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Voter turnout and intergenerational redistribution

Michael Klien[a], Mickael Melki[*,b], Andrew Pickering[c]

[a] Austrian Institute of Economic Research, Austria
[b] Paris School of Business, 59 rue Nationale, Paris 75013, France
[c] University of York, UK

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ABSTRACT

Electoral reforms that lead to reduced turnout modify the composition of the electorate, potentially overrepresenting specific interests in policy implementation. Intergenerational redistribution tilts in favor of the elderly when they are sufficiently numerous, but in favor of the young rich otherwise. We exploit a natural experiment provided by the repeal of compulsory voting in Austrian parliamentary elections to study how exogenous turnout decline affects intergenerational redistribution through pro-young public education spending in Austrian municipalities. Empirically, education spending falls when the proportion of elderly voters exceeds 21% of the electorate, but rises when the proportion of elderly voters is below this threshold.

1. Introduction

How does democracy resolve the question of intergenerational redistribution? The answer, in part, depends on participation in the democratic process. In recent times both Brexit and the election of the U.S. President Donald Trump highlighted stark divides across generations where elderly voters had a disproportionate influence on the election outcome due to their greater propensity to vote.[1] In the aftermath of the UK referendum, the young – overwhelmingly voting to remain – were blamed in the press for having brought Brexit on themselves with their low turnout (Marocchi, 2016). More generally the political consequences of the widespread age gap in turnout are a real and increasing public concern[2] and have led some governments to attempt to redress the balance, for instance by recently reducing the voting age to 16 in Germany, Austria, Scotland and in some Swiss cantons. Compulsory voting also represents an attempt to level the playing field.[3]

Prior research studying the economic consequences of voter turnout predominantly focuses on the income-based voting gap and its consequences for redistribution between income groups (for example Hodler et al., 2015). However the consequences of the

* Corresponding author.
E-mail address: m.melki@psbedu.paris (M. Melki).

[1] Trump attracted 53% of those aged 65+ with a 71% turnout against 39% of those aged 18–29 but with only a 46% turnout (Sources: BBC News and the US Census Bureau.) In the Brexit Referendum 75% of 18–24 year olds voted in favor of remain, with a turnout figure of 64%, against 66% in favor of Leave for those aged 65–74 with turnout of 80% (Source: Ipsos-Mori.)

[2] According to the World Values Survey (2010–2014), almost one in two people think that "Old people have too much political influence" and around 30% that "Older people get more than their fair share from the government". In a telephone survey performed by (Shea and Green, 2004), 88% of 805 local party leaders in the U.S. agreed with the statement "The lack of political engagement by young people is a serious problem."

[3] Compulsory Voting applied in 32 countries in 2008 (Chong and Olivera, 2008).

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generational gap in turnout are relatively unexplored. This is surprising because intergenerational conflict over redistribution is widely acknowledged[4] and the generational gap in turnout has been recognized by political scientists since the 1930s (Bhatti et al., 2012). Understanding the mechanisms underpinning intergenerational redistribution is already of paramount importance as social protection systems in the OECD redistribute more resources across age groups than across income groups.[5] Moreover ongoing increases in life expectancy will likely amplify the tensions already present.

This paper investigates how the abolition of Compulsory Voting (CV) affects intergenerational redistribution through public education spending. Education spending clearly benefits young households with children, but is of little direct advantage to the elderly.[6] We first outline a simple theoretical model, building on the well-documented evidence that both elderly, and separately also richer voters are more likely to participate in voluntary elections. Hence falls in turnout are pronounced among the young poor. In the model greater (relative) participation of particular demographic or socioeconomic groups, compared to the benchmark of full turnout under CV, leads to greater weighting of their preferences in policy-setting. If the old place least weight on education whilst young rich voters place most weight, the effect of the reform on public education is ambiguous, depending on the size of each of the groups in the population. The key result is that when the share of elderly in the population is above a certain threshold, abolishing compulsory voting decreases public education spending as the old become relatively more overrepresented in the policy-setting process. However if the share of elderly voters is below this threshold, then CV abolition results in the pro-education young rich becoming more politically dominant, thus resulting in increased public education spending. Because the young rich represent a force countering the electoral influence of the old, this threshold is higher when the population is richer and the share of young rich, relative to the young poor, in the population is higher.

We empirically test these hypotheses for a legislative change that resulted in significantly reduced turnout in municipal elections in Austria: the abolition of Compulsory Voting in Austrian parliamentary elections. In 1992 the constitutional court repealed CV for parliamentary elections in four out of nine Austrian states. Because the legislative change was made at the national level it represents a quasi-natural experiment, and provides a source of exogenous turnout variation across municipalities. Below we make the case that the reform resulted firstly in reduced turnout in parliamentary elections, which in turn led to reduced political participation in general, and in particular reduced turnout in municipal elections. Austria provides an attractive setting for the empirical analysis for three additional reasons: First, the disproportionate political influence of the elderly has become a major issue in Austrian politics.[7] Second, the Austrian municipal setting allows specific focus on the education share of the budget, as Austrian municipalities have considerable autonomy over their budget expenditure composition but not regarding tax setting. Third, when Austria abolished CV in 1992, no other concurrent reforms were implemented, while CV laws have often been changed as a result of wider political reforms in other countries (Electoral Commission, 2006). Thus the Austrian experience of CV abolition facilitates isolation of the effect of a reduction in the net benefits of voting.

The empirical analysis uses panel data covering more than 2000 Austrian municipalities for 5–6 municipal elections over 1990–2010, combining data from Austrian government accounts, population censuses and election results. We first provide evidence of the conditional effect of the reform on education policies. In the youngest municipalities of our sample (where elderly voters represent only 6% of the population), compared to CV, Voluntary Voting (VV) is found to *increase* the education share of the budget by 19%, holding all else constant. Conversely, in the oldest municipalities (where the elderly share is 43%), VV *reduces* the education share by 29%. The effect of VV on education turns negative when the elderly exceeds 21% of the municipal population, which is slightly above the mean of our sample (18%). Second this threshold is found to be higher in richer municipalities: 20% in a relatively poor municipality against 23% in a relatively rich municipality. This is consistent with the theory which emphasizes two opposing forces under VV: the relative over-representation of the elderly and the young rich against the under-representation of the young poor.

Our identification strategy firstly requires that the observed heterogeneous response of public education spending (depending on demography) to the abolition of CV is only due to the consequent relative overrepresentation of the elderly and young rich in the electorate. Arguably the reform could have led to other compositional effects on the electorate, such as influencing the vote share for left- and right-wing parties, party competition or fragmentation, for example if it especially discouraged impressionable voters who traditionally used to vote for the incumbent or leading parties. However the data exhibit no relationship between these electorate composition variables and observed changes in abstention. We also explore the possibility that VV could have impacted fiscal policies in general hence only indirectly affecting education spending, but again find no evidence that policies other than education were affected.

Identification also requires a strong relationship between turnout in municipal elections and parliamentary elections. Clearly the reform meant that turnout in the parliamentary elections was significantly reduced in overall terms, and also significantly changed in terms of its demographic and socioeconomic composition. We argue that this in turn had a strong effect on turnout, and

[4] The literature on the intergenerational conflict over the provision of public education provides consistent evidence of a negative association between the fraction of the elderly and the level of public education provided at the local level (e.g. Harris et al., 2001).

[5] Across 25 OECD countries, per capita public spending towards the elderly exceeds spending on the non-elderly by a factor of between 3 and 6 (OECD, 2005).

[6] Analyzing individual support for different public spending items in 18 OECD countries, Armingeon and Bonoli (2007) show that the strongest generational divides are on education and pensions.

[7] In addition to the reduction of the voting age, a recent controversy related to the 2013 referendum on ending conscription also exemplifies the disproportionate political influence of the elderly. Conscription was maintained with the strong support of the elderly in spite of the opposition of younger voters.

electorate composition, at the municipal level. Individual level data in repeated cross-sections from the Austrian Social Survey support this argument. Firstly the elderly's turnout in parliamentary elections is virtually unaffected by the abolition of CV of 1992, in contrast to younger voters whose turnout fell meaningfully. The elderly are also observed to identify with particular parties to a greater extent than the rest of the electorate, implying greater benefits from voting. Furthermore, the elderly are also observed to have also higher levels of information and interest-levels in politics, suggesting lower costs of acquiring the political knowledge necessary to vote. Secondly, we provide evidence that the abolition of CV at the parliamentary level affected turnout in subsequent municipal elections. We further show that one possible mechanism linking CV rules in general elections to participation in local elections is that CV abolition is associated with a decrease in interest in politics, which reduces the benefits of voting in local elections.

The paper contributes to the literature analyzing the effects of voter turnout on public policies. Most of this literature focuses on total redistribution following Meltzer and Richard (1981), for example Mahler (2008), though here the focus is on the composition of spending. It also relates to an innovative literature examining how particular public policies respond to change in the composition of the electorate. Miller (2008) investigates how child health policies were affected by the enfranchisement of women in the U.S., and Fujiwara (2015) similarly examines how child health policies changed with the increased turnout of the less educated following the innovation of electronic voting in Brazil. Naidu (2012) examines how the teacher-child ratio fell in black schools with the disenfranchisement of black citizens in the 19th century U.S. South. Closer to our paper, Bertocchi et al. (2017) document that the youth enfranchisement through preregistration laws in the US shifted government spending toward expenditure on higher education. However prior to this paper the consequences of the overrepresentation of the elderly on intergenerational redistribution have not been analyzed.[8]

An important precedent studying the effects of CV laws on fiscal policy in Austria is Hoffman et al. (2017) (HLL henceforth).[9] Interestingly, they find that CV laws did not affect government spending patterns (in levels or composition) nor electoral outcomes at the state level. A first difference between HLL and the present paper is that their analysis is of state-level policy rather than municipalities - which enables a considerably bigger dataset. Secondly our finding of a *conditional* effect of CV repeal on public education spending is compatible with HLL in that we estimate a quantitatively negligible effect for the *average* elderly share - which potentially is close to the cutoff where the overrepresentation of the elderly and of the young rich offset each other. The repeal of CV thus reduces (or increases) education spending only in municipalities where the elderly share in the electorate is sufficiently large (or small).

The paper is structured as follows. Section 2 provides a theoretical analysis of how differential turnout can affect policy choices. Section 3 discusses the Austrian institutional framework and the data. Section 4 presents the empirical strategy and Section 5 contains the results. Section 6 concludes.

2. Theory

Here we provide a simple analytical framework consistent with the Austrian municipal system to illustrate how differential turnout depending on demography and income can influence intergenerational redistribution through public education spending. Suppose first that municipal-level expenditure can be targeted at either education spending (in per capita terms, g^E) or other public goods and services (g^N). In line with the Austrian municipal framework, discussed in more detail in the next section, tax revenue at the municipal level is assumed to be exogenously set at $\overline{\tau}$ per capita, and hence $g^N = \overline{\tau} - g^E$.

Define the *electorate* as those who are entitled to vote, and *voters* as those who actually do vote. The electorate differs firstly by age, with α^O denoting the proportion that are 'old', and $1 - \alpha^O$ the proportion that are 'young'. The young are also differentiated according to their income, with α^R and $\alpha^P (=1 - \alpha^O - \alpha^R)$ respectively denoting the proportions of 'rich' and 'poor' young.[10] Thus, the three groups are the old, the young rich, and the young poor.

For simplicity material preferences are log-linear, denoted

$$U^J = c^J + \beta^J \ln g^E + (1 - \beta^J) \ln g^N \tag{1}$$

for $J = O, R, P$ denoting the old, rich and poor. Private consumption (c^J) is the same for all individuals within a group, with $c^J = y^J - \overline{\tau}$ where y^J is within-group per capita income. β^J denotes relative preference for spending on education, with $0 \leq \beta^J \leq 1$. Both aggregate and individual data indicate that old voters are less supportive of education spending (which of course they generally

[8] For completeness, we should still acknowledge an older literature studying the effect of voter turnout on school bond approval. Piele and Hall (1973) argue that, in school bond elections, individuals mostly likely to turnout are those with vested interests in the provision of public education, such as parents and teachers. However, as turnout increases, the voting power of these likely supporters is reduced because of the increased representation from other groups likely to oppose school taxations (old, childless families). Conversely, Hamilton and Cohen (1974) document a positive association between turnout and school bond approval. They argue that when turnout is high, voters' preferences are heterogeneous and no strong voting groups can emerge.

[9] Also in the Austrian context Shineman (2012) use individual-level data to show that exposure to CV laws had an unclear impact on citizens' political sophistication. It increased the citizens' political interest, attention to political news, and the level of information about party platforms on EU integration but not their ability to identify the left-right ideological position of the major political parties. Using municipal level data for parliamentary elections, Ferwerda (2014) shows that turnout decline subsequent to the 1992 constitutional change is associated with a modest redistribution of votes between parties but with a clearer shift in votes from minor to mainstream parties.

[10] The analysis could also differentiate between rich and poor old, with the latter especially averse to education spending. This generalization would serve to reinforce the argument below.

do not consume) than young voters.[11] However, the preferences of the young are not homogeneous and depend on their income. We posit that the rich are especially keen on education spending in relative terms. Demand for education spending is derived from its effectiveness in human capital production, and for example if public education acts as a complement with other parental investments which are greater for the rich, then the returns to education are increasing with income. It is also likely that other public goods and services (g^N) (for example social housing) are used predominantly by the poor, and not the rich. Hence the opportunity cost of spending on education is likely to be higher for the poor.[12] Given these considerations, and to summarize, $\beta^R > \beta^P > \beta^O$. Note that given this set-up the preferred policy position for each group is $g^E = \beta^J \bar{\tau}$.

Using a probabilistic voting framework (for which details are given in the appendix) then under compulsory voting the entire electorate votes and policy is set according to

$$g^E_{CV} = (\alpha^O \beta^O + \alpha^R \beta^R + \alpha^P \beta^P)\bar{\tau} \tag{2}$$

where g^E_{CV} is the policy choice under compulsory voting. Eq. (2) gives the intuitive result that policy preferences (the β^Js) are weighted depending on the size of the relevant groups (the α^Js) in the electorate. The greater the fraction of old in the municipality, the greater α^O, and hence the lower the level of education spending, holding all else equal. Similarly the richer the municipality, the greater α^R and the greater the level of education spending.

When instead voting is voluntary, these weights change depending on relative turnout. If policymakers know (or at least are able to make reasonable estimates of) how each of the three groups will turn out then in this instance policy is set at:

$$g^E_{VV} = (\lambda^O \beta^O + \lambda^R \beta^R + \lambda^P \beta^P)\bar{\tau} \tag{3}$$

where g^E_{VV} is the policy choice under voluntary voting and the λ^J parameters now reflect the respective proportions of the three groups in those who actually vote. In general $\lambda^J \neq \alpha^J$ and the relative power of the three groups changes depending on their turnout. In the appendix we show how the λ^Js depend on the differential turnout rates, T^J, across the three groups using a standard analysis of turnout decisions following Riker and Ordeshook (1968).

We make two assumptions in relation to turnout behavior. From here we simplify the notation somewhat so that $\alpha \equiv \alpha^O$ and $\gamma \equiv \frac{\alpha^R}{(1-\alpha)}$ (hence $1-\gamma \equiv \frac{\alpha^P}{(1-\alpha)}$). The parameter α thus summarizes the size of the old in the electorate, whilst γ summarizes the proportion of rich in the young electorate. First, the old have a high propensity to vote relative to the young, hence analytically $T^O > T^R\gamma + T^P(1-\gamma)$. Blais (2000) establishes a positive relationship between age and turnout and this regularity also holds for the Austrian case.[13] Second the propensity to vote of the young increases with income. Lijphart (1997) and many others provide empirical support for this supposition. Hence, the young poor are assumed to have a low propensity to vote relative to the rich, and analytically $T^R > T^P$.

The abolition of compulsory voting creates two offsetting forces: greater weight on the preferences of the anti-education old versus greater weight on the preferences of the pro-education young rich. The question is which effect dominates? Figs. 1 and 2 plot policy under the two regimes as a function of α, the proportion of elderly in the population. Under either regime spending on education falls as α increases, but whilst the relationship is linear in the case of compulsory voting, it is non-linear and concave when voting is voluntary. It turns out that given the model assumptions there are exactly two levels of α at which policy is the same under the two regimes, the first (and trivial) case is when $\alpha = 1$ where clearly whether or not voting is compulsory or not has no impact on policy as the voters (and the electorate) are homogenous. The more empirically relevant internal case arises at $\bar{\alpha}$, where $0 < \bar{\alpha} < 1$ and which is derived in the appendix.

The key insight follows from the fact that g^E_{VV} cuts through g^E_{CV} from above due to its concavity. Hence abolishing CV results in increased education spending when $\alpha < \bar{\alpha}$, but results in reduced education spending when $\alpha > \bar{\alpha}$. The intuition is straightforward. At low levels of elderly, abolishing CV benefits the pro-education rich, and spending increases, whilst at high levels, abolishing CV benefits the anti-education old. Hence the effect of compulsory voting on policy is highly contingent upon demographics.

Importantly, the municipality's income level conditions the results. When a municipality's income level is higher, the share of young rich in the populace also becomes higher (holding the old-young repartition constant), and hence the more VV overrepresents the young rich. As a municipality gets richer, the force able to offset the old's over-representation (under voluntary voting) becomes

[11] Brunner and Balsdon (2004) and Cattaneo and Wolter (2009) provide micro-evidence for this in different settings. Armingeon and Bonoli (2007) find that preferences for education spending decrease with age, in 18 OECD countries, and especially in Austria.

As underlined by Levy (2005), education is conventionally seen as spending in favor of the young, due to its positive effect on future income or social capital, which the old cannot capture.

The young/old distinction can also be correlated with whether voters have school age children or not and how much they care for their children's education or future income.

[12] Bursztyn (2016) provides evidence that governments invest less in public education spending because poor voters prefer the government to allocate resources elsewhere. Using US state-level data, Poterba (1998) shows that spending on education increases with per capita income, whilst spending on 'non education' does not not, which is supportive of the idea that the income elasticity of demand for education is greater than unity.

In addition, in the absence of data for individual support for public education spending for Austria, we make use of the 2006 wave of the ISSP (International Social Survey Programme) Role of Government database for Germany, a country similar to Austria in terms of how public education is provided and which also has a similar fiscal system. The results reported in Table A.1 in the Appendix show that the only public spending item for which the respondent's support increases with income is education.

[13] Blais (2000) finds a non-linear relationship between voting and age, in particular that mobilization first increases and then decreases (relatively weakly) with age. Using data from Finland, Denmark and Texas, Bhatti et al. (2012) show that the decline is estimated to occur between 65 and 70, but still that turnout of the elderly is on average higher than for the rest of the population.

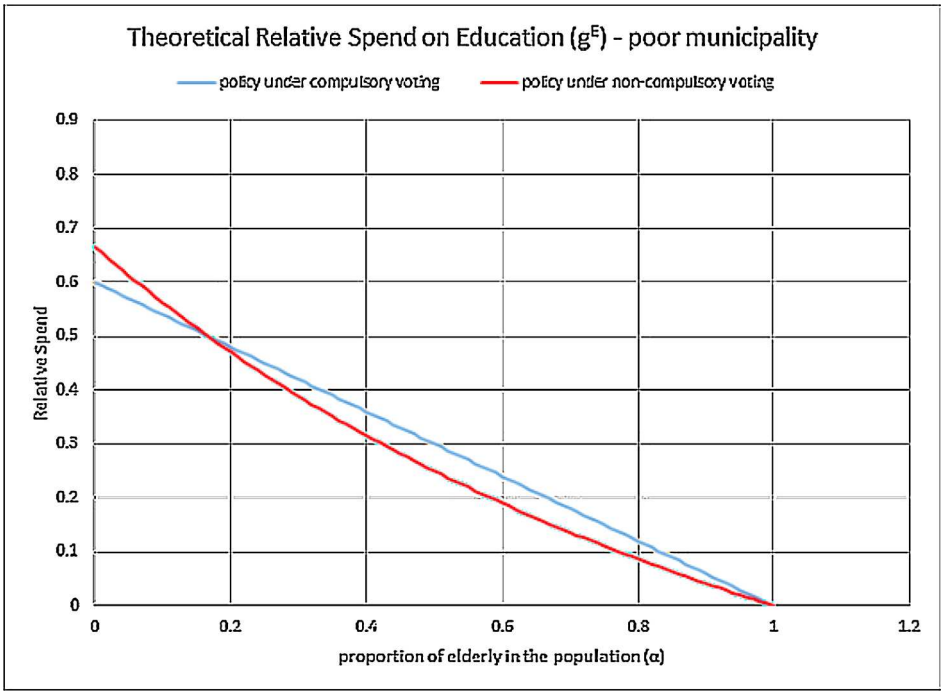

Fig. 1. Policy choice under compulsory and non-compulsory voting. Graph presented assumes: $\beta^R = 1$, $\beta^P = 0.5$, $\beta^O = 0$, $\gamma = 0.2$, $T^o = 1$, $T^R = 1$, $T^P = 0.5$.

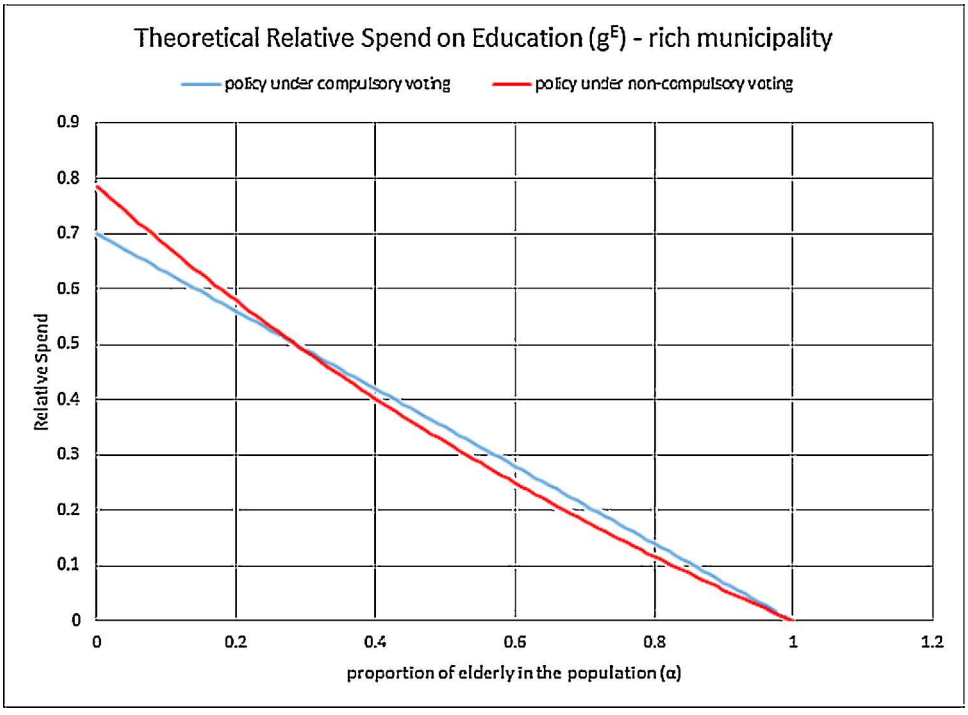

Fig. 2. Policy choice under compulsory and non-compulsory voting. Graph presented assumes: $\beta^R = 1$, $\beta^P = 0.5$, $\beta^O = 0$, $\gamma = 0.4$, $T^o = 1$, $T^R = 1$, $T^P = 0.5$.

stronger, and the point at which the elderly gain electoral advantage from VV shifts. Analytically $\frac{d\bar{\alpha}}{dy} > 0$. Hence whether or not VV results in redistribution away from or towards the young depends both on demographics, and the level of income in a municipality. Figs. 1 and 2, respectively depict relatively poor and rich municipalities.[14] As the constituency gets richer the demand for education increases under both regimes simply because $\beta^R > \beta^P > \beta^O$ and there is now a greater weight on β^R. But now also the electoral capability of the elderly weakens, holding all else constant, because the young rich are more likely to turn out than the young poor. The intersection of the two functions ($\bar{\alpha}$) therefore shifts to the right, meaning that the demographic range over which VV benefits the young rich now increases.

In a nutshell, we have the following concrete hypotheses:

1. Abolishing CV results in a lower education share of the budget when the share of the elderly in the eligible electorate is higher than the critical value, $\bar{\alpha}$.

2. The threshold ($\bar{\alpha}$) that the share of the elderly has to exceed so that CV abolition reduces the education share of the budget increases with the municipal income level.

3. Background and data

3.1. Institutional background

Responsibilities of Austrian municipalities There are two levels of sub-national government in Austria below the federal government. The nine states are the intermediate tier of government[15] and the municipalities form the lower tier. In 2010 there were 2357 municipalities with an average population of 3520 inhabitants (Austria, 2011). In 2010, municipal public expenditure in Austria represented more than 10% of total public spending and around 30% of total public education spending in primary, secondary education and kindergarden.

Austrian municipalities are responsible for the provision of a variety of basic public goods and services (General, Education, Social welfare and housing, Streets and traffic, Public and services, Public order and safety, Art and culture, Health, Economic affairs, Financial affairs). Second only to local services (water, sanitation, waste), education expenditures accounted for roughly 15% of municipal spending in 2010.[16] This comprises spending on primary, secondary, vocational and nursery schools for children below school age. These expenditures cover operating as well as capital expenditures for investment and maintenance of school facilities. The uses range from the maintenance of school buildings and replacing furniture to heating and canteens. Teachers' salaries are not paid by the municipalities but by the states. Intermediate and higher education is not within the jurisdiction of municipal governments but borne by states and the federal government.

Private education at all levels of education has no tradition in Austria and remains of little importance. As a result, municipalities have a quasi monopoly in providing infant education in Austria and enjoy significant discretionary leeway in provisioning education expenditures. Indeed, the autonomy of local authorities to formulate the school budget is assessed to be very high in Austria, with an index of autonomy of 70 against 28 for the average OECD, according to the 2012 Pisa study. The monopoly of Austrian municipalities, along with the strong autonomy of schools, allow for substantial heterogeneity in education spending across municipalities.

Whilst pensions in Austria are paid for through social security and subsidies from the federal government, the elderly still likely benefit directly from a number of policies set at the local level such as spending on retirement homes and (health) care facilities. Although many of these services are not under the control of particular single municipalities – e.g. hospitals and care facilities are organized collectively in a region and with the support of the state government – municipalities are free to spend additional resources and initiate complementary programs. For instance municipalities frequently operate smaller health facilities run by doctors in the employment of the municipality or support elderly care at home.

The funding of Austrian municipalities On the financing side, fiscal autonomy in terms of own taxes and independent tax setting is generally low. The most important sources of finance are derived from the fiscal equalization scheme (33%), local taxes, e.g. on business and property (16.7%) and tariffs for public services (17.4%) in 2010 (Austria and Vienna, 2011). Austrian municipalities have little to no influence over grants, which are calculated on the basis of a fiscal equalization scheme and are therefore by and large a function of population and own tax revenues. It is also important to notice that contrary to other countries such as Germany, the equalization scheme does not depend on the number of schools or children in the municipality.

Own tax revenues are not easily alterable by local governments. The tax power and tax mix of Austrian municipalities are almost nil and thus one of the very lowest in the OECD. Autonomous taxes as share of GDP and autonomous taxes as share of total tax revenue are 0.3 and 0.8, respectively, according to OECD Fiscal Decentralisation Database. As a consequence, the associated tax rates are either uniform across municipalities – as is the case for the local share of the payroll tax, the most important source of tax revenues for local governments – or all municipalities are themselves choosing the same tax rate. The latter case applies to the land tax, where 2335 out of 2357 municipalities have adopted the maximum rate. In addition, local governments are quite constrained in setting tax rates, with limiting rules for instance on property tax.

Compulsory voting in Austria In 1945, each state had the prerogative to adopt CV for parliamentary elections. As a result, three

[14] Numerically $\gamma = 0.2$ in the poor municipality against $\gamma = 0.4$ in the rich municipality.

[15] The 9 states are Upper Austria, Lower Austria, Burgenland, Salzburg, Vienna, Carinthia, Styria, Vorarlberg and Tyrol.

[16] By contrast, health spending, the other service that potentially most aligns with the elderly, never exceeds 5% of municipal spending throughout our observation period.

Table 1
Summary statistics.

	Obs.	Mean	Min	Max	Std.dev.		
					overall	between	within
Panel A: 1990–2010							
Fiscal variables							
Education share of the budget	49,289	0.15	0.001	0.86	0.08	0.05	0.06
Total Expenditure per cap.	49,290	1811	203	26,287	939	674	654
Tax revenues per cap.	49,289	254	6	4896	227	209	87
Total fiscal revenues per cap.	49,290	1837	195	27,972	937	675	649
Demographic variables							
Electorate share aged 65+	49,415	0.18	0.06	0.43	0.04	0.03	0.02
Population share aged 15−	49,451	0.18	0.06	0.31	0.03	0.02	0.02
Total number of inhabitants	49,451	0.2739	0.0025	25.9928	0.8281	0.8277	0.0299
Population density	48,569	0.01	0.00	0.49	0.02	0.02	0.00
Political variables							
VV (Voluntary Voting)	50,077	0.88	0.00	1.00	0.32	0.14	0.29
Panel B: 1996–2010							
Political variables							
Abstention	32,178	0.17	0.01	0.55	0.07	0.06	0.04
Leftwing council	32,178	0.26	0.00	1.00	0.37	0.27	0.26
Number of parties	32,178	3.02	1.00	9.00	0.96	0.87	0.43
Margin of victory	32,178	5.97	0.00	24.00	3.94	3.58	1.59

Notes: Education share of the budget = Education spending as a percentage of total municipal spending; Total Expenditure per cap. = Total municipal spending per capita; Tax revenues per cap. = Yearly total municipal taxes per capita; Total fiscal revenues per cap. = Yearly total municipal revenues (from taxes, government grants and fees/charges) per capita; Electorate share aged 65+ = share of people aged over 65 in municipality's electorate; Population share aged 15− = share of population below age 15; Total number of inhabitants = total number of inhabitants in 000's; Population density = municipal population density; VV (Voluntary Voting) = dummy coded 1 from the second year of the municipal electoral term following Voluntary voting for parliamentary elections abstention rate for the latest municipal election; Abstention = abstention rate for the latest municipal elections; Leftwing council = Dummy for left-wing (SP KP municipal councils; Number of parties = Number of parties in the municipal councils; Margin of victory = difference in vote shares between the highest-ranking party and the runner-up for the latest municipal election. Demographic data are interpolated between the census dates.

states (Tyrol, Vorarlberg and Styria) decided in 1949 to implement CV for parliamentary elections. A fourth state, Carinthia, joined them in 1986. In 1992, the constitutional court ruled that this prerogative was invalid and states no longer had the authority to enforce CV for national elections. As a consequence, the four states ended CV with effect from the 1994 parliamentary elections. Individual states were still allowed to enforce CV in the case of state elections after 1992. However, between 1993 and 2007, these states decided on their own to abolish CV in state elections. For further details, the historical practice in the different states is illustrated in Fig. A.1 in the appendix.

3.2. Data

The empirical analysis uses data for 2357 Austrian municipalities covering the 1990–2010 period. Our dataset combines data from government accounts, population censuses as well as election results. Municipal expenditure data is gathered from government accounts as published by the national Austrian statistics office (Austria and Vienna, 2011). Demographic data are obtained from the censuses of 1991, 2001 and 2011 published by the national Austrian statistics office (Austria and Vienna, 2011). We interpolate the values between the census dates. Political data come from published election results for municipalities, provided by the Austrian states.

The dependent variable is public education expenditure (on primary, secondary, vocational and nursery schools) as a share of total expenditure in the municipality. Table 1 gives descriptive statistics for the main variables of our analysis for the 1990–2010 period and for additional political variables for the 1996–2010 period. The average education share of the municipal budget in our main sample is 15% (i.e. 1478 euros per pupil) ranging from 0.15% to 86% (i.e. 18 euros to 50,404 euros per pupil). A key advantage of our sample is that the education share of the budget varies across municipalities as well as across time. The cross- and within-municipality standard deviations are respectively 4.8% and 6.4%. Table A.2 in the Appendix also shows that despite the common institutional and fiscal setting to each state, there also is substantial variation in the education share of the municipal budget within states.

The share of the aged population (α in the theory) is measured using the share of the people aged over 65 in the municipality's eligible electorate, defined as the population aged above 15. The mean value for this variable is 18%, ranging from 6% to 43%. The standard deviation of 3.6% is mainly driven by cross-municipality heterogeneity (the cross-municipality standard deviation is 3.2%) as the elderly are geographically concentrated in the center and the east of Austria and more generally in rural areas (OECD 2005), as shown by the spatial distribution in Fig. 3 based on the 2011 census. Due to the ageing process over the 20 years of the sample, there

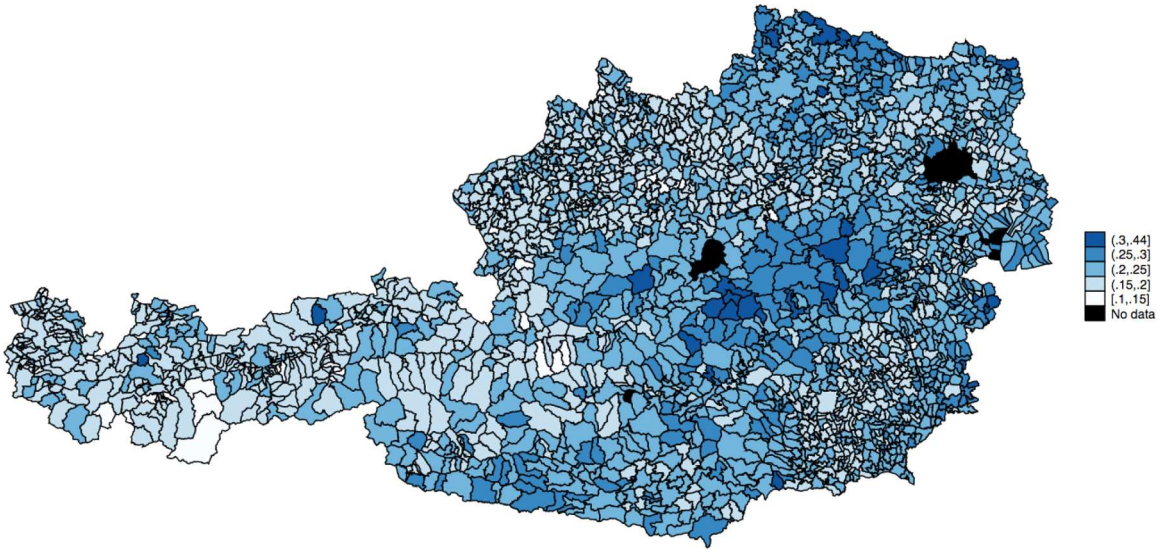

Fig. 3. Geographical distribution of the share of population above 65 in total population. Notes: These figures depict the share of the population above 65 as a percentage of the total population in Austrian municipalities in the census year 2011.

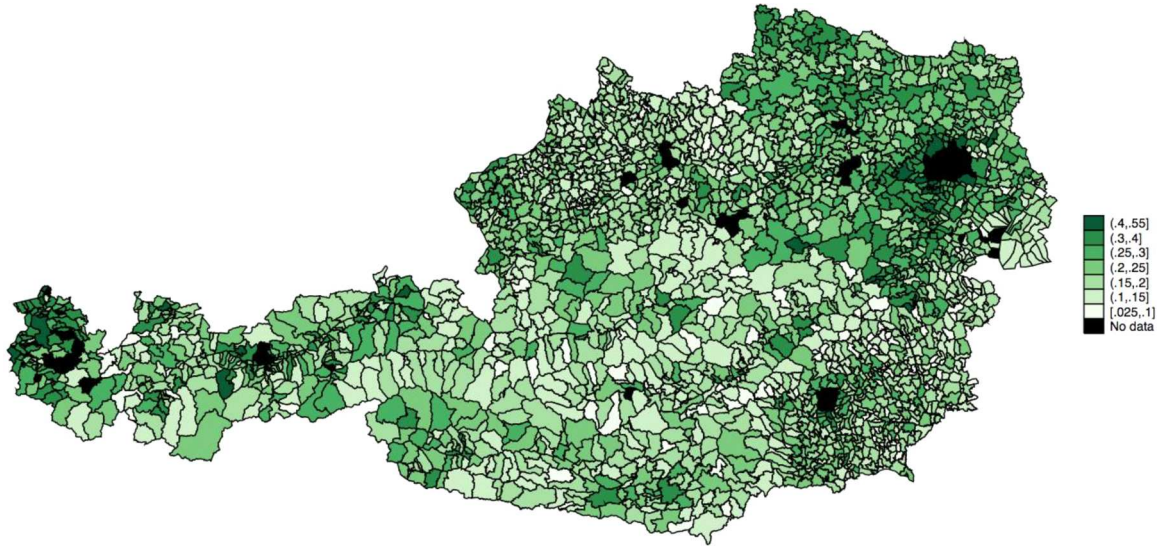

Fig. 4. Geographical distribution of the abstention rates in municipal elections. Notes: These figures depict the rate of abstention (defined as one minus the participation rate, i.e. the number of actual votes divided by the number of eligible voters) in municipal elections held in 2004 (Tyrol), 2005 (Lower Austria, Styria, Vorarlberg), 2007 (Burgenland), and 2009 (Carinthia, Upper Austria, Salzburg).

is also exploitable within-municipality variation, albeit to a lesser extent (the within-municipality standard deviation is 1.7%).

Another important variable is the abstention rate in municipal elections, defined as one minus the participation rate, which is the number of actual votes divided by the number of eligible voters. These data are available since 1990 for Styria and Vorarlberg and since 1996 or 1998 for the others states, up until the most recent municipal elections – again held at different dates by state. During the period 1996–2010 there are 2 or 3 municipal elections depending on the state, which provides exploitable variation both between and within municipalities (the across-municipality and within-municipality standard deviations are 6.1% and 3.6%, respectively). The average abstention rate is somewhat low (17.45%) but there is considerable heterogeneity as it ranges from 1.3% to 55%. Fig. 4 depicts the spatial distribution of abstention rates in the most recent municipal elections in the sample. Notably abstention is not restricted to differences across states. For instance, it varies from 3.8% to 55% within Lower Austria and from 1.3% to 50.5% in Tyrol, as shown by Table A.2 in the appendix.

The analysis also uses other demographic variables to control for important supply- and demand-side factors driving the share of education in the budget. Thus we include the share of the non-working population below age 15, as a proxy for the underlying need in

education,[17] and also the total number of municipality inhabitants as well as the population density. In some specifications we also include fiscal variables measuring the structure of municipality's revenues, which potentially affects the budget composition (Fletcher and Kenny, 2008). These data include the receipts from unconditional government grants, tax revenues, debt and revenues from fees and charges. Additional controls include political data, available since 1996, that might separately drive the spending composition. These include a dummy variable for left wing municipal councils, the number of political parties in the city council as a proxy for political fragmentation and the difference in votes share between the largest party and its closest challenger as a measure of absence of political competition.

As well as the municipality-level analysis, we also make use of individual-level data from two waves (1986 and 2003) of the Austrian Social Survey (ASS), a nationally representative survey. This enables us to examine whether abstention and CV repeal overrepresent the elderly in the actual electorate. The survey asks respondents questions on demographics (and importantly age and pensioner status), socioeconomic status, education and voting behavior as well as interest in politics. This data is then related to information on turnout in parliamentary elections (1983 and 2002).[18] Our individual-level analysis also uses information on the individual's interest and involvement in politics with data on party membership, reading newspapers or having a preference or not for a party.

4. Empirical strategy

4.1. Identification

The focal point of the analysis is how the compositional change in the electorate entailed by the repeal of CV affects intergenerational redistribution through education spending. We exploit the abolition of CV for parliamentary elections as a means to introduce exogenous variation in the relative turnout of the elderly and the young in local elections. While presidential and state elections also provide sub-national variations in CV laws, we focus on parliamentary elections for two reasons. First, the parliamentary elections are the most consequential elections in Austria, and are thus the bedrock of political participation. Disengagement at this level is likely to pre-empt disengagement at local elections. In support of this argument, Mattila (2003) provides evidence showing that turnout in 'secondary' elections (defined as local, or European elections) is strongly dependent on turnout in 'primary' (national parliamentary) elections. Reduced turnout in the latter leads to reduced turnout in the former.

Second, the abolition of CV for parliamentary elections was imposed by constitutional decision made at the federal level, whilst CV abolition in presidential and state elections through the sample period was the jurisdiction of state government. Therefore focusing on CV laws in parliamentary elections provides a quasi-natural experiment immune to confounding factors that might have led states to repeal CV or not.

Identification comes from the fact that four states (Styria, Tyrol, Vorarlberg and Carinthia) were forced by constitutional decision to end CV for parliamentary elections in 1992 while the other four states (Vienna being excluded from our sample) never practiced CV in parliamentary elections.[19] As we discuss below the reform had the effect of decreasing turnout, therefore changing the composition of the voting electorate in both parliamentary and municipal elections. In particular turnout of the elderly was less sensitive to the reform, hence their relative turnout increased.

The empirical strategy thus relies on two premises. The first is that the elderly turnout is less sensitive to CV abolition than the rest of the electorate. Using the notation of Section 2 if D^O (average 'D' for elderly voters) were sufficiently high, then turnout would not be affected by the reduction of C_{NV}^{IJ} entailed by CV abolition. By comparison if D^P (analogously defined) is sufficiently low, then CV abolition has a bigger impact on the turnout of the young poor.

4.1.1. CV abolition and elderly turnout

In support of the first premise we follow HLL and make use of the ASS to examine how turnout by different types of voters is affected by changes in CV laws. HLL show that the impacts of CV repeal are larger among females, those with low education, low income and people who are not interested in politics. The ASS data correspond to 1986 and 2002, and include an indicator variable for whether or not the respondent voted in the previous parliamentary election (in 1983 and 2002). While no states had CV in the 2002 parliamentary election, 3 states (Styria, Tyrol, and Vorarlberg) had it in the 1983 elections.

Table 2 presents estimation results where this indicator is regressed against a dummy for whether voting was voluntary (VV) in that election in the state where the respondent lives. The specification follows HLL by controlling for a set of individual covariates, as well as state and survey year fixed effects. To examine whether old voters are less likely to respond to CV than younger voters, we interact VV with variables related to the individual's age. Standard errors are clustered at the state level. However, given the small number of clusters, standard errors might be inconsistently estimated. Following HLL, we also report wild-bootstrap p-values in brackets, in addition to standard errors clustered by state in parentheses. We follow this procedure for all the regressions throughout the paper, in which standard errors are clustered at the state level.[20]

[17] Our results are not affected if we take another definition such as the share of the population below age 19.

[18] Note that the type of elections considered here differs from our panel analysis focusing on municipal elections but in the absence of appropriate data on the municipal level, this is a valuable complement to our panel analysis.

[19] The first municipal election after CV abolition in 1992 was held in 1992 in Tyrol, in 1995 in Styria and Vorarlberg and in 1997 in Carinthia.

[20] The p-values obtained using the clustered standard errors and the wild bootstrap procedure are very similar. Throughout the paper, for

Table 2
Individual-level impact of voluntary voting on turnout.

	Turnout in Last Parliamentary Elections		
	(1)	(2)	(3)
Voluntary voting	−0.0548*		
	(0.0279)		
	[0.0820]		
Non-pensioner*Voluntary voting		−0.0856*	
		(0.0390)	
		[0.0625]	
Pensioner*Voluntary voting		−0.0627	
		(0.0361)	
		[0.1680]	
Age_{Q1}*Voluntary voting			−0.137**
			(0.0438)
			[0.0000]
Age_{Q2}*Voluntary voting			−0.0544
			(0.0335)
			[0.1055]
Age_{Q3}*Voluntary voting			−0.0180
			(0.0280)
			[0.3711]
Age_{Q4}*Voluntary voting			−0.0557
			(0.0425)
			[0.4805]
Controls	X	X	X
N	3369	3369	3369
R^2	0.174	0.043	0.078

Notes: Observation unit: an individual, and the sample includes all individuals in the 1986 and 2003 Austrian Social Survey who reported whether they voted in the last parliamentary elections (1983 and 2002) and were of voting age. Except for column (1) replicating HLL, the coefficients shown are interactions of Voluntary voting with individual characteristics. Dependent variable: dummy for whether the individual voted in the previous parliamentary elections. Independent variables: Voluntary voting = dummy for whether voting was voluntary for that election in the individual's state of residence; Pensioner (Non-pensioner) = dummy for whether the individual is (not) pensioner; Age_Qi = dummy for whether the individual belongs to the age quartile i. All regressions include baseline controls for gender, educational attainment, parents' education, household size, community size, state fixed effects, and survey year fixed effects. In addition, regression 1 controls for age, age squared, working status, selfreported political preference, party membership, being informed, interest in politics. Standard errors clustered by state in parentheses, and cluster-robust wild-bootstrap p-values in square brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Column (1) first replicates HLL (their Table 6 Panel 1) showing that on average VV decreases turnout by 5.5 percentage points. The specifications in columns (2) and (3) investigate the heterogeneous effect of VV with respect to age. Column (2) shows that while VV has no significant effect on the pensioners' turnout, non-pensioners are 8 percentage points less likely to vote when CV is abolished. Column (3) shows more specifically that this age gap in turnout is due to the voters of the lowest age quartile (i.e. below 32 years old) who are the only age group to respond to VV. Those in the lowest age quartile are 13.7 percentage points less likely to turnout when CV is repealed. This set of estimates provides suggestive evidence that the repeal of CV overrepresents the elderly in the actual electorate.[21]

4.1.2. Turnout in municipal and parliamentary elections

The second premise is that CV rules for parliamentary elections influences turnout in local elections. One simple mechanism here is habit. Abtsention by a voter in the parliamentary election (following the repeal of CV) could serve to behaviorally underpin abstention in subsequent local elections. A related alternative is that the intrinsic value of voting (D^{iJ} in the analysis above) in local elections is a function of whether or not the voter turned out in the parliamentary election – for example one might place value on consistency of behavior.[22] It is worth observing that CV laws in Austria have in the main been non-binding because of different legal means to derogate from the obligation (HLL 2017), hence the observed falls in turnout are potentially due to perceived moral

(*footnote continued*)
simplicity, our discussion of the statistical significance of coefficients is based on the clustered standard errors.

[21] Ferwerda (2014) also finds that Austrian municipalities with greater numbers of retired voters were the least likely to experience large turnout declines in parliamentary elections after the abolition of CV in 1992.

Our finding that elderly's turnout did not respond to the repeal of CV could come from a CV exemption for the elderly, as it was the case for other CV experiences in other countries (Gonzales et al., 2019), but that was not the case for Austria.

[22] Using the notation of section 2 if D^O (average 'D' for elderly voters) were sufficiently high, then turnout would not be affected by the reduction of C^{iJ}_{NV} entailed by CV abolition. In contrast if D^P were sufficiently low, then CV abolition potentially has a big impact on the turnout of the young poor.

Table 3
Individual-level impact of pensioner and VV on political involvement.

	Turnout in last elections (1)	Party Membership (2)	Reads Newspaper (3)	No Party Preference (4)	High interest in politics (5)	Low interest in politics (6)
Voluntary voting	−0.0785*	0.0249	−0.0428	0.0747	−0.00943	0.0532**
	(0.0351)	(0.0415)	(0.0457)	(0.0490)	(0.0306)	(0.0200)
	[0.0664]	[0.6250]	[0.4883]	[0.2539]	[0.7734]	[0.0234]
Pensioner	0.110***	0.105***	0.0450*	−0.0493	0.0568**	−0.0812***
	(0.0223)	(0.0182)	(0.0222)	(0.0348)	(0.0229)	(0.0208)
	[0.0273]	[0.0000]	[0.0742]	[0.2305]	[0.0313]	[0.0156]
Controls	X	X	X	X	X	X
N	3369	3369	3369	3369	3369	3369
R^2	0.050	0.095	0.038	0.067	0.121	0.110

Notes: Observation unit: an individual, and the sample includes all individuals in the 1986 and 2003 Austrian Social Survey who reported whether they voted in the last parliamentary elections (1983 and 2002) and were of voting age. Dependent variable: dummy for whether the individual voted in the previous parliamentary elections in column (1); is a member of a political party in column (2); regularly reads the newspaper in column (3); has no party preferences in column (4); is very interested in politics in column (5); uninterested in politics in column (6). Independent variables: Pensioner = dummy for whether the individual is pensioner; Voluntary voting = dummy for whether voting is voluntary for that election in the individual's state of residence. All regressions include baseline controls for gender, educational attainment, parents' education, household size, community size, state fixed effects, and survey year fixed effects. Standard errors clustered by state in parentheses, and cluster-robust wild-bootstrap *p*-values in square brackets (imposing the null hypothesis). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

obligation, or endogenous disengagement from politics in general, rather than through financial penalties.[23] If voting is enacted out of a sense of duty, then legislation that undermines that sense of duty in the most important elections likely erodes any duty 'capital' driving turnout at local elections. Abolition of CV for primary (parliamentary) elections signals that abstention in secondary (municipal) elections is morally acceptable. Thus CV laws in parliamentary elections influence voter turnout in municipal elections.

Similarly, abolition of CV for parliamentary elections may legitimize disengagement from politics more generally. Table 3 contains regression results where alternative measures of political involvement are related to demographics and the existence of CV in parliamentary elections.

Column (1) shows that turnout in the previous parliamentary election is higher for pensioners, controlling for VV. Quantitatively, pensioners are 7.3 percentage points more likely to turnout than the rest of the electorate. The elderly thus have a higher propensity to vote, regardless of the voting laws. The remaining regression results in Table 3 also demonstrate strong evidence of greater political engagement by the elderly. Party membership, newspaper reading and the level of interest in politics are all statistically higher for pensioners.[24] This set of results supports the argument that the elderly have higher net benefits from voting, if (as seems likely) an individual's intrinsic value of voting is related to their engagement in politics more generally. Using the notation of Section 2, this means $D^O > D^Y$ in municipal elections. Alternatively (and certainly not mutually exclusively) the elderly may have lower voting costs due to their higher general level of information and interest in politics, which decreases the costs of acquiring political knowledge necessary to vote in particular elections.[25]

Table 3 provides some indirect evidence in support of the premise that turnout is related across elections.[26] In all columns the coefficient estimate for VV is negative. Abolition of CV is associated with general disengagement from politics. In particular column (6) showing that respondents are 5 percentage points more likely to be uninterested in politics once CV in parliamentary elections is repealed. This disengagement would likely transmit into reduced turnout in local elections.

In addition we provide more direct evidence for the municipalities of the two states for which we could collect municipal-level abstention data prior to 1992 – Styria and Vorarlberg. This permits comparison of abstention rates in municipal elections before (i.e. the 1990 municipal abstention rate), and after, (i.e. the 1995 municipal abstention rate) the repeal of CV for parliamentary elections in 1992. The regression results in Table 4 control for demographic variables such as the share of the people over 65 in the electorate, the share of the population below age 15, the total number of inhabitants, population density as well as fixed effects.

Column (1) of Table 4 shows for the municipalities of Styria that abstention in municipal elections increased after the abolition of CV for parliamentary elections. However, the 1995 municipal election in Styria was also the first election without CV for state elections. Thus it is not possible to disentangle the effect of VV for parliamentary elections and of VV for state elections. Column (2) presents the results for Vorarlberg, for which CV was abolished at different dates for parliamentary and state elections. Indeed CV was abolished for state elections in Vorarlberg only from 2005. The results show again that abstention in municipal elections increased once CV was abolished for parliamentary elections. These results support our identification strategy in that CV laws for general elections influenced turnout for local elections.

Our empirical strategy relies on the hypothesis that, when voting is no longer compulsory, relatively disinterested voters stop to turnout, which leads to the underrepresentation of their preferences in the political process. However, if these same disinterested voters simply cast

[23] Funk (2007) finds that abolishing CV significantly decreased turnout in Switzerland despite the fact that fines were small and not enforced. The Electoral Commission (2006) reports that in some countries it appears that the existence of CV in law is enough to ensure public compliance, even without the application of sanctions.

[24] Table A.3 in the Appendix shows how these same variables increase with the respondent's age.

[25] i.e. $C_V^O < C_V^Y$, where C_V^J are average costs of voting within a group, which has the same implications for turnout as $D^O > D^Y$.

[26] As discussed above this empirical relationship is also established in Mattila (2003) in the context of European elections.

Table 4
Voluntary voting and municipal abstention in Styria and Vorarlberg – Panel 1990–1995.

	Abstention	
	Styria (1)	Vorarlberg (2)
Voluntary voting	0.0672***	0.0211***
	(0.00316)	(0.00326)
Demographic controls	X	X
Municipality FE	X	X
N	1004	192
R^2	0.743	0.508

Notes: Observation unit: municipality-election year for 1990 and 1995. Dependent variables: abstention rate for the latest municipal election. Independent variables: VV = dummy coded 1 if voluntary voting for parliamentary elections; (unreported) Demographic controls: share of people aged over 65 in municipality's electorate; share of population below age 15; total number of inhabitants and population density; as well as municipality fixed effects. Standard errors clustered by municipality in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

spoiled ballots prior to the reform, then the preferences structure is unaltered and we should expect no change upon policy. To investigate this possibility, we compare, in the spirit of Table 4, the share of invalid votes before and after the repeal for Styria and Vorarlberg, the two states for which we have invalid votes data before the repeal. The regression results, reported in Table A.4 in the Appendix, provide evidence that the repeal did reduce the share of invalid ballots for the case of Styria but not for Vorarlberg. However, based on the coefficients in this Table and from the abstention regressions of Table 4, VV is estimated to have increased abstention by 6.7% in Styria and by 2.1% in Vorarlberg between the 1990 and 1995 municipal elections; while VV is estimated to have decreased spoiled ballots by only 1.14% in Styria and had no significant effect on spoiled ballots in Vorarlberg between 1990 and 1995. Thus we are confident that the effect of the reform on spoiled ballots is negligible compared to the effect on turnout, giving credit to our empirical strategy.

4.2. Empirical model

To estimate the causal effect of turnout decline on education spending through a compositional change of the electorate, we use a difference-in-difference design comparing how the share of education spending changes in municipalities within states initially enforcing CV with the same change in municipalities within states initially enforcing Voluntary Voting (VV). Our panel analysis exploits both across- and within-municipality variation from 1990 to 2010. The dataset thus covers 5 to 6 elections per state, depending on the date of the first municipal election and their frequency, which both vary across states. The main hypothesis predicts that in older municipalities, a reduction in turnout following the adoption of VV leads to over-representation of the elderly in the voting electorate, thus resulting in a lower education share of the budget. To test the heterogeneous effect of VV on education spending with respect to the elderly share of the (total) electorate, we estimate a fixed effects model with an interaction between the elderly share of the electorate and VV using annual data:

$$Y_{i,t} = \beta_0 + \beta_1 OLD_{i,t} + \beta_2 VV_{s,t} + \beta_3 OLD_{i,t} * VV_{s,t} + \beta_K X_{i,t} + \beta_4 T_s + \psi_i + \zeta_t + \epsilon_{i,t} \quad (4)$$

with $Y_{i,t}$ the share of education spending in the budget of municipality i in year t, $OLD_{i,t}$ the share of the electorate aged over 65, $VV_{s,t}$ a dummy for whether Voluntary Voting for parliamentary elections is enacted in state s in year t. More precisely it is coded 1 from the second year of the municipal electoral term following Compulsory Voting abolition for parliamentary elections in 1992. As new municipal governments are elected within the course of a given year, we consider that they could only start to implement their platforms from the second year of their term. $X_{i,t}$ is a vector of time-varying controls at the municipal level, measured either in the last election year or interpolated between censuses. This vector includes demographic variables such as the share of the population below age 15, the total number of inhabitants, population density, and in some specifications a set of fiscal controls including the log of government grants, the log of tax revenues, the log of revenues derived from fees and charges and the log of debt. ψ_i and ζ_t are municipality and year fixed effects, respectively. T_s is a state specific linear time trend, allowing heterogenous trends across states initially with and without CV. Regressions are estimated using robust standard errors clustered at the municipality.

The parameters of interest are the coefficient estimates for Voluntary Voting (β_2) and the interaction term (β_3). In particular the effect of VV is hypothesized to be positive when $OLD_{i,t}$ is low - hence $\beta_2 > 0$, but declining as $OLD_{i,t}$ increases - hence $\beta_3 < 0$. When the old are few, then turnout reduction results in over-representation of the young rich, and an increased education share of the budget. When the old are numerous, then reduction in turnout results in their over-representation and a lower education share of the budget.[27]

[27] We consider the elderly share as exogenous but there may be an endogeneity problem if the elderly select into municipalities providing low education, in accord with their preferences. However, the elderly's mobility is very limited in Austria. For instance, in 2013, total relocations across municipality borders amounted to 3.9% of Austria's population (Austria, 2014). Among these 3.9%, the age group over 55, (representing 30% in the overall population), only accounted for 9.6% of the total mobile population, hence elderly mobility is very low.

Table 5
Voluntary voting and education spending – Panel 1990–2010.

	Education share of the budget					
	(1)	(2)	(3)	Low income (4)	High income (5)	(6)
VV	0.0361**	0.187***	0.266***	0.200**	0.289***	0.0590
	(0.0171)	(0.0672)	(0.0659)	(0.0951)	(0.0940)	(0.140)
Electorate share aged 65+	−0.616*	0.216	0.334	0.0794	0.627	0.315
	(0.369)	(0.512)	(0.495)	(0.675)	(0.746)	(0.494)
VV*Electorate share aged 65+		−0.935**	−1.293***	−0.987*	−1.278**	−1.256***
		(0.393)	(0.387)	(0.563)	(0.544)	(0.386)
VV*Income per cap.						1.06e−05*
						(6.42e−06)
Demographic controls	X	X	X	X	X	X
Fiscal controls			X	X	X	X
Municipality FE	X	X	X	X	X	X
Year FE	X	X	X	X	X	X
State trend	X	X	X	X	X	X
N	48,414	48,414	46,905	23,157	23,748	46,905
R^2	0.070	0.070	0.108	0.099	0.124	0.108

Notes: Observation unit: municipality-year for all the years from 1990-2010. Dependent variables: Education spending as a percentage of total municipal spending (in logs). Independent variables: VV = Voluntary voting: dummy coded 1 from the second year of the municipal electoral term following Voluntary voting for parliamentary elections; Electorate share aged 65+ = share of people aged over 65 in municipality's electorate; Income per cap. = Average municipal income per capita logs in 2010; (unreported) Demographic controls: share of population below age 15, total number of inhabitants and population density; (unreported) Fiscal controls (in logs): government grants, tax revenues, revenues from the fees and charge and debt. All regressions include municipality fixed effects, year fixed effects, and state-specific linear trends (at the year level). Columns 4 and 5 respectively correspond to lower and higher average municipal income per capita in 2010 (< >median = 19'385.27). Standard errors clustered by municipality in parentheses. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.10$.

5. Results

5.1. Main results

Table 5 contains regression results estimating how the education share of the budget responds to CV abolition and the elderly share of the electorate within and across Austrian municipalities through 1990–2010. Column (1) is a preliminary specification where the interaction term is excluded.[28] Here the estimated coefficient for VV is positive and reaches the 5% significance level, though is quantitatively rather small. In this unconditional specification abolishing CV is estimated to result in an increase in the share of education spending by around 3.6% of the municipal budget. When interpreted in the light of the theoretical framework this implies that the average elderly share (18%) lies to the left of $\bar{\alpha}$, hence that on average VV overrepresents relatively more the young rich in the actual electorate. Note also that an increase in the elderly share is estimated to decrease the education share of the municipal budget, although the coefficient is significant at only 10%.

Column (2) presents regression results estimating a conditional relationship by including the interaction between VV and the elderly share along with the other control variables. In this specification the estimated 'unconditional' effect is positive and statistically significant ($\hat{\beta}_2 > 0$) whilst the estimated coefficient for the interaction term is negative ($\hat{\beta}_3 < 0$), consistent with the hypotheses stated above. This estimated heterogeneous effect is robust when controlling for the structure of the municipality's budget, as shown in column (3), our baseline specification. Using the coefficient estimates of column (3), in municipalities with the sample minimum elderly share of the electorate (6%), VV increases the education share of the budget by 19%. Given representative public education expenditure of 1103 euros per pupil when voting is compulsory, this effect implies an increase of 209 euros per pupil following the abolition of CV. Conversely, in municipalities with the maximum elderly share (43%), VV is estimated to reduce the education share by 29% (i.e. 320 euros per pupil).[29] Inference may be complex in the presence of interaction terms, and one approach advocated is to plot the marginal effect of the reform conditional on the elderly share, contained in Fig. 5 obtained from the estimation of column (3).

[28] This regression, as standard, also controls for state fixed effects, year fixed effects, state-specific linear trends and demographic controls.

[29] As Austrian municipalities strongly diverge both in terms of education spending (from 0.15% to 86% of the municipal budget) and of population size (from 3 to 25,992 inhabitants), our results could be driven by a few outliers. As a robustness check (unreported estimations), we reestimated our preferred specification (of column 3) but excluding the 5% highest and the 5% lowest values of education spending and separately excluding the 5% highest and lowest values of total population. Our main result holds and the heterogeneous effect is quantitatively very similar. The effect of VV varies from 15% for the youngest municipalities to -21% for the oldest ones when excluding the 10% extreme values in terms of education spending and it varies from 20% to −28% when excluding the 10% extreme values in terms of population.

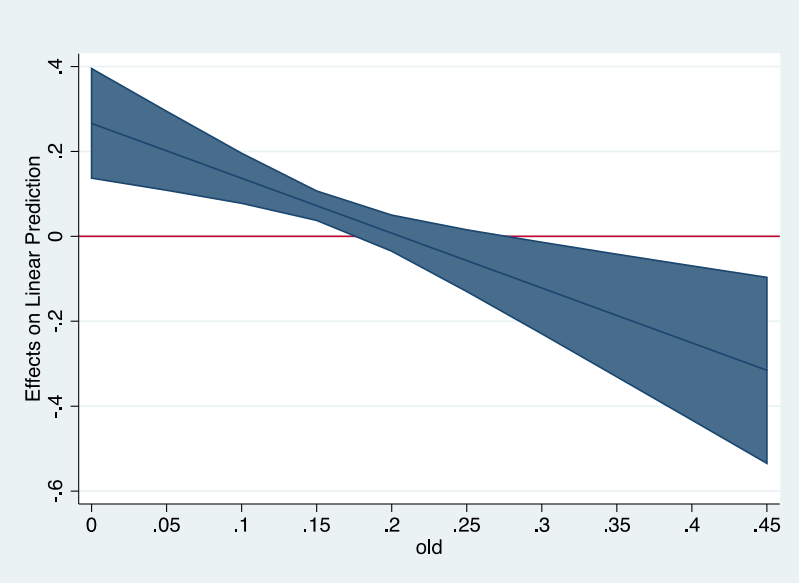

Fig. 5. Marginal effect of voluntary voting on education spending conditional on the elderly.

This plot confirms a significant and positive impact of the reform in younger municipalities and a significant and negative impact in older municipalities.

The results align with the theoretical framework predicting that VV reduces the education share once the share of the elderly exceeds a certain threshold. More precisely, according to the coefficients of column (3), the implied $\bar{\alpha}$ equals 21%. This explains why we found that the effect of VV is quantitatively weak in column (1) for the average elderly share (18%), which is close to this threshold. The fact that the average elderly share is close to the implied $\bar{\alpha}$ also facilitates a reconciliation with HLL, who find no (unconditional) effect for demography using state level data.

The second hypothesis arising from the theoretical analysis is that the elderly threshold at which VV reduces the education share increases with the municipal income level. In the absence of time-varying income data, we use the (time-invariant) average municipal income per capita from 2010.[30] Columns (4) and (5) of Table 5 re-estimate the baseline specification splitting the sample by income level (determined by the median value of the average municipal income per capita). In both instances the findings that $\hat{\beta}_2 > 0$ and $\hat{\beta}_3 < 0$ are sustained. Based on the coefficient estimates the old need to exceed the threshold of 20% of the eligible electorate in a representative poor municipality (column 4), against 23% in rich municipalities (5). Hence the estimated threshold is estimated to increase to a small extent with income.

A related prediction is that VV results in a higher education share of the budget when the municipal income increases as the young rich become more politically powerful. Column (6) of Table 5 contains estimation results for a regression augmenting the baseline specification by including an interaction between VV and the municipal income level per capita as of 2010. Hence the impact of VV can now differ by municipal income level as well as by demography.[31] Column (6) shows that the estimated interaction between VV and income is positive and significant at 10%, which is reasonable given that the income measure is time invariant. The data therefore suggest that the positive impact of VV on the education share of the budget magnifies when the municipality gets richer. Importantly, the main interaction between VV and the elderly share survives the inclusion of this alternative interaction. The fact that the interactions work in opposite directions are fully supportive of the thesis of this paper, that a reduction in the incentive to vote can either reduce or increase intergenerational redistribution depending on demographic and socioeconomic conditions.

[30] Income per capita in 2010 provides some exploitable variation across municipalities with a mean of 19,533 and a standard deviation of 2102, ranging from 12,010 to 33,863 (in euro).

Municipal income may be correlated with income inequality (inequality data are not available at the municipal level). The question of the implications of income levels versus income distribution is interesting though it is not central in the paper. From a theoretical perspective, income distribution can be an outcome of the model when the tax rate, decided by voters, is not the maximum one and thus inequality persists, as in the seminal paper by Levy (2005). However the tax rate is fixed in our model and in Austrian municipalities. Inequality can also reinforce the cohesiveness within each income group (rich or poor) of the different generations (young or old) in median voter models. However, the cohesiveness is less relevant in our probabilistic voting model in which the preferences of each voting group is taken into account in the policy. If one considers varying degrees of cohesiveness in our model, the implication is not clear and not likely decisive, as more social cohesion may push the old poor to collude with the young poor who wish intermediate levels of education and of the other pubic good.

[31] Testing this hypothesis is also useful because if a higher share of the elderly in the municipality is correlated with higher municipal income levels, the observed heterogeneous effect of VV depending on the elderly could be reflecting heterogeneous effects depending on income. However the elderly share and the average income in 2010 are not correlated (the correlation coefficient is -0.04.)

5.2. Robustness

A first issue is why our results differ from HLL who found no significant effect of CV laws for Parliamentary elections on education spending at the state level for the 1980–2012 period.[32] The analysis here differs from HLL in that we focus on municipal spending instead of state-level spending. Whilst state (and federal) government also undertakes education expenditures, the remit at this level is quite different from the municipal level. Education spending at the state level largely comprises teacher salaries, which are reimbursed by the federal government.[33] Given also that the number of teachers per school is fixed through the federal ministry of education, states potentially have much less discretion over education spending. On the other hand as discussed above municipalities have considerable discretion regarding education expenditure.

An alternative possibility is that an estimated unconditional effect of VV can be statistically insignificantly different from zero, as found by HLL, if the average elderly share is close enough to the threshold where the overrepresentation of the old and of the young rich offset each other.[34] As noted above, the average elderly share of our sample is 18% and the threshold is estimated to be 21%. If the corresponding state-level measures are sufficiently similar to each other, then absence of statistical significance is consistent with our analysis. To investigate this hypothesis, we replicate the analysis in HLL by averaging our municipal data at the state level.[35] Column (1) of Table 6 reports estimation results excluding the interaction term between VV. In line with HLL, the unconditional effect of VV is estimated to be statistically insignificant. However, when the interaction term is included (in column (2)), we find evidence of a heterogeneous effect of VV with respect to the elderly share. Both $\hat{\beta}_2 > 0$ and $\hat{\beta}_3 < 0$, as predicted by the theory and found in the case of the municipal-level data.

Table 6 also contains results showing that the heterogeneous effect of VV is robust to alternative specifications. In column (3) the data are averaged at the electoral term level and column (4) reverts to the municipal-year data but using an alternative dependent variable: the log of municipal education expenditure per pupil. The findings that $\hat{\beta}_2 > 0$ and $\hat{\beta}_3 < 0$ are sustained in both cases. The heterogeneous effect estimated using the coefficient estimates from column (4) is quantitatively very close to those estimated with our main dependent variable. The threshold of elderly share above which the effect of VV turns negative is estimated at 22%.

An additional important issue is that changes in education spending can lead to migration, therefore biasing upwards our results. Therefore we test the hypothesis that the number of inhabitants at the municipal is affected by changes in the voting laws by running our main specification with the size of municipal population as a dependent variable. The estimation result, reported in column (5), shows that the population size is not affected by VV, which is against the hypothesis that the underlying changes in education spending lead to migration.

A remaining concern of our specification is the persistence of the dependent variable that ideally should be accounted for in the analysis. Indeed, as shown in Figs. 6.1 and 6.2 later in the analysis, the initial level of education spending (as a share of budget) is consistently lower in municipalities that never had CV than in municipalities that enacted CV before 1992. To adjust for the initial level of education spending, we have re-estimated the baseline regressions of Table 5 by including the (1-year) lagged dependent variable. The regression results reported in Table A.5 in the Appendix show that our main results are unchanged when taking the initial education level into account.[36]

Finally, the analysis has considered that the results are driven by variation at the municipal level. In order to investigate the possibility that the results are driven by state-level trends, Table A.6 in the Appendix provide the estimates for our main specification including state-year fixed effects along with the share aged 65+ and its interaction with VV but without VV alone, (which are collinear with the state-year FE). The main results survive the inclusion of the state-year effects and suggest that our results are driven mostly by municipal- and not state-level variation.

5.3. Parallel trend assumption

Our difference-in-difference strategy relies on the assumption that, conditional on the set of observables and fixed effects, the trends in education expenditures in older (/younger) municipalities within CV states were the same as in older (/younger) municipalities within voluntary voting states prior to CV repeal, i.e. they have parallel trends in the pre-treatment period. We are confident there is no such confounding influence. Firstly note that the estimation results include state-level linear trend terms, though the possibility of non-linear trends of course remains. Secondly recall that we focus on a change in CV laws issued at the federal and not the state level, which mitigates the risk that VV is correlated with either unobserved municipal or state characteristics.

Nonetheless, the adoption of CV for parliamentary elections by four states between 1949 and 1983 was certainly not a random process. One concern would be that some specific factors to these four states may have led them to adopt CV in the first instance and

[32] e.g. their Table A.5, Panel C.

[33] The legal basis for the reimbursement of states by the federal government is part of the fiscal equalization scheme – 3, Finanzausgleichsgesetz 2017, BGBl. I Nr. 116/2016.

[34] HLL do not include any interaction terms in their analysis.

[35] Standard errors are now clustered at the state level. Given the small number of clusters, the standard errors might be inconsistently estimated. Thus following HLL, we also estimated wild-bootstrap p-values, not reported in the paper. However our results are robust.

[36] The inclusion of a lagged dependent variable in least square dummy variable (LSDV) models may induce a bias but this bias decreases with the panel's time dimension T (Nickell, 1981). According to Dincecco and Katz (2016) this bias may be considered as negligible when $T > 20$, which is our case for the period 1990–2010.

Table 6
Robustness – Panel 1990–2010.

	Education share of the budget			Education per pupil	Population size
	(1)	(2)	(3)	(4)	(5)
VV	0.0635	1.017***	0.174**	0.239***	0.0118
	(0.0621)	(0.259)	(0.0835)	(0.0630)	(0.00986)
	[0.3984]	[0.0469]			
Electorate share aged 65+	4.208	13.52	0.0331	1.352***	-0.112**
	(8.618)	(7.273)	(0.630)	(0.472)	(0.0550)
	[0.6875]	[0.1250]			
Interaction		−6.034***	−1.090**	−1.066***	−0.0803
		(1.431)	(0.522)	(0.370)	(0.0591)
		[0.0313]			
Demographic controls	X	X	X	X	X
FE	X	X	X	X	X
Time FE	X	X	X	X	X
State trend	X	X	X	X	X
Observation unit	year state	year state	term municip.	year municip.	year municip.
N	168	168	9697	48,414	46,910
R^2	0.695	0.759	0.107	0.422	0.219

Notes: Observation unit: state-year in columns 1 and 2; municipality-electoral term in column 3; municipality-year in columns 4 and 5 for all the years from 1990-2010. Dependent variables: Education spending as a percentage of total municipal spending (in logs) in all columns except in column 4: Education spending in per pupil logs and column 5: Municipal population size. Independent variables: VV = Voluntary voting: dummy coded 1 from the second year of the municipal electoral term following Voluntary voting for parliamentary elections in columns; Electorate share aged 65+ = share of people aged over 65 in municipality's electorate; (unreported) Demographic controls: share of population below age 15, total number of inhabitants and population density; Columns 1 and 2 include state fixed effects, year fixed effects, and state-specific linear trends (at the year level). Column 3 includes municipality fixed effects, term fixed effects, and state-specific linear trends (at the term level). Columns 4–5 include municipality fixed effects, year fixed effects and state-specific linear trends (at the year level). Standard errors clustered by state in parentheses and cluster-robust wild-bootstrap p-values in square brackets in columns 1 and 2 (imposing the null hypothesis) and standard errors clustered by municipality in columns 3 to 5. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

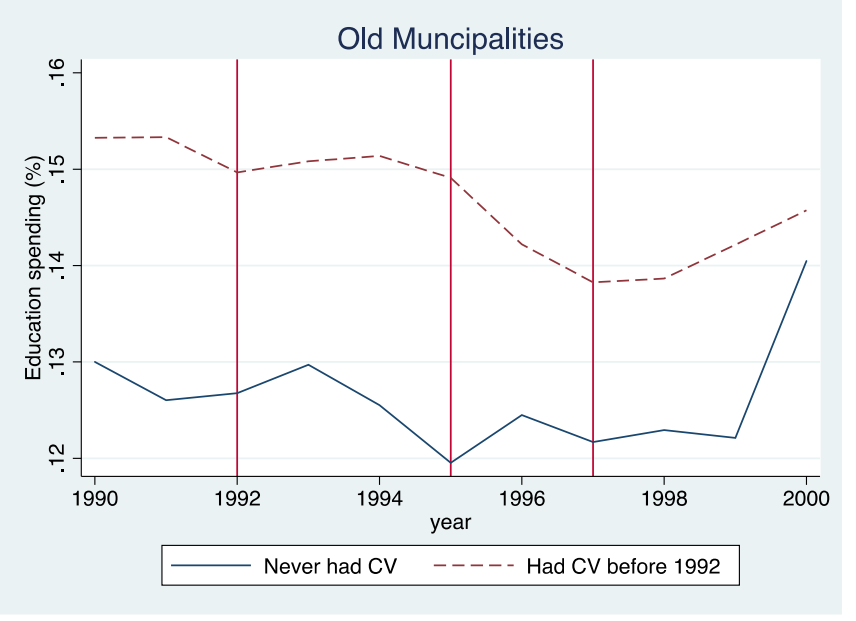

Fig. 6.1. Average municipal education share of the budget in old municipalities. Notes: Mean of education share of the budget in municipalities with an elderly share above the median of the whole sample. Vertical red lines indicate the dates of the first municipal elections following the 1992 repeal: 1992 in Tyrol, 1995 in Styria and Vorarlberg and 1997 in Carinthia. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

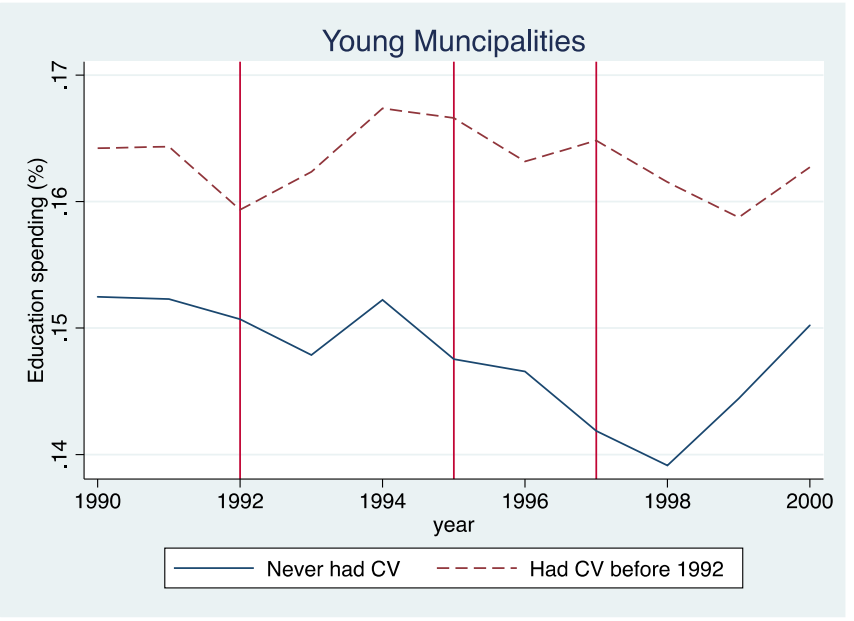

Fig. 6.2. Average Municipal Education Share of the Budget in Young Municipalities. Notes: Mean of education share of the budget in municipalities with an elderly share below the median of the whole sample. Vertical red lines indicate the dates of the first municipal elections following the 1992 repeal: 1992 in Tyrol, 1995 in Styria and Vorarlberg and 1997 in Carinthia. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

could incidentally also explain the heterogeneous relationship between VV and the education share of the budget. A first way of lessening this concern is to show that, before the 1992 repeal, municipalities with CV were similar with respect to observable characteristics to those with VV. Table A.7 in the Appendix presents cross-sectional regressions of different variables measured in 1990 on the "Voluntary Voting" variable. The results show that, before the repeal, in 1990, municipalities with CV did not significantly differ from those with VV regarding observable demographic and fiscal characteristics.

We also examine whether we observe a different trend in education spending in the older municipalities within states that never had CV and those within states that abolished it from 1992 onwards, not only from the date of abolition but also in previous years or electoral periods.[37] Fig. 6.1 plots the evolution of the average education share of the budget for the two groups of old municipalities for the 1990–2000 period, focusing on the pre-treatment period. Old municipalities are defined as those with an elderly share above the national median. This exercise is replicated for young municipalities (elderly share below the national median) in Fig. 6.2. In spite of the few years available before the 1992 repeal, the figures illustrate the common trend for both groups (CV and VV) until 1992 and then differing trends from 1992 as the municipalities within CV states progressively enact VV in municipal elections from 1992 (Tyrol) to 1997 (Carinthia). Importantly, regarding the old municipalities (Fig. 6.1), the gap in education spending between the treatment and control groups progressively narrows, in line with the prediction that, in the old municipalities, the reform (in the treatment group) reduces the education share of the budget. However, for the young municipalities (Fig. 6.2), the gap progressively widens from 1992 onwards, also consistent with the prediction that, in the young municipalities, CV abolition (in the treatment group) raises education spending.

As additional graphical evidence of the timing of the effect of the reform, we plot state by state the evolution of education spending for the young and the old municipalities within each state. Fig. 7.1 plots the evolution for the four states that abolished CV following the 1992 constitutional ruling; the date of the first municipal election following 1992 being represented by a vertical red line. Fig. 7.2 plots the evolution for the control group, i.e. the four states that always enacted VV. As predicted by the theory, we observe in Fig. 7.1 a consistent decrease in education spending in the old municipalities and a consistent increase for the young municipalities, immediately in the wake of the first municipal election following 1992. By contrast, education spending seems to have followed a similar evolution in the four states of the control groups, as shown by Fig. 7.2.

Finally, as described by Angrist and Pischke (2008, p.177), difference-in-difference models enable a Granger-causality test. Our variable of interest, the voting regime, $VV_{s,t}$, changes at different times in different states depending on the date of the first municipal election following the 1992 reform. In this context, Granger causality testing means a check on whether, conditional on state and year effects, past voting regimes $VV_{s,t}$ predicts contemporaneous education spending $Y_{s,t}$ while future $VV_{s,t}$ do not. If $VV_{s,t}$ (Granger-)causes $Y_{s,t}$ but not vice versa, then leads should not matter. Because of the limited number of years available before 1992, we are not able to

[37] This pattern could also be observed if municipalities anticipated the repeal of CV and altered the composition of public spending before the law change.

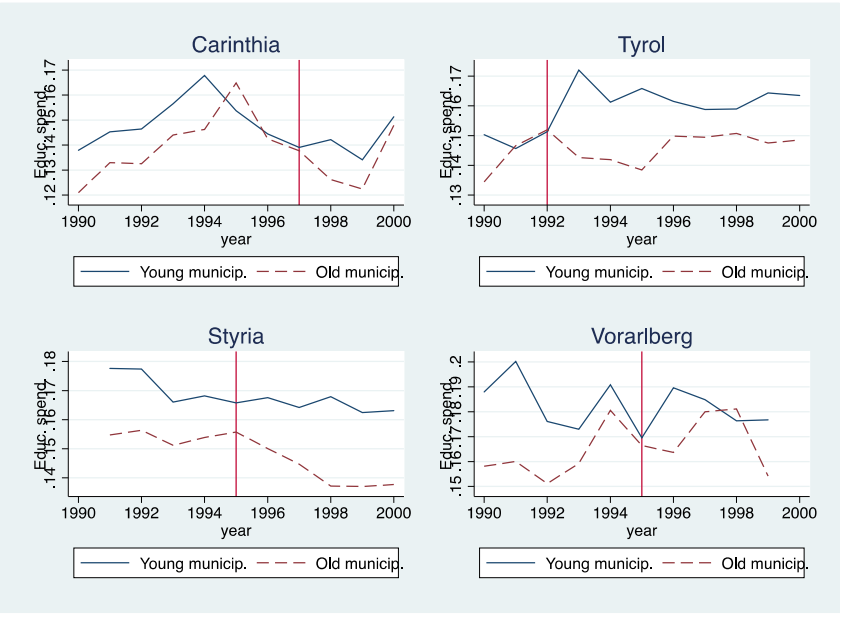

Fig. 7.1. Average Municipal Education Share of the Budget in Treatment Group. Notes: Mean of education share of the budget in municipalities with an elderly share below the median of the whole sample. Vertical red lines indicate the dates of the first municipal elections following the 1992 repeal. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

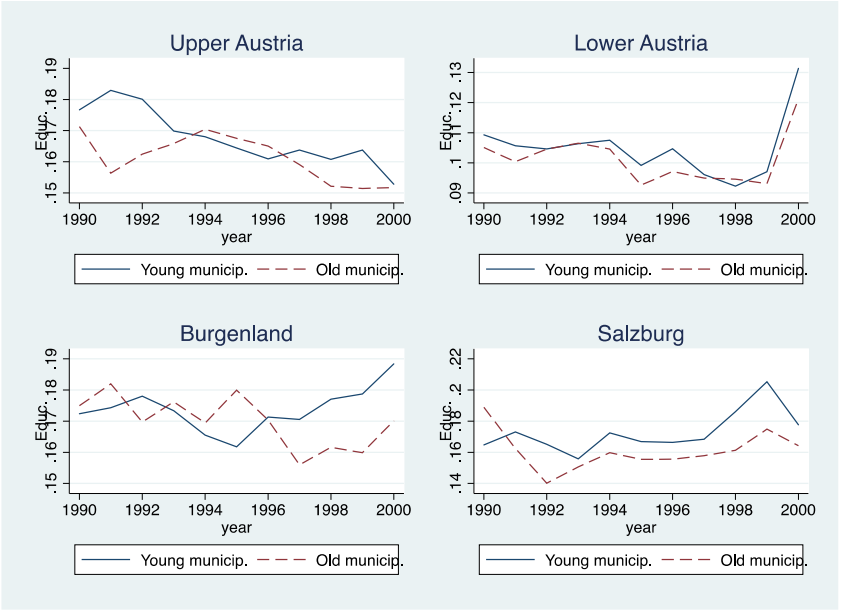

Fig. 7.2. Average municipal education share of the budget in control group. Notes: Mean of education share of the budget in municipalities with an elderly share below the median of the whole sample. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

include lags of *VV* but we can still include one lead as its interaction with *OLD*, in the following specification:

$$Y_{i,t} = \beta_0 + \beta_1 OLD_{i,t} + \beta_2 VV_{s,t} + \beta_3 OLD_{i,t} * VV_{s,t} + \\ \beta_{2+e} VV_{s,t+e} + \beta_{3+e} OLD_{i,t} * VV_{s,t+e} + \beta_K X_{i,t} + \beta_4 T_s + \psi_i + \zeta_t + \epsilon_{i,t} \quad (5)$$

with the same notation as in Eq. (4), $VV_{s,t}$, the contemporaneous voting regime defined as a dummy for whether Voluntary Voting is enacted in state s in year t, $VV_{s,t+e}$, the lead of the voting regime, a dummy for whether Voluntary Voting is enacted in state s in year

Table 7
Placebo test on the date of abolition of mandatory voting – Panel 1990–2010.

	Education share of the budget
Voluntary voting in t × Electorate share aged 65+	−1.267***
	(0.393)
Voluntary voting in t+e × Electorate share aged 65+	−0.0760
	(0.340)
Demographic controls	X
Fiscal controls	X
Municipality FE	X
Year FE	X
State trend	X
N	46,905
R^2	0.108

Notes: Observation unit: municipality-year for all the years from 1990–2010. Dependent variables: Yearly education spending as a percentage of total municipal spending (in logs). The coefficients shown are interactions of the share of people aged over 65 in municipality's electorate with Voluntary voting in t = a dummy coded 1 from the first municipal electoral term following Voluntary voting for parliamentary elections (1997 for Carynthia, 1995 for Styria and Vorarlberg, 1992 for Tyrol); Voluntary voting in t+e = a dummy coded 1 from the second municipal electoral term following Voluntary voting for parliamentary elections (2003 for Carynthia, 2000 for Styria and Vorarlberg, 1998 for Tyrol). All regressions include municipality fixed effects, year fixed effects, state-specific linear trends (at the year level), unreported demographic and fiscal controls. Standard errors clustered by municipality in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 8
Abstention and education spending – Panel 1996–2010.

	Education share of the budget	
	(1)	(2)
Abstention	0.128	1.065**
	(0.123)	(0.478)
Electorate share aged 65+	−1.030**	−0.0728
	(0.462)	(0.669)
Interaction		−4.960**
		(2.526)
Demographic controls	X	X
Fiscal controls	X	X
Municipality FE	X	X
Year FE	X	X
State trend	X	X
N	30,806	30,806
R^2	0.128	0.128

Notes: Observation unit: municipality-year for all the years from 1996–2010. Dependent variables: Yearly education spending as a percentage of total municipal spending (in logs). Independent variables: Abstention = abstention rate for the latest municipal elections; Electorate share aged 65+ = share of people aged over 65 in municipality's electorate. All regressions include municipality fixed effects, year fixed effects, state-specific linear trends (at the year level) and unreported demographic and fiscal controls. Standard errors clustered by municipality in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

$t + e$ i.e. one electoral period after the 1992 abolition reform.[38] As before β_2 and β_3 measure the effect of the contemporaneous voting regime, while β_{2+e} and β_{3+e} measures the effect of the future voting regime.

The estimation results presented in Table 7 show no effect of the future voting regime, while the heterogeneous effect of the contemporaneous regime remains statistically significant. This pattern is consistent with a causality running from the voting regime to education spending.

[38] VV_{t+e} therefore entails that VV is effective from the second municipal election after 1992 (i.e. 2003 for Carinthia, 2000 for Styria and Vorarlberg and 1998 for Tyrol).

5.4. Abstention and education spending

So far we have estimated the heterogeneous effect of VV at the state level on municipal education spending, which we infer to be caused by turnout decline that disproportionately concentrates on the (poor) young. This subsection directly estimates how municipal education spending responds to turnout using data through 1996–2010, for which turnout data are available. Following the theory we test the hypothesis that a decline in the average municipal turnout results in a lower education share of the budget when the elderly share is higher, thus include an interaction term as before. The econometric specification includes demographic and fiscal controls, an election year dummy, municipality and year fixed effects and state specific time trends.

Column (1) of Table 8 excludes the interaction term and shows that for the average elderly share, the estimated coefficient of abstention is positive, as for the unconditional impact of VV, but not statistically significant. When the interaction term is included in column (2) the coefficient estimate for abstention now becomes positive and statistically significant, whilst the coefficient estimate for the interaction term is negative. These results resonate with the main results above. If interpreted as a causal relationship, then this suggests that for the minimum elderly share for the 1996-2010 sample (8%), a one percentage point increase in abstention results in an 0.7% increase in the education share, while for the maximum elderly share (43%), a one percentage point increase in abstention results in a 1% reduction of the education share. The estimated threshold above which the impact of abstention becomes negative is reached when the elderly represent 21% of the eligible electorate, which is almost exactly the same as that found above.

5.5. Exclusion restriction

Our exclusion restriction assumption is that the estimated heterogeneous effect of VV on education spending with respect to the elderly is only due to the compositional change in the actual electorate following VV. Note that our exclusion restriction assumption is on the heterogeneous effect of VV and not the total effect of the reform. In other words, we do not need to assume that VV had no other compositional effect on the electorate but that the conditional effect of VV (i.e. depending on the elderly population) is only due to the overrepresentation of the elderly in the actual electorate. Here we provide a series of credibility tests suggesting that the observed heterogeneous effect cannot be accounted for by alternative concurrent explanations.

Potentially the decline in voting net benefits following the repeal of CV can have various alternative compositional effects on the electorate, that in principle could impact education spending. For instance, if voters who abstain due to the repeal of CV are on average more left-wing, as suggested by Lijphart (1997), then there will be a reduction in left-wing votes, which can affect the composition of the municipal budget. On the other hand, if those who abstain due to VV traditionally used to vote for the leading parties or candidates, then VV can reduce the margin of victory of the winners, thus increasing party competition. Increased competition can in turn affect the budget for instance by fostering public goods (e.g. education spending) at the expense of rent. In addition to weakening the major parties, VV also potentially fosters the electoral success of other minor parties, thus increasing the number of (especially minor) parties in city councils, which could also impact the budget.

HLL test the impact of CV laws on these different political outcomes. They find that changes in CV laws did influence turnout in the Austrian States but not the left/right votes share, the number of parties in the government or party competition. Somewhat

Table 9
Abstention and political outcomes – Panel 1996–2010.

	Leftwing council	Number of parties	Margin of victory
	(1)	(2)	(3)
Abstention	−0.129*	−2.273***	9.599***
	(0.0715)	(0.274)	(1.349)
Electorate share aged 65+	0.0448	−0.873	2.110
	(0.325)	(0.799)	(3.264)
Interaction	−1.146	0.459	−16.74
	(1.430)	(4.969)	(21.53)
Demographic controls	X	X	X
Fiscal controls	X	X	X
Municipality FE	X	X	X
Year FE	X	X	X
State trend	X	X	X
N	30,808	30,808	30,808
R^2	0.012	0.139	0.042

Notes: Observation unit: municipality-year for all the years from 1996–2010. Dependent variables: Leftwing council = Dummy for left-wing (SP KP municipal councils; Number of parties = Number of parties in the municipal councils; Margin of victory = the difference in vote shares between the highest-ranking party and the runner-up for the latest municipal election. Independent variables: Abstention = abstention rate for the latest municipal elections; Electorate share aged 65+ = share of people aged over 65 in municipality's electorate. All regressions include municipality fixed effects, year fixed effects, state-specific linear trends (at the year level), unreported demographic and fiscal controls. Standard errors clustered by municipality in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 10
Voluntary voting and fiscal outcomes – Panel 1990–2010.

	Total expend. per cap.	Taxes per cap.	Total revenues per cap.
	(1)	(2)	(3)
Voluntary voting	0.0259**	0.0857***	0.0351***
	(0.0110)	(0.0133)	(0.0109)
Electorate share aged 65+	1.059***	−0.0516	1.053***
	(0.312)	(0.415)	(0.309)
Interaction	−0.335	−0.330	−0.335
	(0.245)	(0.307)	(0.242)
Demographic controls	X	X	X
Municipality FE	X	X	X
Year FE	X	X	X
State trend	X	X	X
N	48,420	48,419	48,420
R^2	0.440	0.212	0.406

Notes: Observation unit: municipality-year for all the years from 1990–2010. Dependent variables: Total expend. per cap. = Yearly total municipal spending per capita logs; Taxes per cap. = Yearly total municipal taxes per capita logs; Total revenues per cap. = Yearly total municipal revenues (from taxes, government grants and fees/charges) per capita logs. Independent variables: Voluntary voting = dummy coded 1 from the second year of the municipal electoral term following Voluntary voting for parliamentary elections; Electorate share aged 65+ = share of people aged over 65 in municipality's electorate. All regressions include municipality fixed effects, year fixed effects, state-specific linear trends (at the year level) and unreported demographic controls. Standard errors clustered by municipality in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

conversely Ferwerda (2014) finds that CV laws modestly affected the votes share for each party for parliamentary elections. This leads us to ask whether the observed heterogeneous effect of VV on education spending at the municipal level is channeled by these alternative mechanisms.

As political data are available only from 1996 onwards (once CV is repealed in all states), it is not possible to examine the effect of VV on these variables. But we can still analyze the heterogeneous effect of changes in the average municipal turnout on these variables for the 1996–2010 period. However we should be cautious in interpreting the estimated coefficients as causal effects as both the abstention measure and the political variables are election outcomes. The dependent variables thus are: a dummy for left-wing city council, the number of parties in the city council, the margin of victory of the winning party. The key explanatory variable is the interaction between the municipal abstention rate and the municipal elderly share. Results are presented in Table 9. We observe no evidence of any relationship between these dependent variables and the interaction between abstention and the elderly share. Hence the observed heterogeneous effect reduced voting benefits on education spending is not explained by these alternative channels.

The mechanism proposed in this paper focuses on the provision of public education. However both VV and the elderly, and indeed their interaction, can potentially affect other fiscal outcomes thus only incidentally affecting the education share of the budget. Indeed, the decline in voting net benefits (subsequent to the abolition of CV) have been found in some settings to be associated with fiscal outcomes such as the tax rate or the size of total expenditure. The heterogeneous effect of VV on education could therefore result from the heterogeneous effect of VV on other fiscal outcomes. First note that this concern is mitigated by the fact that Austrian municipalities have very low autonomy regarding taxation and other receipts while they do have room regarding their budget composition. In addition, recall that our baseline specification controls for the composition of the municipal revenue.

Nevertheless, we address this issue explicitly in Table 10 where we use our baseline regression specification replacing the education share with other fiscal outcomes as dependent variables: total municipal expenditures per capita, total municipal tax revenues per capita and total municipal revenues (including taxes and other revenues) per capita. While VV seems to have positively affected these outcomes, there is no evidence of a heterogeneous effect with respect to the elderly as the interaction term never reaches statistical significance. In Table A.8 in the Appendix, we replicate this exercise but with an interaction between the municipal abstention rate and the elderly share. This provides the same conclusion. Therefore, the conditional effect of VV on education spending does not seem to be indirectly driven by effects on other fiscal policies.

6. Conclusion

There is a common concern that political disengagement by younger and poorer citizens serves to exacerbate inequality. If politicians want to win elections they will surely bend policies in favor of those who are likely to vote. This paper takes the premise that the composition of the voting electorate changes when turnout declines and studies intergenerational redistribution in the form of investment in education. Our theoretical analysis posits a conditional relationship between education spending and the proportion of elderly in the electorate. Reduced turnout following the repeal of CV only leads to reduced spending on education if the proportion of older citizens in the electorate is sufficiently large. If this proportion is below this threshold then the turnout decline results in increased education spending because young rich voters become dominant in the voting electorate.

Our empirical work exploits the repeal of compulsory voting for parliamentary election in 1992 in four out of eight Austrian states as a exogenous source of variation in the composition of the electorate in local elections. Using panel data for Austrian municipalities

for the 1990-2010 period, we estimate that when the share of the elderly in the electorate exceeds 21%, the exogenous decline in the incentive to vote shifts policy in their favor, thus reducing the education share of municipal budget. Conversely, below this threshold, the decline in the incentive to vote results in overrepresentation of the young rich in the actual electorate, thus increasing the education share of the budget. By the end of our sample period, the share of the elderly in the electorate exceeded this threshold in half of the municipalities. This suggests that, because of population ageing, declines in voter turnout will increasingly overrepresent the elderly in the electorate and bias intergenerational redistribution in favor of the elderly. Moreover, this tendency could be reinforced by the fact that the generational gap in turnout seems to be widening because of the declining turnout of the young. Indeed, according to Eurobarometer, the percentage of Europeans aged 15–30 who voted in an election plummeted from 80% in 2011, to 73% in 2013 and 63% in 2015.

Appendix. Appendix: Theory

Electoral competition is characterized by probabilistic voting. Two parties (A and B) set policy to maximize their probability of election victory. As well as having material preferences characterized by U^J defined in the text, voters also have ideological preferences and respond to a popularity shock, hence voter i in group J votes for party A – if they are voting – if

$$U^J(g_A^E, g_A^N) > U^J(g_B^E, g_B^N) + \sigma^{iJ} + \delta$$

where σ^{iJ} is voter i's individual ideological bias towards party B. Following Persson and Tabellini (2000) we consider the case of $\sigma^{iJ} \sim U\left[-\frac{1}{2\phi}, \frac{1}{2\phi}\right]$, $\sigma^{iJ} \sim U\left[-\frac{1}{2\phi}, \frac{1}{2\phi}\right]$, where for simplicity we assume that ideological dispersion is the same across groups. δ represents the popularity shock in favor of party B, with $\delta \sim U\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right]$.

Consider first the case of full turnout – i.e. that associated with compulsory voting. The probability of candidate A winning is

$$p_A = \frac{1}{2} + \psi \sum_J \alpha^J [U^J(g_A^E, g_A^N) - U^J(g_B^E, g_B^N)].$$

Maximization of this with respect to g_A^E subject to the government budget constraint yields

$$g_{CV}^E = (\alpha^O \beta^O + \alpha^R \beta^R + \alpha^P \beta^P)\overline{\tau}$$

which is Eq. (2) in the text.

When instead turnout is voluntary, following Riker and Ordeshook (1968), we start with the idea that turnout depends on

$$R^{iJ} = PB^{iJ} - C_V^{iJ} + D^{iJ} + C_{NV}^{iJ}$$

where R^{iJ} is the reward from voting for individual i in group J, with negative realizations resulting in abstention. P is the probability that an individual's vote will be decisive in determining the election result, and B^{iJ} represents the net benefits of the voters' preferred party relative to the alternative, with P (and hence PB^{iJ}) in practical cases essentially equal to zero. Note that this last property means that the turnout decision, and hence the difference between the α^J and λ^J parameters defined in the text, can be considered independently of policy-setting. The individual decision to vote thus rests only on the costs of voting (C_V^{iJ}) relative to the costs of not voting (C_{NV}^{iJ}) and intrinsic value (D^{iJ}).

The costs of not voting (C_{NV}^{iJ}) are by construction higher under compulsory voting, where they would include the amount of the fine to pay for not voting or the cost of breaking the law. It is reasonable to assume that C_{NV}^{iJ} is set high enough in order to ensure very high turnout for all three groups. In this instance policy is simply determined by local demographic and socioeconomic conditions, as in Eq. (2) in the text.

However when compulsory voting is abolished, turnout in general falls, depending on $D^{iJ} - C_V^{iJ}$, and this plausibly varies both within and across groups. Using the parameters α and γ defined in the text, he proportions of each of the three groups out of those who actually vote, and therefore the extent to which policy is weighted, can be written as

$$\lambda^O = \frac{T^O\alpha}{T^O\alpha + T^R\gamma(1-\alpha) + T^P(1-\gamma)(1-\alpha)}$$

$$\lambda^R = \frac{T^R\gamma(1-\alpha)}{T^O\alpha + T^R\gamma(1-\alpha) + T^P(1-\gamma)(1-\alpha)}$$

$$\lambda^P = \frac{T^P(1-\gamma)(1-\alpha)}{T^O\alpha + T^R\gamma(1-\alpha) + T^P(1-\gamma)(1-\alpha)}$$

where the T^J parameters define the turnout rate of each of the groups. These parameters are used in Eq. (3).

Given these parameters, the vote-maximizing policy decision under non-compulsory (voluntary) voting (g_{VV}^E) becomes:

$$g_{VV}^E = \left(\frac{T^O\alpha\beta^O + T^R\gamma(1-\alpha)\beta^R + T^P(1-\gamma)(1-\alpha)\beta^P}{T^O\alpha + T^R\gamma(1-\alpha) + T^P(1-\gamma)(1-\alpha)}\right)\overline{\tau}$$

where the extent to which policy is affected by turnout is now transparent. Analytically $\frac{dg_{VV}^E}{d\alpha} < 0$ follows from $\beta^R > \beta^P > \beta^O$, and $\frac{d^2g_{VV}^E}{d\alpha^2} < 0$ follows from $T^O > T^R\gamma + T^P(1-\gamma)$.

To obtain $\overline{\alpha}$ insert $\alpha \equiv \alpha^O$, $\gamma \equiv \frac{\alpha^R}{(1-\alpha)}$ and $1-\gamma \equiv \frac{\alpha^P}{(1-\alpha)}$ into (2) and set equal to (3). The resulting equality is a quadratic in α with the two roots, $\alpha = 1$ and

$$\overline{\alpha} = \frac{\gamma(1-\gamma)(\beta^R - \beta^P)(T^R - T^P)}{(\gamma\beta^R + (1-\gamma)\beta^P - \beta^O)(T^O - T^R\gamma + T^P(1-\gamma))}.$$

Supplementary material

Supplementary material associated with this article can be found, in the online version, at 10.1016/j.jce.2020.07.004

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