o_{\mathcal{I}}(\cdot) = \delta$ and $\mathbf{c}^o_{\mathcal{C}}(\cdot) = -\delta$. Hence,

$$1 - \pi^{o*}(\gamma) = \frac{\overline{c}^o - \left|\frac{\chi}{\psi}\right|}{\overline{c}^o - \underline{c}}.$$

We note that as γ increases: (i) $\overline{c}^y(\gamma)$ decreases and, in turn, $\pi^* = \theta\pi^{y*}(\gamma) + (1-\theta)\pi^{o*}(\gamma)$ increases since $\pi^{y*}(\gamma)$ increases, while leaving $\pi^{o*}(\gamma)$ unaltered; (ii) $\tau^*_\kappa(\gamma)$ and $e^*_\kappa(\gamma)$ increase, while $R^*_\kappa(\gamma)$ decreases; (iii) $p^*_{\mathcal{I}}(\gamma)$ increases (decreases) when $\alpha_{\mathcal{I}} > (<)\,\alpha_{\mathcal{C}}$, while it remains constant when $\alpha_{\mathcal{I}} = \alpha_{\mathcal{C}}$.

Denote $\mathcal{V}_{\mathcal{I}}(\gamma) \equiv p_{\mathcal{I}}(\gamma) \cdot (\alpha_{\mathcal{I}} + (1-\alpha_{\mathcal{I}})R^*_{\mathcal{I}}(\gamma))$. The incumbent implements a preregistration reform if and only if $\mathcal{V}_{\mathcal{I}}(\gamma) \geq \mathcal{V}_{\mathcal{I}}(0)$, i.e.,

$$p^*_{\mathcal{I}}(\gamma) \cdot (\alpha_{\mathcal{I}} + (1-\alpha_{\mathcal{I}})R^*_{\mathcal{I}}(\gamma)) \geq p^*_{\mathcal{I}}(0) \cdot (\alpha_{\mathcal{I}} + (1-\alpha_{\mathcal{I}})R^*_{\mathcal{I}}(0)).$$

Here we show that there exists a threshold level $\tilde{\alpha}_{\mathcal{I}}$, which is larger than $\alpha_{\mathcal{C}}$, such that if $\alpha_{\mathcal{I}} > \tilde{\alpha}_{\mathcal{I}}$, then the incumbent implements the reform. First, we note that if $\alpha_{\mathcal{I}} = \alpha_{\mathcal{C}}$, then $p^*_{\mathcal{I}}(\gamma) = p^*_{\mathcal{I}}(0)$ and, in turn, $\mathcal{V}_{\mathcal{I}}(\gamma) < \mathcal{V}_{\mathcal{I}}(0)$, since $R^*_{\mathcal{I}}(\gamma) < R^*_{\mathcal{I}}(0)$ for each γ. Second, we note that for $\alpha_{\mathcal{I}}$ larger than $\alpha_{\mathcal{C}}$ and close to one, the term $(1-\alpha_{\mathcal{I}}) R^*_{\mathcal{I}}(\gamma)$ approaches zero for each γ. This implies that $\mathcal{V}_{\mathcal{I}}(\gamma) > \mathcal{V}_{\mathcal{I}}(0)$. Finally, $\mathcal{V}_{\mathcal{I}}(\gamma)$ is a monotonic and increasing function of $\alpha_{\mathcal{I}}$ for each γ. Indeed, since $R^*_{\mathcal{I}}(\gamma) = \frac{1}{\lambda\psi}\left(\theta + (1-\theta)\frac{\overline{c}^y(\gamma)-\underline{c}}{\overline{c}^o-\underline{c}}\right) p^*_{\mathcal{I}}(\gamma) - \frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}}$, we have $\frac{\partial \mathcal{V}_{\mathcal{I}}(\gamma)}{\partial \alpha_{\mathcal{I}}} = 2\frac{\partial p^*_{\mathcal{I}}(\gamma)}{\partial \alpha_{\mathcal{I}}}(1-\alpha_{\mathcal{I}}) - p^*_{\mathcal{I}}(\gamma)$. Using Eq. (13), we obtain

$$\frac{\partial \mathcal{V}_{\mathcal{I}}(\gamma)}{\partial \alpha_{\mathcal{I}}} = \frac{\lambda\psi}{3}\left(\frac{\overline{c}^o-\underline{c}}{\theta(\overline{c}^o-\underline{c}) + (1-\theta)(\overline{c}^y(\gamma)-\underline{c})}\right)\left(\frac{2-\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}} + \frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right) - \left(\frac{1}{2} + \frac{1}{3}\chi\right) \tag{14}$$

Under the restriction that $\chi < \overline{\chi}$, the partial derivative (14) is always positive for each $\alpha_{\mathcal{I}}$. This implies that there exists a unique $\tilde{\alpha}_{\mathcal{I}} \in (\alpha_{\mathcal{C}}, 1)$ so that $p^*_{\mathcal{I}}(\gamma)\cdot(\tilde{\alpha}_{\mathcal{I}} + (1-\tilde{\alpha}_{\mathcal{I}}) R^*_{\mathcal{I}}(\gamma)) = p^*_{\mathcal{I}}(0)\cdot(\tilde{\alpha}_{\mathcal{I}} + (1-\tilde{\alpha}_{\mathcal{I}}) R^*_{\mathcal{I}}(0))$.

We conclude by highlighting that if $\alpha_{\mathcal{I}} \geq \tilde{\alpha}_{\mathcal{I}}$, such that $\mathcal{V}_{\mathcal{I}}(\gamma) \geq \mathcal{V}_{\mathcal{I}}(0)$, then (i) $p^*_{\mathcal{I}}(\gamma) > 1/2$ with $p^*_{\mathcal{I}}(\gamma) > p^*_{\mathcal{C}}(\gamma)$, since $\tilde{\alpha}_{\mathcal{I}} > \alpha_{\mathcal{C}}$; (ii) $R^*_{\mathcal{I}}(\gamma) > R^*_{\mathcal{C}}(\gamma)$, since using Eqs. (9) and (10), we have that $R^*_{\mathcal{I}}(\gamma) \geq R^*_{\mathcal{C}}(\gamma)$ for $\alpha_{\mathcal{I}} \geq \hat{\alpha}_{\mathcal{I}} \equiv \frac{\frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}} + 2\chi\frac{1}{\lambda\psi}\left(\theta + (1-\theta)\frac{\overline{c}^y(\gamma)-\underline{c}}{\overline{c}^o-\underline{c}}\right)}{\frac{1}{1-\alpha_{\mathcal{C}}} + 2\chi\frac{1}{\lambda\psi}\left(\theta + (1-\theta)\frac{\overline{c}^y(\gamma)-\underline{c}}{\overline{c}^o-\underline{c}}\right)}$, where $\hat{\alpha}_{\mathcal{I}} < \tilde{\alpha}_{\mathcal{I}}$; (iii) $\tau^*_{\mathcal{I}}(\gamma) = \tau^*_{\mathcal{C}}(\gamma)$, since Eq. (8) is not a function of α_κ; (iv) $e^*_{\mathcal{I}}(\gamma) > e^*_{\mathcal{C}}(\gamma)$, since $\tau^*_{\mathcal{I}}(\gamma) = \tau^*_{\mathcal{C}}(\gamma)$ and $R^*_{\mathcal{I}}(\gamma) > R^*_{\mathcal{C}}(\gamma)$, and by Eq. (1) the fiscal budget must be balanced. ■

Proof of Proposition 3. Consider the case with $\alpha_{\mathcal{I}} > \tilde{\alpha}_{\mathcal{I}}$. From the previous proof of Propositions 1 and 2 we learned that $e^*_{\mathcal{I}}(\gamma) > e^*_{\mathcal{C}}(\gamma)$ with $\frac{\partial p^*_{\mathcal{I}}(\gamma)}{\partial \gamma} > 0$ and $\frac{\partial e^*_{\kappa}(\gamma)}{\partial \gamma} > 0$ for each κ. Hence, the impact of γ on the expected level of education expenditure, i.e., $e^*(\gamma) = p^*_{\mathcal{I}}(\gamma) e^*_{\mathcal{I}}(\gamma) + p^*_{\mathcal{C}}(\gamma) e^*_{\mathcal{C}}(\gamma)$, is equal to:

$$\frac{\partial e^*(\gamma)}{\partial \gamma} = \frac{\partial p^*_{\mathcal{I}}(\gamma)}{\partial \gamma}\left(e^*_{\mathcal{I}}(\gamma) - e^*_{\mathcal{C}}(\gamma)\right) + p^*_{\mathcal{I}}(\gamma)\frac{\partial e^*_{\mathcal{I}}(\gamma)}{\partial \gamma} + (1 - p^*_{\mathcal{I}}(\gamma))\frac{\partial e^*_{\mathcal{C}}(\gamma)}{\partial \gamma} > 0.$$

The following additional comparative statics hold:

$$\frac{\partial e^*(\gamma)}{\partial \chi \partial \overline{c}^y(\gamma)} = -\frac{2\chi}{\lambda\psi(\overline{c}^o-\underline{c})} - \left(\frac{1}{\theta(\overline{c}^o-\underline{c}) + (1-\theta)(\overline{c}^y(\gamma)-\underline{c})} - 1\right)\left(\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}} - \frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right) > 0,$$

$$\frac{\partial^3 e^*(\gamma)}{\partial\theta\partial\chi\partial\overline{c}^y(\gamma)} = \frac{2\chi}{\lambda\psi(\overline{c}^o-\underline{c})} + \left(\frac{1}{\theta(\overline{c}^o-\underline{c}) + (1-\theta)(\overline{c}^y(\gamma)-\underline{c})} - 1\right)\left(\frac{\alpha_{\mathcal{I}}}{1-\alpha_{\mathcal{I}}} - \frac{\alpha_{\mathcal{C}}}{1-\alpha_{\mathcal{C}}}\right) < 0,$$

and

$$\frac{\partial^2 e^*(\gamma)}{\partial(\widehat{\omega}^y/\widehat{\omega})\partial\overline{c}^y(\gamma)} = -\frac{\widehat{\omega}^o}{\lambda^2}\frac{1-\theta}{\overline{c}^o-\underline{c}} > 0.$$

■

8.3 Appendix C: Data

8.3.1 State Level Data

A. Registration Reforms: The main source of information on registration reforms is the National Conference of State Legislatures (ncsl.org). For each state we collect data on the year of enactment of the following four reforms: Preregistration, Online Registration, Election Day Registration, and NRVA. For each reform, we construct a dummy variable which takes value 1 if the provision is present in a given state in a given year, 0 otherwise.

B. Electoral Variables: To code the following variables (variable definitions are in parentheses) we obtain information from Dave Leip's Atlas of U.S. Presidential Elections (uselectionatlas.org): Incumbent (dummy for governor presently running a second term), Year of Mandate (years since the last gubernatorial election), Government Runs Next Election (dummy for governor running again), Democratic Governor (dummy for whether the governor is a Democrat), Democratic President (dummy for whether the president is a Democrat), Democratic Governor and President (dummy for whether both the governor and the president are Democrats), Political Competition (the difference in the voting share between Democrats Republicans, in absolute terms). From the same source we also obtain data on gubernatorial turnout, which we divide by the number of eligible voters from the United States Elections Project (electproject.org) to construct the variable Gubernatorial Turnout Rate.

C. Fiscal Variables: Annual financial data on the activity of local and state governments are provided by the Annual Surveys of State and Local Government Finances conducted by the U.S. Census Bureau (census.gov/govs/local). Data are available for the period 1977-2013, which thus delimits our state level sample. Variables are provided in constant 2013 U.S. dollars per capita. We report variable codes in parentheses. With the only exception of Federal Intergovernmental Expenditure (R32), the expenditure data we employ reflect direct expenditure (i.e., payments to employees, suppliers, contractors, beneficiaries, and other final recipients of government payments). Our focus is on Total Education Expenditure (E024), which refers to schools, colleges, and other educational institutions (e.g., for handicapped individuals), as well as educational programs for adults and other special classes. Total Education Expenditure is classified by character, as Current Operating Expenditure (E025) vs. Capital Outlay Expenditure (E026), and by function, as Elementary and Secondary Education Expenditure (E027) vs. Higher Education Expenditure (E030). The former comprises payments for instructional, support services, and other activities of local public schools for kindergarten through high school programs. The latter include activities of institutions operated by the state. Residual expenditures are collected under Non Classified Education Expenditure (NEC) (E037). Turning to

other kinds of expenditure, Public Welfare Expenditure (E090) refers to support to the needy such as Old Age Assistance; Health Expenditure (E090) includes general public health activities; Total Assistance and Subsidies (E009) consists of cash contributions and subsidies to persons; Unemployment Compensation Expenditure (E137) comprises payments under unemployment compensation programs. On the revenue side we also report Total Tax Revenue (R05) and Total Debt Outstanding (D01).

D. Socio-economic Variables: Data on Population (in thousands) and Personal Income are from the Bureau of Economic Analysis (bea.gov). We define the variables Median Age, Share of 18-25, Share of Blacks, and Share of Whites using population data by age and race obtained from the Surveillance, Epidemiology, and End Result (SEER) program of the National Cancer Institute (seer.cancer.gov). Information on Post-secondary Enrolment (in thousands) comes from the National Center for Education Statistics (nces.ed.gov). The Unemployment Rate is provided by the Bureau of Labor Statistics (bls.gov). The variables Educational Attainment, which reflects the share of population with a High School Diploma, and Inequality (defined as a Theil Index) come from the U.S. State-Level Income Inequality Data - Mark W. Frank (shsu.edu/eco_mwf/inequality.html).

8.3.2 County Level Data

A. Preregistration: As for state level data, the main source of information used to construct the Preregistration dummy is the National Conference of State Legislatures (ncsl.org).

B. Education Institutions Variables: The data source is the Integrated Postsecondary Education Data System (IPEDS) provided by the Delta Cost Project Database run by the National Center for Education Statistics (nces.ed.gov/ipeds/deltacostproject). IPEDS provides three sub-samples. The first includes over 2,100 institutions eligible for a 26-year panel (from 1987 to 2012). The second includes almost 3,900 institutions eligible for a 11-year panel (from 2002 to 2012). The third includes almost 4,400 institutions eligible for a 6-year panel (from 2007 to 2012). We focus on the second sub-sample (2002-2012) because it provides more variation across institutions. In addition, information for several variables/years are missing from the first sample, thus further reducing variation. We disregard the third sample because it does not provide enough variation in terms of the adoption of preregistration laws. The main variables are defined as follows. % State Grants is state grants divided by total student financial aid. % Receivers State Grants is the Number of Receivers of State Grants divided by the number of full time first time degree seekers. % Institutional Grants, % Receivers Institutional Grants, % Federal Grants, and % Receivers Federal Grants are defined analogously. We also report the number of

Total, Male, and Female Applications, Full Time Enrolment, Enrolment by race (White, Hispanic, Black, Asian, and American Indian), and Non Resident Enrolment. Institutional characteristics reflect the following: the Carnegie Classification, a ranking of all U.S. colleges and universities that are degree granting (we refer to the 2010 Collapsed edition); Medical Degree Institution; Institutional Control (public, private not-for-profit, private for-profit); Institutional Level (4-year and higher, 2-but-less-than 4-year, less than 2-year); Institutional Sector (a categorical variable taking 9 values combining control and level); Land Grant Institution (institution originally designated to receive state benefits coming from federally controlled land to support the teaching of practical skills); Historically Black College; and Hispanic Serving Institution. Financial information include Tuition Reliance (net tuition share of operating revenues); Total Expenditures (the sum of operating and non-operating expenses and deductions in the current year), and In-State (Sticker price) and Out-of-State Tuition and Fees for full time undergraduates. We also report the Share of (first time degree/certificate-seeking) Students submitting SAT scores and information on the SAT Percentile Score for Math and Critical Reading.

C. *Socio-economic Variables:* As for the state level dataset, data on Population (in thousands) and Personal Income are from the Bureau of Economic Analysis (bea.gov).

8.3.3 CPS Data

A. Preregistration: As for previous datasets, the main source of information for the Preregistration dummy is the National Conference of State Legislatures (ncsl.org).

B. Electoral Variables: We obtain information on voting and registration at the individual level from the Current Population Survey (CPS) conducted by the Census Bureau for the U.S. Government (census.gov/programs-surveys/cps.html). While the CPS is a monthly survey focused on labor market outcomes, its Voting and Registration Supplement (census.gov/topics/public-sector/voting.html) provides information biannually after each November election. Our sample covers the period 1996-2014. Both the NBER (nber.org/cps) and IPUMS (cps.ipums.org) maintain a collection of historical CPS data. Unless otherwise mentioned, we employ the NBER version. The variable Voter Turnout is a dummy for whether an individual in a given state and year has voted in the previous November election. The variables Registered (IPUMS) and Registered at School, on Campus or at Hospital are coded analogously. The sample is confined to individuals that do answer to the Voter Turnout and/or Registration questions.

C. Socio-economic Characteristics: As for Electoral Variables, our source is the CPS, since the November Supplement also provides information on individual characteristics of the respondents. The set of dummy variables Age 18-24, Age 25-44, Age 45-64, and Age

65+ reflects the corresponding age shares of survey respondents. We also use dummy variables identifying individual characteristics such as Sex, Black, Hispanic, and (for IPUMS only) White. Citizenship is measured by a categorical variables taking values from 1 to 5 (native born in U.S., native born in Puerto Rico or U.S. outlying area, native born abroad of American parent(s), foreign born U.S. citizen by naturalization, foreign born not a citizen of the U.S.). Marital Status is measured by a categorical variable taking values from 1 to 6 (married spouse present, married spouse absent, widowed, divorced, separated, never married). Metropolitan Status is a categorical variable taking values from 1 to 3 (metropolitan, non metropolitan, not identified). Years of Schooling reports years of completed grades, from category 1 to 16. (less than 1st grade, 1st 2nd 3rd or 4th grade, 5th or 6th grade, 7th or 8th grade, 9th grade, 10th grade, 11th grade, 12th grade no diploma, high school grad-diploma, some college but no degree, associate degree-occupational/vocational, associate degree-academic program, bachelor's degree, master's degree, professional school degree, doctorate degree). Family Income, i.e., household's total combined income during the past 12 months, is reported by bracket, from bracket 1 to 16 (less than $5,000, 5,000 to 7,499, 7,500 to 9,999, 10,000 to 12,499, 12,500 to 14,999, 15,000 to 19,999, 20,000 to 24,999, 25,000 to 29,999, 30,000 to 34,999, 35,000 to 39,999, 40,000 to 49,999, 50,000 to 59,999, 60,000 to 74,999, 75,000 to 99,999, 100,000 to 149,999, 150,000 or more). Housing Tenure is a categorical variable taking values from 1 to 3 (owned or being bought by a household member, rented for cash, occupied without payment of cash rent). Employment Status is a categorical variable taking values from 1 to 4 (working, looking, layoff, with a job not at work). Labor Force Participation is a dummy variable taking two values (1, 0).