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The generation gap in direct democracy: Age vs. cohort effects

Abstract: We document a generation gap in direct democracy outcomes across a wide range of topics that is causally related to aging. To this end, we combine different sources of postelection survey data covering more than 300 Swiss referenda and four decades. Young voters are more likely to support initiatives that favor their own generation in the present, e.g., a lower retirement age or increased unemployment benefits, or in favor of all generations in the future, e.g., environment protection. To estimate the causal effect of aging on political attitudes, we propose a novel unconstrained panel rank regression approach that separately identifies age and cohort effects. The aging effect on political attitudes is robust for controlling for arbitrary cohort effects and appears to be driven by expected utility maximization and not by habituation-induced status-quo bias.

Key words: age, cohort, direct democracy, status quo, referendum

JEL: D7, H3, H4, J1, P48, Q5

1 Introduction

Popular voices argue that the generation gap in voting today is wider than it has been at any time since the 1960s (The New York Times, 2012). Some economists attribute the rise of a “New Generation Gap” to intergenerational injustice (Stiglitz, 2016). Against this background, some political scientists predict that population aging will lead to a democratic crisis owing to an increasing resistance to plan for the future (Runciman, 2018). From a normative economics perspective, there is a problem if future generations belong in the social welfare function, but their interests are not represented by a non-altruistic, aging median voter with limited exposure to the long-run benefits of “reform projects” (Messner and Polborn, 2004). Whether or not the median voter is non-altruistic and there is a causal effect of aging on attitudes toward reform projects, however, is a non-trivial empirical question as any generation gap may originate from age *or* cohort effects (Ryder, 1965).

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We provide the first systematic documentation of a generation gap in direct democracy across a broad range of topics, and the first econometric analysis of its origins. To this end, we use a large micro data set covering postelection surveys for 305 federal referenda held between 1981 and 2017 in Switzerland. The long time period that is covered by this unique data set allows us to estimate the causal effect of aging on political attitudes conditional on arbitrary cohort effects, a challenge that the related literature has long faced. One of our central findings is that as voters of the same cohort age, they become less politically liberal and less supportive of policies that seek to protect the environment, support young workers and families, or redistribute wealth from the rich to the poor. This within-cohort aging effect empirically substantiates the concern expressed in social science and political economy literature that population aging may lead to a “gerontocracy” in which adopting forward looking economic, social, or environmental policies will prove difficult (Galasso and Profeta, 2002; Holtz-Eakin et al., 2004; Montén and Thum, 2010; Preston, 1984; Sørensen, 2013; Tepe and Vanhuysse, 2009).

In a theoretical piece, Messner and Polborn (2004) argue that many “reform projects” share similarities with investments in that they require some initial expenditure and pay dividends over a long period. Rational voters of all ages will maximize their individual expected utility conditional on their stage in the lifecycle accordingly; i.e., they weigh the expected costs against the discounted benefits expected over their remaining lifetime. As voters age, the period over which they expect to receive the benefits decreases so that they become less inclined to support projects with long-run returns. Therefore, a generation gap may imply that collective decisions are likely to deviate from decisions that would maximize the net present value (NPV) for subsequent generations. Moreover, in an aging society, projects with long-run returns and short-run costs will have declining chances of winning majorities.

However, there are competing explanations for a generation gap. From a theoretical perspective, a status-quo bias is a frequently documented feature of political, economic, and social behavior (Ciccone, 2004; Fernandez and Rodrik, 1991; Hessami and Resnjanskij, 2019; Kahneman et al., 1991; Meier et al., 2019). Theoretically, older voters could prefer the status quo because they have experienced it over a longer period. As voters age, they could become more averse to reform projects simply due to habituation (Samuelson and Zeckhauser, 1988). This hypothesis is consistent with the empirical observation that individuals become more risk-averse as they age (Dohmen et al., 2017). While population aging would still affect a society’s ability to respond to changing circumstances, a status-quo bias would not necessarily affect policies that benefited recent or future generations more than older generations. From an empirical perspective, a generation gap that is observed at any given

point in time may equally be attributed to cohort effects because differences in age directly map to differences in birth years. Individuals with similar birth years, often referred to as birth cohorts or social generations, live through their “impressionable years” in similar social and political environments. Consequently, values, attitudes and orientations tend to be similar within cohorts and different across cohorts (Krosnick et al., 1989; Mannheim, 1952). A generation gap that originates from cohort effects is unlikely to interact with population aging because today’s young will maintain their political attitudes and orientations as they age. If cohort effects follow a random walk, the generation gap could even shrink or reverse, irrespective of whether the population ages.

To document the generation gap and analyze its origins, we collect and process comprehensive micro data from Swiss post-election surveys. We use the individual yes vs. no voting decisions recorded in the data and a referendum-specific mapping that we overlaid on the official documentation to encode two binary outcome variables: status-quo orientation and political attitude. With the status-quo orientation, we distinguish between a voting decision that supports the legal status quo and a vote for a change in legislation. To encode the political attitude, we use 24 officially defined topical themes to categorize the 305 referenda into four policy areas: regulatory, environmental, generational, and public finance. Consistent with conventional definitions in the US political science literature, we define votes as left-wing if they correspond to positions that can be considered politically liberal (e.g., in favor of international integration), pro-environmental protection (e.g., in favor of climate change mitigation measures), in the interest of younger generations (e.g., supporting families with dependent children), or pro-progressive redistribution (e.g., favoring state revenues via income tax over user fees) (Budge et al., 2001; Neumayer, 2004; OECD, 2009).

With this data set at hand, we first document the existence of a generation gap in direct democracy across a broad variety of outcomes. Younger voters are more likely to vote for change and support reform projects which can be associated with the political left. Younger voters attach a higher priority to protecting the environment and are more supportive of policies that benefit the young. Voters in their 30s and 40s, more than those in their 20s or at later stages of the lifecycle, tend to support policies that have progressive redistribution consequences.

Next, we proceed to separating age and cohort effects by tracking how the attitude of voters belonging to the same cohort towards similar reform project changes over time. In doing so, we face the problem that an individual’s age is a linear combination of its birth year and the year in which it is observed. It is thus impossible to identify age, period, and cohort (APC) effects without constraints on the functional form, a problem that is known as the APC conundrum (Fienberg and Mason, 1985).

A novelty of our study is that we estimate an unconstrained rank model to distinguish between age and cohort effects in a flexible manner. We remove period effects by computing the rank a cohort occupies in the distribution of attitudes within a period. Conditional on this transformation, we can separately identify age and cohort effects on attitude ranks non-parametrically and without imposing any constraints on functional form. The estimated age parameter in this rank regression approach has convenient bounds of positive and negative unity: If attitudes strictly and monotonically changed in age, all cohorts would move along the rank distribution by one step each year they aged as a new cohort entered the data at the top or the bottom of the distribution.

As a central quantitative result, we find that the political attitude rank increases by, on average, 0.62 each year a voter ages (1.00 is the theoretical upper bound), on a scale that ranks political attitudes from left-wing to right-wing. Political attitudes change strongly around the retirement age, where estimated aging effects are near the theoretical upper bound. This pattern is fairly generally and shows up consistently in distinct categories of referenda that relate to, e.g., political ideology, the environment, or intergenerational transfers. The age effects are not driven by turnout (we find a similar age effect on attitudes reported by non-voters), altruism (we consider voters without children), and fuzzy measurement of political attitudes (we exploit political party recommendations and self-reported political attitudes). The estimated within-cohort aging effects are quantitatively relevant as they imply that five referenda since 2004 would have had a different outcome, had the population distribution remained at 1981 levels.

Cohort effects are also a prominent feature of the data. After controlling for arbitrary age effects, we find that baby boomers (born between 1946 and 1964) are more inclined to support environmental protection, policies that benefit the young, and progressive redistribution than other generations. Recent generations (born since 1965), in terms of political preferences, are more similar to prebaby-boomers (born up to 1945). The age-adjusted difference in political attitudes between cohorts born from 1935 to 1939 (more right-wing) and baby boomers born from 1955 to 1959 (more left-wing) is equivalent to the estimated effect of an individual aging by 32 years.

Turning to a potential status-quo bias, we generally find much smaller effects of aging on status-quo orientation than on political attitudes. Significant within-cohort effects of age on political attitudes persist if we control for status-quo orientation. Thus, over their voting life, cohorts shift from the political left to the political right in a manner that is not determined by an increasing tendency to favor the status quo. Overall, with regard to rationalizing the generation gap, there is more support for the utility-maximization than the habituation hypothesis.

Our study connects to several strands in the economics literature. One strand concerns how age shapes socio-economic and political attitudes and behaviors (Chetty et al., 2014; Costa and Kahn, 2011; Ermisch and Francesconi, 2000; Fisher and Gervais, 2011; Giuliano and Spilimbergo, 2013; Kong et al., 2018), particularly in the context of population aging and the resulting intergenerational conflicts (Baltrunaite et al., 2015; Galasso and Profeta, 2004; Profeta, 2002; Rattsø and Sørensen, 2010; Tepe and Vanhuysse, 2010). Specifically, we add to a literature summarized by Ahlfeldt et al. (2019) that has considered age as an explanatory factor in cross-sectional referendum analyses and a literature that seeks to separate age and cohort effects on political outcomes such as attitudes to public spending (Fullerton and Dixon, 2010; Sørensen, 2013), political parties (Tilley and Evans, 2014), and European integration (Eichengreen et al., 2018).

We also relate to a political economy literature on the nature of democratic decision-making (Castanheira et al., 2006; Deacon and Shapiro, 1975; Feld, 2006; Hodler et al., 2015; Mueller and Stratmann, 2003; Osborne and Turner, 2010) and specifically how interest groups seek to influence political outcomes (Ahlfeldt et al., 2017; Feinerman et al., 2004; Giger and Klüver, 2016). In analyzing the determinants of age-related opposition to reform projects, we connect to studies that distinguish between utility maximization and other determinants of socio-political behavior that lead to status-quo bias (Fernandez and Rodrik, 1991; Hessami and Resnjanskij, 2019; Kahneman et al., 1991; Meier et al., 2019; Stutzer et al., 2019). Our analysis is also connected to economic research on various types of publicly provided goods on which voters often decide directly, such as education (Bearse et al., 2013; Cattaneo and Wolter, 2009; Plutzer and Berkman, 2005), infrastructure and public transportation (Ahlfeldt and Maennig, 2015; Meya et al., 2020), and the protection of health and the environment (Bornstein and Thalmann, 2008; Pampel and Hunter, 2012; Thalmann, 2004). Relevant to the wider social sciences literature, our unconstrained rank models used to separately identify age and cohort effects are a methodological contribution to a broad literature concerned with the analysis of APC effects (Fu, 2016; Giuliano and Spilimbergo, 2013; Luo and Hodges, 2015; Sørensen, 2013).

Section 2 introduces our empirical strategy against the background of the challenges to the identification of APC effects. In Section 3, we discuss the Swiss context and our data. We document the existence of a generation gap in referenda on a wide range of subjects in Section 4 before we separate age and cohort effects in Section 5. In Section 6, we evaluate the robustness of the estimate, in particular with respect to the role of turnout, altruism and measurement of political attitudes. Finally, we use our estimated aging effect to assess the degree to which population aging has affected direct votes since 1981. Section 7 concludes the study.

2 Identifying age and cohort effects

Consider a general model that describes the probability $V_{c,r,t}$ of a voter from birth cohort c to vote in line with a certain political attitude (e.g., a vote that supports left-wing policies).

$$V_{c,r,t} = g(AGE_{c,t}) + h(c) + k(t) + \varepsilon_{c,r,t}, \quad (1)$$

where r indexes referenda held at time t . $AGE_{c,t}$ gives the age of a voter belonging to cohort c at time t , $g(\cdot)$, $k(\cdot)$, $t(\cdot)$ are differentiable functions, and $\varepsilon_{c,r,t}$ is a random error that captures unobserved voter characteristics and idiosyncratic referendum effects.

We are primarily interested in an estimate of $g' = \partial V_{c,r,t} / \partial AGE_{c,t}$, i.e., the causal effect of aging holding other effects constant. We refer to this effect as the *aging effect*. An identification challenge originates from $AGE_{c,t}$ being a linear combination of the birth year of cohort c and the time of the referendum t :

$$AGE_{c,t} = t - c. \quad (2)$$

The first problem common to the analysis of individual or grouped voting data is that in a cross section, age is a linear transformation of c because there is no variation in t . Using equation (2) in equation (1), it is clear that a cross-sectional estimation of the effect of voter age on voting outcomes identifies the composite effect of aging and cohort affiliation, i.e., $\partial V_{c,r} / \partial AGE_c = g' - h'$. There is no way to separate the effects of age and cohort affiliation other than by assumption (e.g., by assuming that $h' = 0$).

One positive feature of our data set, which is rare in the context of referendum data, is that we observe voting decisions across a relatively large number of referenda spread across several decades. Although this longitudinal dimension of our data helps overcome the first identification problem, there is a second. There is no variation in t conditional on $AGE_{c,t}$ and c . Therefore, it is impossible to identify the effects of $AGE_{c,t}$, t , and c without restrictions. This is the APC conundrum, a fundamental problem in the analysis of APC effects that has been faced by researchers from a wide range of disciplines for decades (Abramson, 1979; Hanoch and Honig, 1985; Heathcote et al., 2005; Mason et al., 1973; Ryder, 1965).

Despite a long tradition of dealing with this problem, the literature has achieved little consensus on how to address it. One approach is to estimate age and cohort effects without controlling for period effects. If $k(t) = k^A(AGE_{c,t}) + k^B(c)$ is an additive function, the estimated age effect is $\partial V_{c,t} /$

$\partial AGE_{c,t} = g' + k^{A'}$. An unbiased estimate of g' then requires the strong identifying assumptions that $\partial V_{c,t}/\partial t|c = k^{A'} = 0$. Likewise, a control for cohorts can be omitted with the assumption of $h' = 0$. To relax the identifying assumption, some researchers have proposed controlling for period effects by means of time-varying variables that capture the determinants of an outcome (Heckman and Robb, 1985), although concerns regarding unobserved time-varying controls naturally remain. Another approach is to impose constraints on the functional form of $g(AGE_{c,t})$ and $h(c)$, typically by assuming a parametric function for the age effect (generally a polynomial function) and fixed effects for a limited number of (e.g., decadal) birth cohorts. The age effect is then identified from within cohort variation. However, such a control for cohort affiliation is naturally imperfect, and the results tend to be sensitive to the definition of cohort groups (Luo and Hodges, 2015).

Since we are primarily interested in estimating age effects conditional on arbitrary cohort effects, we desist from the identification of period effects. Because the number of referenda per period is limited, period effects are likely to capture referendum effects that depend on the varying characteristics of referenda. Thus, the interpretation of period effects is not particularly intuitive in our context. To separately identify age and cohort effects, we estimate the following empirical model:

$$R_{c,t} = R(V_{c,t}) = m(AGE_{c,t}) + \theta_c + \varepsilon_{c,t}, \quad (3)$$

where $R(\cdot)$ is a function that gives a cohort's field rank (lowest rank to highest value) in the distribution of voting propensities within a period, θ_c is an arbitrary cohort fixed effect, and $m(\cdot)$ describes how the position of cohort in the rank distribution of preferences and orientations changes over time as the cohort ages. The rank transformation of the dependent variable removes period effects because the rank of a cohort within a period $R_{c,t}$ is independent of period effects $k(t)$. The longitudinal dimension, thus, allows for the separate identification of aging effects and cohort effects without further constraints, which is why we refer to this approach as an unconstrained rank model. It is the nature of the APC conundrum that – following the rank transformation – period effects cannot be estimated. Hence, our baseline estimates are not informative with respect to changes in the average political attitude over time that originate from reasons other than population aging. For the interested reader, we provide a complementary application of a conventional parametric APC regression model in Appendix I, Section 9. The period effects recovered with this estimation approach provide little evidence for a universal trend in political attitudes over the considered study period.

The rank transformation removes cardinal information as (mean) orientations and attitudes are converted into an ordinal scale. However, the rank transformation also lends an intuitive interpretation

to the marginal effects we estimate. If orientations and attitudes were exclusively determined by age and the propensity to support a certain type of initiative decreased with age, each cohort, as it reached the minimum voting age, would enter the data with a rank of 1. Because in every period, a new cohort would enter the data with a rank of 1, all other cohorts would climb up the rank scale by one step every period they age. Thus, the implied aging effect would be $\partial R_{c,t}/\partial AGE_{c,t} = m'(AGE_{c,t}) = 1$. Likewise, we expect $m'(AGE_{c,t}) = -1$ if aging was associated with increases in the propensity to support initiatives. By contrast, an aging effect of zero would imply that any cross-sectional correlation between voting outcomes and voter age was spurious and attributable to correlated cohort effects. These values thus represent convenient bounds for estimated aging effects.

3 Context and data

For 150 years, Swiss voters have been routinely called to the polls to make decisions on a wide range of topics at the municipal, cantonal, and federal levels. Adjudications concerning changes to the constitution and the ratification of international treaties must be approved by the electorate by a direct vote. Other adjunctions can be subject to facultative referenda if a sufficient number of signatures are collected. Occasionally, government authorities propose a counter initiative or alternative version to the original initiative on the same referendum ballot. In general, federal referenda – on which we focus – are held four times a year, with votes on three to five referenda on average per occasion. Eligible voters are automatically registered for the polls. Along with their polling cards, voters receive an information package that includes arguments in favor of and against each proposition, estimates of anticipated benefits and financial consequences, and where applicable, a summary of the parliamentary debate and outside opinions by interest groups.

Swiss authorities collect unique micro data on voter decisions and characteristics. Since 1977, representative postelection surveys have been conducted after each referendum, asking approximately 1,000 randomly selected eligible voters about their voting decisions and a broad range of individual characteristics. These so-called VOX surveys occur within two to three weeks after a referendum by telephone interviews. The data covers the actual voting behavior, political attitudes (e.g., party identification, trust in the government) and socio-economic attributes (e.g., age, household size, gender, education level, income). Because survey design has changed over time, the department of political science at the University of Geneva publishes standardized versions of the original data, which we use in our work. These VoxIt data cover virtually all referenda since 1981, combining a standardized set of variables from the VOX surveys with official referendum data, e.g., results, turnout, government and party endorsement. In 2016, the VOX project was replaced by the so called VOTO surveys, which

are run by the Swiss Centre of Expertise in the Social Sciences (FORS), the Centre for Democracy Aarau (ZDA), and the LINK Institute for Market and Social Research. Since the VoxIt and VOTO surveys ask very similar questions, it is possible to pool the covered referenda, subject to some harmonization described in Appendix I, Section 3.3.

For our main analysis we restrict our data set to respondents who cast a vote in a referendum. This should mitigate many of the concerns regarding the validity of voting survey data (Bertrand and Mullainathan, 2001). Because of the frequency of direct decisions and the quality of the data, Swiss referenda have become a popular subject of political and socio-economic research (Frey and Schaltegger, 2020; Funk and Gathmann, 2015). We refer to a growing number of studies for further details on the institutional setting and Swiss post-vote survey data (Bello and Galasso, 2021; OECD, 2009; Stutzer et al., 2019).

Between June 14, 1981 and May 21, 2017, 312 public referenda took place at the federal level in Switzerland. Survey data availability constrains the set of analyzed referenda to 305. These referenda fall into 12 officially defined contextual *categories* (*Ebene-1 Deskriptoren*). Within each category, we define subcategories of contextually homogeneous referenda, which we refer to as *themes*. We define a total of 24 themes, which we then aggregate to four *policy areas*. The regulatory policy area comprises referenda on topics that typically polarize voters into conservative and liberal camps, such as constitutional order, foreign affairs and security policy. The environmental policy area comprises referenda that concern the environment, e.g., affecting carbon emissions or protecting natural habitats. In the generational policy area, we include referenda on policies that are specifically targeted at certain age groups, e.g., allowances for families (with dependent children) or labor market regulations (e.g., regarding maximum working hours) that affect those who are not yet retired. Finally, the public finance policy area includes referenda in which voters have the choice between options that have distributional consequences that may be described as either progressive (e.g., relatively more important income tax) or regressive (e.g., relatively more important user fees). In the interest of a transparent empirical analysis, our policy areas are mutually exclusive.

Table 1 Summary by category, theme, and policy area

#	Official categories (numbers) and defined themes (letters)	N		Share yes votes			Policy area
		Ref	Survey	Survey	Actual	Diff.	
-	01 Constitutional order	31	16,068	0.549	0.532	0.017	-
1	A Pro liberal law system	19	10,301	0.596	0.570	0.026	Regulatory
2	B Pro direct democracy	12	5,767	0.466	0.465	0.001	Regulatory
-	02 Foreign affairs	12	7,556	0.553	0.498	0.056	-
3	A Pro international integration	12	7,556	0.553	0.498	0.056	Regulatory
-	03 Security policy	22	12,712	0.481	0.455	0.026	-
4	A Pro smaller military	22	12,712	0.481	0.455	0.026	Regulatory
-	04 Markets (regulation)	20	12,099	0.452	0.438	0.014	-
5	A Pro worker protection	11	6,819	0.427	0.417	0.010	Generational
6	B Pro protection of consumers	9	5,280	0.484	0.467	0.018	Regulatory
-	05 Agriculture	13	5,878	0.561	0.536	0.025	-
7	A Pro limiting intensive farming	13	5,878	0.561	0.536	0.025	Regulatory
-	06 Public finance	28	15,293	0.517	0.513	0.004	-
8	A Pro progressive fiscal policy	17	10,119	0.504	0.494	0.010	Public finance
9	B Pro fiscal expansion	11	5,174	0.541	0.550	-0.008	Public finance
-	07 Energy	14	7,793	0.484	0.439	0.044	-
10	A Pro sustainable energy	14	7,793	0.484	0.439	0.044	Environmental
-	08 Transport and infrastructure	30	17,913	0.533	0.506	0.028	-
11	A Pro sustainable mode	25	15,056	0.527	0.503	0.025	Environmental
12	B Pro lower transport tolls and taxes	5	2,857	0.564	0.519	0.045	Public finance
-	09 Environment	20	12,456	0.447	0.427	0.021	-
13	A Pro-environment protection	9	5,835	0.439	0.410	0.029	Environmental
14	B Pro more housing supply	11	6,621	0.455	0.442	0.013	Regulatory
-	10 Social policy	92	58,320	0.465	0.461	0.004	-
15	A Pro liberal health policies	14	7,906	0.483	0.472	0.011	Regulatory
16	B Pro health expenditures	18	11,452	0.430	0.426	0.004	Public finance
17	C Pro state pension	13	7,790	0.445	0.433	0.012	Public finance
18	D Pro lower retirement age	5	2,722	0.411	0.404	0.006	Generational
19	E Pro unemployment benefits	5	3,334	0.473	0.458	0.014	Generational
20	F Pro family allowances	12	8,360	0.401	0.390	0.011	Generational
21	G Pro liberal immigration policy	25	16,756	0.528	0.538	-0.010	Regulatory
-	11 Research and education	15	7,913	0.543	0.500	0.043	-
22	A Pro expenditures on education	7	3,099	0.512	0.444	0.068	Public finance
23	B Pro limiting in vivo studies	8	4,814	0.563	0.535	0.028	Regulatory
-	12 Arts and culture	8	3,790	0.637	0.564	0.074	-
24	A Pro support of culture and media	8	3,790	0.637	0.564	0.074	Public finance
-	All referenda	305	177,791	0.519	0.489	0.030	-

Notes: Data cover 305 referenda from 1981 to 2017. All themes are defined to be in line with the attitude of the political left (as opposed to the political right). N ref. is the number of referenda. N sur. is the number of survey observations. Share yes votes survey is the proportion of yes votes in the survey data. Share yes votes actual is the proportion of yes votes of all votes cast in a referendum.

Table 1 summarizes our data by themes and policy areas, comparing the share of yes votes in the survey data to the official voting results. As expected, the yes-vote share of the survey data is close to the official result if the number of referenda (within a theme or category) is sufficiently large. However, across all referenda, we find the yes-vote share in the survey data to exceed the official results by some notable 3.1 percentage points, possibly due to a survey bias (Funk, 2016). Since we generally analyze the distribution of voting decisions within referenda, a potential bias will not affect our results to the extent that it is uncorrelated with voter characteristics.

To render the data amendable to pooled analysis, we define voting outcomes that are comparable across referenda. Our first outcome variable assumes the value of 1 if the vote is in line with a change in the legal status quo and 0 otherwise. To this end, we combine a voter’s individual voting decision (yes vs. no) as recorded in the survey and a referendum-specific mapping on whether a yes or a no vote would imply a change in legislation. We refer to this outcome variable as *status-quo orientation*. Our second outcome variable assumes the value of 1 if the vote is in line with a position that can be ascribed to the political left, and 0 if it is in line with the political right. For this purpose, we first create a referendum-specific mapping of voter decisions to policy-area-specific attitudes. Following conventions in the US political science literature, we then associate a left vote with the following attitudes: liberal (as opposed to conservative), high priority (as opposed to low priority) environmentalist, pro-young (as opposed to pro-elderly), and pro progressive (as opposed to regressive) redistribution (Budge et al., 2001). We refer to the resulting outcome variable as *political attitude*.

A full list of the referenda included in our study with the mapping of a yes vote to status-quo orientation and policy area-specific attitudes is in Appendix II. For 17 referenda held before 1985, voter age is defined by five-year age categories (instead of integer values). In an auxiliary step summarized in Appendix I, Section 3.2, we predict a voter’s age (within age categories) based on the wide range of socio-demographic variables in the data set. We also note that the minimum voter age in Switzerland was lowered from 20 to 18 in 1991. To maintain a consistent definition over the study period, we generally exclude responses from voters below the age of 20.

4 Voting outcomes by age

4.1 Generation gap by policy areas

Before estimating the causal effects of aging on voting outcomes, we examine the extent to which a generation gap prevails across a range of referendum topics. To this end, Figure 1 summarizes how the conditional mean political attitude controlling for voter characteristics and referendum effects changes by age for each of the four policy areas defined in Table 1. For the interested reader, we present an analysis by theme in Appendix I, Section 5. For each policy area, we first run OLS regressions of the political attitudes defined in Section 3 against voter characteristics, referendum effects, and integer age-bin effects and then plot the results of local polynomial (degree = 0) regressions of the latter against age. The conditional mean political attitude may be interpreted as the propensity of observationally equivalent voters casting a vote that is consistent with the positions of the political left.

We find that younger voters tend to vote less conservative, attach higher priorities to the environment, and support policies that benefit the young. Specifically, controlling for observable individual characteristics, the propensity of a 20-year-old voter casting a conservative vote is approximately six percentage points (11%) lower than that of an 80-year-old voter. The similarly defined generation gap in terms of a high vs. a low priority environmentalist attitude is approximately ten percentage points (18%). The propensity of casting a vote that favors the young declines by more than fifteen percentage points (30%) over the voting life.

Within each policy area, there is a relatively sharp reduction in conditional mean attitudes around the age of 60, close to retirement age. The strong “retirement effect” within the generational policy attitude appears to be driven by referenda concerning unemployment benefits and retirement age (themes 10D and 10E) – those who have already retired do not benefit from unemployment allowances, nor do they benefit from earlier retirement (see Appendix I, Section 5, for an analysis of political attitudes by theme). This generational attitude effect is also consistent with recent US survey evidence revealing that elderly generations are less supportive of policies that benefit the young (Pew Research Center, 2018). Within the public finance policy area, the age trend is non-monotonic. Up to their early 30s, voters are increasingly more likely to support progressive fiscal policies that are associated with redistribution from higher to lower income and wealth groups. From then on, voters become increasingly more averse to the same kind of policies. This lifecycle pattern is consistent with voters becoming more economically vulnerable as they start their own families and then less vulnerable due to increasing incomes and inherited wealth.

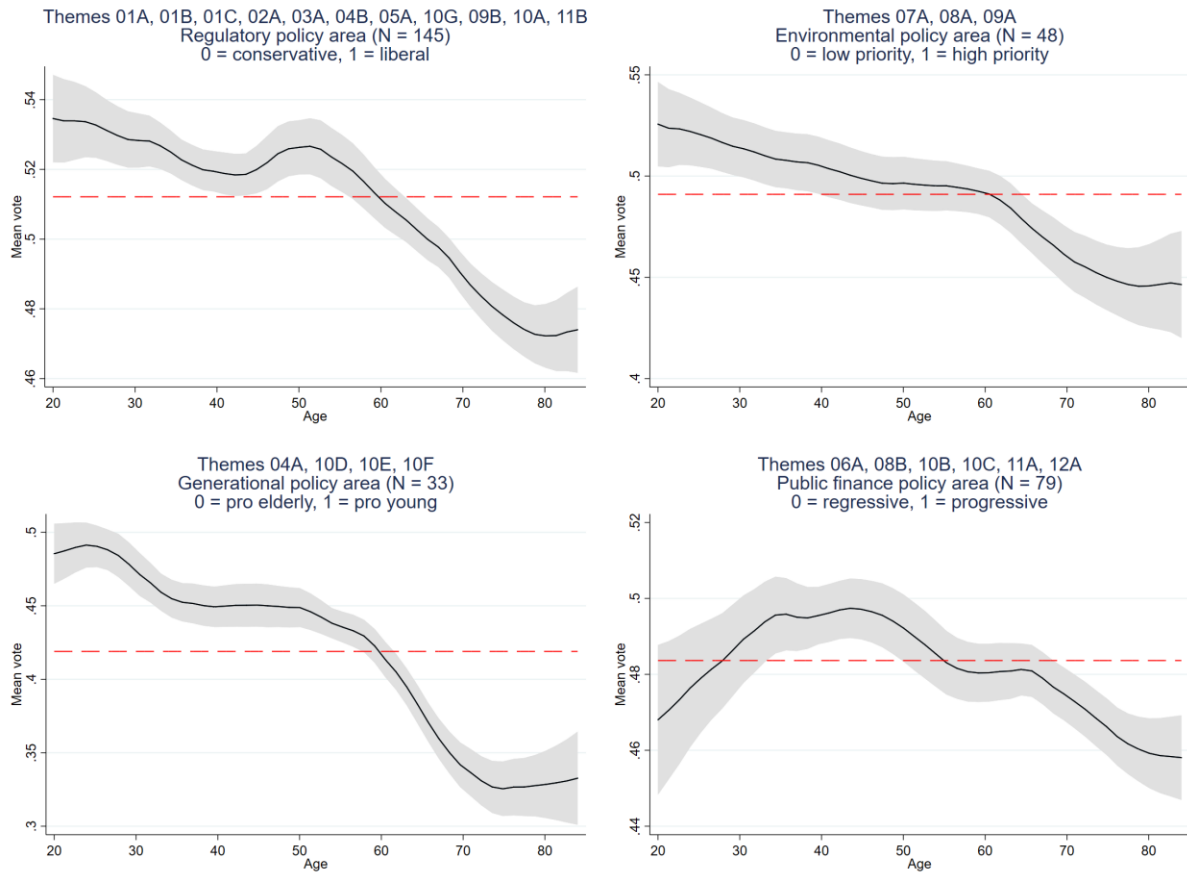


Fig. 1 Political attitude by age and policy area. A voting outcome of zero [one] is in line with the political right [left]. For each policy area, we regress the voting outcome against individual socio-economic and voting behavior controls, referendum fixed effects and one-year-age-bin fixed effects. Point estimates (solid lines) and 95% confidence intervals (gray-shaded areas) are from local polynomial regressions of the age-bin fixed effects against (integer) age. Dashed lines are the mean outcomes across all age groups within policy areas. N is the number of referenda within a policy area.

Briefly summarized, regulatory, environmentalist, and generational attitudes tend to shift from positions that are associated with the political left toward the political right as voter age increases. Regarding voters' political attitudes toward public finance policies, a similar trend exists over approximately two-thirds of the voting life (from the 40s onwards). In all four policy areas, the trend accelerates around retirement age. Overall, this section documents a systematic generation gap in direct democracy outcomes, the origins of which are to be explored in the remainder of the paper.

4.2 Status-quo orientation vs. political attitude

The generation gap documented above may originate from an expected utility of (left) reform projects that decreases in the remaining life time (Messner and Polborn, 2004). Alternatively, voters could become more averse to reforms due to habituation; i.e., older voters could prefer the status quo more because they have experienced it over a longer period (Samuelson and Zeckhauser, 1988). Distinguishing between utility-maximization and habituation as drivers of age effects would not be empirically feasible if our two primary outcomes (status-quo orientation and political attitude) were

collinear, i.e., if a change in the legal status quo strictly implied a change in policy toward the political left. However, 17.9% of all votes in our sample are in support of change and a right-wing policy at the same time and a similar fraction is in support of the status quo and left-wing policies. These fractions are larger for the regulatory and public finance policy areas than for the environmental and generational policy areas, but, in general, there is enough variation in the data to distinguish between utility-maximization effects and habituation effects (see Appendix I, Section 6).

In Table 2 we show how the conditional mean status-quo orientation (model (1) to (5)) and political attitude (model (6) to (10)) changes in age by the four policy areas defined in Table 1. For each policy area, we first run OLS regressions of the political attitude against voter characteristics, referendum effects, and integer age-bin effects and then report the results of linear regressions of the latter against age. We find a negative age trend in both outcomes, but the age effect is stronger on political attitude. In models (11) to (15), we estimate the age effect on political attitude controlling for status-quo orientation in the first-stage regressions. The age effect on political attitude is only marginally affected by holding status-quo orientation constant. One interpretation is that the differences in political attitudes between the young (relatively more inclined to left-wing policies) and the old (relatively more inclined to right-wing policies) are not driven by a habituation-induced status-quo preference by the latter.

Table 2 Parametric age effects on status-quo orientation and political attitude

<i>Voting outcome</i>	<i>Policy area</i>				
	Regulatory	Generational	Public finance	Environmental	All
<i>Status-quo orientation (SO)</i>	(1)	(2)	(3)	(4)	(5)
Age (years)	.00021 (.00038)	-.0009*** (.00023)	-.00201*** (.00028)	-.00007 (.00039)	-.00037*** (.00011)
r2	0.004	0.166	0.412	0.000	0.035
<i>Political attitude (PA)</i>	(6)	(7)	(8)	(9)	(10)
Age (years)	-.00061* (.00036)	-.00205*** (.00028)	-.00209*** (.00033)	-.00097*** (.00031)	-.00102*** (.00013)
r2	0.036	0.427	0.351	0.115	0.168
<i>PA conditional on SO</i>	(11)	(12)	(13)	(14)	(15)
Age (years)	-.00065* (.00036)	-.00155*** (.00026)	-.001*** (.00028)	-.00096*** (.0003)	-.00092*** (.00012)
r2	0.040	0.328	0.143	0.123	0.160
Controls	Yes	Yes	Yes	Yes	Yes
Ages	All	All	All	All	All
N ref	145	48	33	79	305

Notes: In the models (1) to (5), the voting outcome is encoded as zero [one] if the vote is in support of defending [challenging] the status quo. In the remaining models (6) to (15), the voting outcome is encoded as zero [one] if it is in line with the political right [left]. In the model (1) to (10), we regress different voting outcomes (status-quo orientation and political attitude) against individual socio-economic and voting behavior controls, referendum fixed effects and one-year-age-bin fixed effects. Point estimates are from linear regressions of the age-bin fixed effects against (integer) age. In the models (11) to (15), we use the political attitude outcome as the dependent variable and control for the status-quo orientation in addition to the other covariates. Standard errors are clustered on cohort fixed effects where included.
* $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

4.3 Age vs. cohort effects

The generation gap documented above may be causally related to the aging of individuals or attributable to cohort effects. Individuals belonging to different birth cohorts had different experiences at similar stages of their lifecycles and may consequently have developed different values, attitudes and orientations. In fact, numerous studies have ascribed different tastes, values, and political preferences to distinct social generations (Abramson, 1979; Alwin and Krosnick, 1991; Foner, 1974; Fullerton and Dixon, 2010; Sørensen, 2013).

To separate aging and cohort effects, our approach is to analyze how attitudes change within cohorts as they age. To this end, we tabulate the unconditional mean political attitude by cohorts and age groups in Table 3. Virtually all cohorts shift from a left to a right political attitude as they age. The exception are the earliest cohorts, which, however, are sparse in our data (they are already in their 70s or older when our observation period starts in 1980s). It is worth noting that Table 3 also reveals consistent age effects within groups of voters who voted for change or the status quo, once more indicating that habituation is an imperfect explanation for the generation gap. Age trends are also similar within referenda that won a majority or failed, which does not support a further alternative hypothesis that age effects could be driven by older voters being better at making choices that are in the interest of society as a whole. We also find similar age effects when differentiating by gender and periods.

Table 3 Mean political attitude and status-quo orientation by age and other attributes

	Age								
	20s	30s	40s	50s	60s	70s	80s	90s	All
All	0.538	0.514	0.498	0.491	0.473	0.451	0.450	0.462	0.491
Status-quo vote	0.359	0.368	0.358	0.360	0.356	0.324	0.330	0.323	0.354
Change vote	0.703	0.661	0.642	0.630	0.598	0.598	0.576	0.596	0.633
Referendum won	0.591	0.561	0.543	0.545	0.523	0.519	0.509	0.548	0.543
Referendum failed	0.493	0.476	0.459	0.446	0.432	0.396	0.402	0.381	0.447
Female voter	0.548	0.522	0.505	0.502	0.480	0.457	0.465	0.471	0.500
Male voter	0.530	0.505	0.490	0.479	0.466	0.446	0.437	0.453	0.482
Period = 1980s	0.555	0.514	0.480	0.455	0.448	0.423	0.402		0.484
Period = 1990s	0.555	0.533	0.507	0.496	0.490	0.475	0.484	0.545	0.510
Period = 2000s	0.531	0.530	0.515	0.506	0.475	0.460	0.465	0.513	0.500
Period = 2010s	0.493	0.473	0.479	0.486	0.467	0.435	0.427	0.424	0.468
Cohort = 1900s							0.402	0.545	0.413
Cohort = 1910s						0.423	0.484	0.513	0.453
Cohort = 1920s					0.448	0.475	0.465	0.424	0.466
Cohort = 1930s				0.455	0.490	0.460	0.427		0.464
Cohort = 1940s			0.480	0.496	0.475	0.435			0.471
Cohort = 1950s		0.514	0.507	0.506	0.467				0.493
Cohort = 1960s	0.555	0.533	0.515	0.486					0.514
Cohort = 1970s	0.555	0.530	0.479						0.518
Cohort = 1980s	0.531	0.473							0.491
Cohort = 1990s	0.493								0.493

Notes: A voting outcome of zero [one] is in line with the political right [left]. Cells in the table show the unconditional mean vote by age group (columns) and the attributes (rows).

Although Table 3 supports the presence of aging effects, it is the nature of the APC conundrum that the within-cohort age trend could also be attributable to period effects, i.e., a shift in the mean attitude over time. We illustrate the intuition behind the unconstrained rank model described in Section 2 as a means to separately identifying of age and cohort effects in Figure 2. To this end, we convert the unconditional mean political attitudes in the age group-cohort cells reported in Table 3 into within-period field ranks. Within each period (decade), each cohort is assigned a rank in the distribution of political attitudes in which left political attitudes correspond to low ranks and right political attitudes correspond to high ranks. Since this transformation removes period effects, we can separate age and cohort effects without further functional-form assumptions (see Section 2).

Although we observe at most four periods per cohort due to the limited longitudinal dimension of our data, the pattern in the data is quite unambiguous. Cohorts generally begin their voting life with a left political attitude. In our data, we observe the 1960s, 1970s, 1980s, and 1990s birth cohorts in the first period (decade) in which they are entitled to vote. All of them occupy a low attitude rank of one or two during this period, and all step up in the rank scale toward a more right-wing rank as they age in the subsequent periods, except for the 1970s cohort. Likewise, cohorts that we observe for the first time at higher ages enter the data with higher ranks and then also climb the rank scale as they age. By the end of their voting lives (we set this to period 7 for consistency), the cohorts that we

observe at that stage of their voting lives (1900s, 1910s, 1920s, and 1930s birth cohorts) are those with the most right-wing political attitudes (ranks 7-8). They all occupy a lower political attitude rank the first time we observe them in the data.

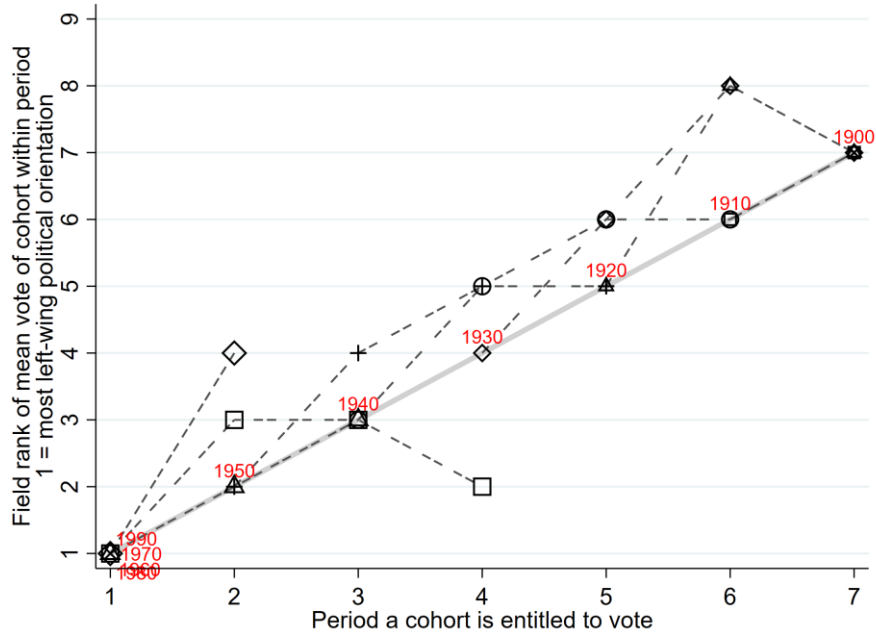


Fig. 2 Cohort rank in political attitude distribution by period. Field ranks (lowest rank to highest value) are computed as the ranks in the distribution of unconditional means in political attitude of cohorts within periods. The temporal unit of observation is periods defined as decades. Our data cover four decades and 10 birth cohorts. During the first/.../seventh period a cohort is entitled to vote, voters are in their 20s/.../80s. Cohorts are labeled when they first appear in our data. Light thick line is the 45-degree line.

Figure 2 further suggests that cohorts, on average, climb up the rank distribution by approximately one step each period. As discussed in Section 2, this is the upper-bound that we can expect from the aging effect. Figure 2 implies that aging effects (instead of cohort effects) account for much of the generation gap documented above. We provide an econometric analysis of the unconstrained rank model to affirm this notion in the next section.

5 Age and cohort effects in an unconstrained rank model

5.1 Empirical implementation

Throughout this section, we aggregate the individual data to five-year cohort-period cells using an approach that shares similarities with Mincer regression (Rosen, 1992). To control for individual voter characteristics, we run first-stage regressions of the individual voting outcomes against a large set of individual characteristics and cohort-referendum effects, recover the latter, and collapse the data onto that level. The first-stage regression results are presented in Section 10 of Appendix I. The result is a panel data set of adjusted voting outcome propensities in which birth cohorts $c =$

(1895 – 1899, 1900 – 1904, ..., 1995 – 1999) are observed over periods $t = (1980 – 1984, 1985 – 1989, \dots, 2015 – 2017)$. In each of the eight periods, we observe 14 age groups $a = t - c = (20 – 24, 25 – 29, \dots, 85 – 89)$. We exclude cohort-period cells for older age groups because these are sparsely populated with survey observations.¹ To maintain the intuitive interpretability (bounds of positive and negative unity) in the aggregated (to five-year age groups) data, we rescale the rank measure to obtain $\tilde{R}_{c,t} = R_{c,t} \times 5 - 2$, where $R_{c,t}$ is the rank of a five-year age group in the distribution of voting propensities within a period (1-14). This transformation ensures that voters can climb up as many steps on the rank scale as they can age in years over their voting life and that the rank of a five-year age group (e.g., $\tilde{R}_{c,t} = 3$ for the first-ranked age group) corresponds to the mean rank of five-integer-age groups with the same relative location in the distribution (e.g., ranks one to five).

We then use the data set to estimate a version of equation (3). To obtain estimates of the lifecycle-specific average field rank conditional on arbitrary cohort effects as well as on marginal aging effects that are specific to age groups \tilde{a} , we estimate the following empirical specification:

$$\tilde{R}_{c,t} = \beta_{\tilde{a}} AGE_{c,t} + \varphi_{c,\tilde{a}} + \epsilon_{c,t,\tilde{a}}, \quad (4)$$

where $AGE_{c,t}$, as before, is the age of cohort c in period t , $\beta_{\tilde{a}}$ is the marginal effect of aging for age group \tilde{a} , $\varphi_{c,\tilde{a}}$ is a cohort effect, and $\epsilon_{c,t,\tilde{a}}$ is an error term. We estimate this model in a series of locally weighted (linear) regressions (LWR) (Cleveland and Devlin, 1988). In each regression, we weight all observations by their distance from age group \tilde{a} using weights that are defined by a Gaussian kernel of the form

$$w_{c,t,\tilde{a}} = \frac{1}{\kappa\sqrt{2\pi}} \exp\left(-\frac{1}{2}\left(\frac{AGE_{t,c} - \tilde{a}}{\kappa}\right)^2\right), \quad (5)$$

where κ is the bandwidth defined as $\kappa = \mu\lambda$, λ is the Silverman rule-of-thumb (Silverman, 1986) bandwidth and μ is a multiplier. Before we run the LWR, we run an additional auxiliary regression of ranks against cohort fixed effects to remove any time-invariant components.

Age-group- \tilde{a} -specific predicted (conditional on cohort effects) ranks are recovered as $\hat{\beta}_{\tilde{a}} AGE_{c,t} + \bar{\varphi}$, where $\bar{\varphi}$ is the mean over the cohort effect of any cohort at any period. Specification (5) collapses to

¹ For a handful of cohort-period observations, we impute the propensity of voting outcomes due to missing values (see Appendix I, Section 11).

the standard linear parametric model with $\beta_{\tilde{a}} = \bar{\beta}$ as $w_{c,t,\tilde{a}}$ approaches a uniform distribution ($\mu \rightarrow \infty$).

5.2 Results

We start by estimating the effect of aging on status-quo orientation and political attitude across all referenda. Figure 3 displays the results for the rule-of-thumb bandwidth ($\mu = 1$).

Over the voting lifetime, there is a significant but moderate increase in the mean status-quo orientation rank by 12 steps, which corresponds to $(12/(85 - 20) =) 0.18$ ranks per year. The marginal aging effects are mostly close to zero and even negative for the oldest age groups. They are not statistically significant at the 95% level for any age group. By contrast, the mean political attitude rank increases by 41 from 19 to 60 over the course of the lifecycle. This corresponds to more than 0.6 ranks per year. The marginal aging effects are positive (and often significant at the 95% level). There is a particularly strong shift in the political attitudes when voters are in their 60s, when the marginal effect is close to the upper bound of one (cf. Section 4.1).

Since non-parametric estimation of derivatives (here $\partial R_{c,t}/\partial AGE_{c,t}$) often requires more smoothing, we also used larger bandwidth multipliers that typically result in smaller confidence intervals at the cost of being more restrictive in the functional form. The marginal aging effects on the status-quo orientation remain insignificant whereas the marginal aging effects on the political attitude all become significantly different from zero and statistically indistinguishable from one (see Section 12, Appendix I). As the bandwidth approaches infinity, we obtain the linear parametric rank models (4) and (10) reported in Table 4, in which we also report models excluding cohort effects (1, 3, 7, 9) and individual controls (1, 2, 7, 8).

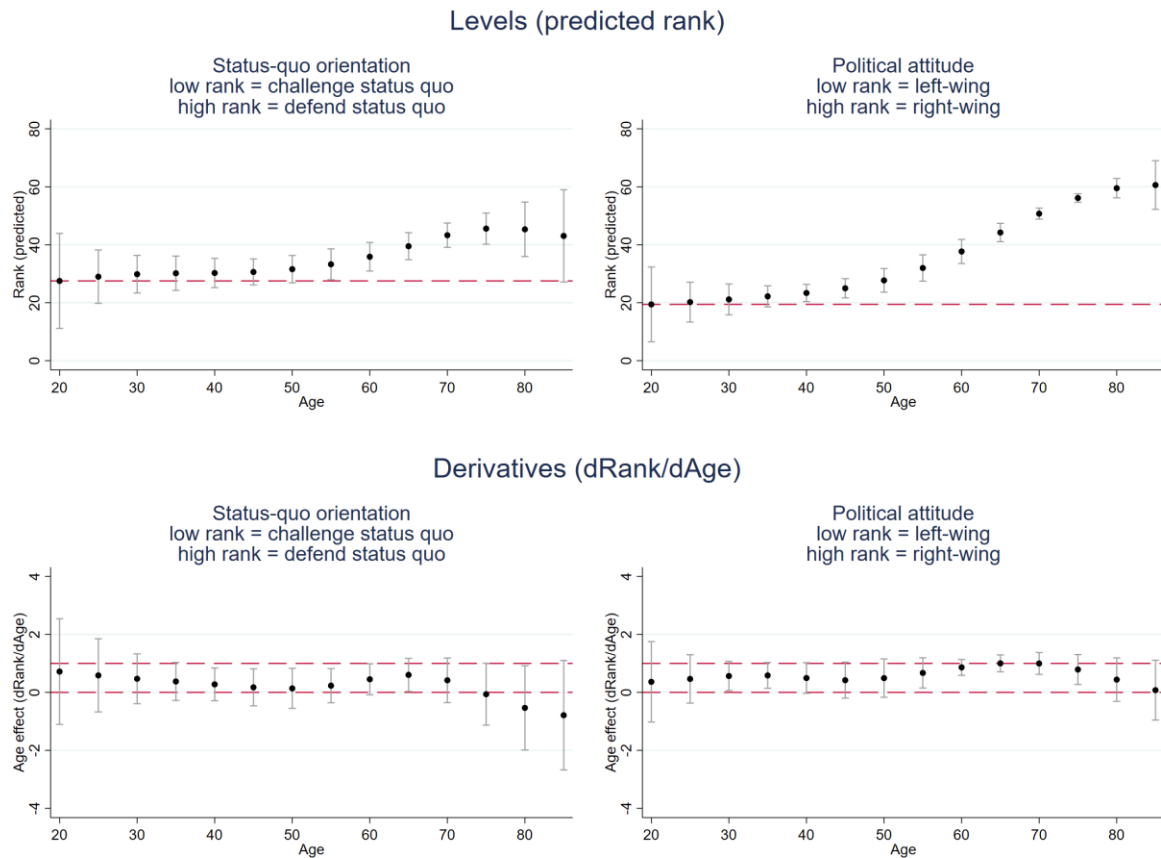


Fig. 3 Semi-non-parametric aging effect on status-quo orientation and political attitude rank. Upper panels show the predicted rank from locally weighted polynomial regressions (LWR) of status-quo orientation [political attitude] rank against voter age while controlling for cohort effects. Before running the LWR, cohort fixed effects are removed in auxiliary linear regressions. LWRs are weighted by distance from an age bin (the black dots). Bottom panels show the marginal effect of age on the orientation [attitude] rank. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age \times five-year period cells. Specifically, the reform [political] orientation is adjusted in a first-stage regression of the reform [political] orientation against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals based on standard errors clustered on cohort fixed effects.

Table 4 reveals that controlling for cohort effects reduces the age effect on the status-quo orientation more than the age effect on the political attitude. The age effect on the status-quo orientation rank, in the preferred models controlling for voter characteristics (4 vs. 3), decreases by approximately one-third. The age effect also changes from being significant to being insignificant. For the aging effect on the political attitude rank, the effect of controlling for cohort effects, at -16% , is smaller in relative terms. Conditional on cohort effects, the aging effect on the attitude rank, at 0.61 , is large, highly significant, and consistent with Figure 3. We also find that the aging effect on the political attitude rank is particularly strong among older age groups (model 12). One insight from Table 4 is that controlling for individual effects (in the first-stage) has a minor effect on the attitude and orientation ranks; if anything, the aging effect increases. Thus, the aging effect is largely independent of

income, housing tenure (renter vs. owner), marital status, number of children, and many other individual attributes that may change as voters age.

The results, thus, support the notion from the descriptive analyses in Section 4. Aging is a genuine driver of the generation gap as voters of the same cohort become less supportive of left-wing policies and more supportive of right-wing policies over the lifecycle. Moreover, an increasing status-quo preference due to habituation does not appear to be the primary driver of the aging effect on the political attitude since the age effects on status-quo orientation are significantly smaller and not even statistically distinguishable from zero, conditional on cohort effects.

Table 4 Parametric aging effects on status-quo orientation and political attitude rank

<i>Status-quo orientation rank</i>	(1)	(2)	(3)	(4)	(5)	(6)
Age (years)	0.333*** (0.103)	0.200 (0.240)	0.316*** (0.105)	0.237 (0.241)	0.394 (0.396)	0.065 (0.475)
r2	0.111	0.279	0.100	0.333	0.447	0.263
<i>Political attitude rank</i>	(7)	(8)	(9)	(10)	(11)	(12)
Age (years)	0.731*** (0.081)	0.586*** (0.124)	0.738*** (0.071)	0.612*** (0.194)	0.589* (0.327)	0.848*** (0.156)
r2	0.534	0.761	0.545	0.744	0.444	0.808
Cohort effects	-	Yes	-	Yes	Yes	Yes
Controls	-	-	Yes	Yes	Yes	Yes
Ages	All	All	All	All	< 50	>= 50
N	112	112	112	112	48	64

Notes: Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age x five-year period cells. Prior to the LWR, cohort effects are removed after running an auxiliary regression of the orientation [attitude] rank against cohort fixed effects where indicated. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The addition of controls means that the status-quo orientation [political attitude] is adjusted in a first-stage regression, thereby controlling for a battery of individual socio-economic and voting behavior covariates. Standard errors are clustered on cohort fixed effects where included. * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

Figure 4 replicates the analysis separately for referenda in the four different policy areas defined in Table 1. We focus on the level effects for brevity (the marginal effects are reported in Section 12, Appendix I). We find a relatively strong effect of aging on regulatory policy attitudes. Controlling for cohort effects, the average rank increases by approximately 40 ranks (from liberal to conservative) over a voting life, which corresponds to approximately two-thirds of a rank for every year of aging. The effect of aging on status-quo orientation ranks is smaller and more ambiguous. Within the environmental policy area, there is a similar transition from attaching a high priority to environment protection to a low priority. The age trend is fairly linear, implying that changes in attitudes occur at an approximately constant rate over one's voting life. By contrast, the shift from a pro-young to a pro-elderly attitude occurs quite sharply near the retirement age (cf. Section 4.1). Within both the environmental and generational policy areas, the aging effect on status-quo orientation are slightly muted but generally similar to the effects on political attitudes. Last, we find a non-monotonic aging effect

on political attitude toward public finance policies. Until the age of 40, voters in relative terms are increasingly more inclined to support fiscally progressive policies. Thereafter, voters gravitate back toward more regressive policies which they actively pursue by voting for change. The corresponding results from linear parametric models are provided in Appendix I, Section 12.

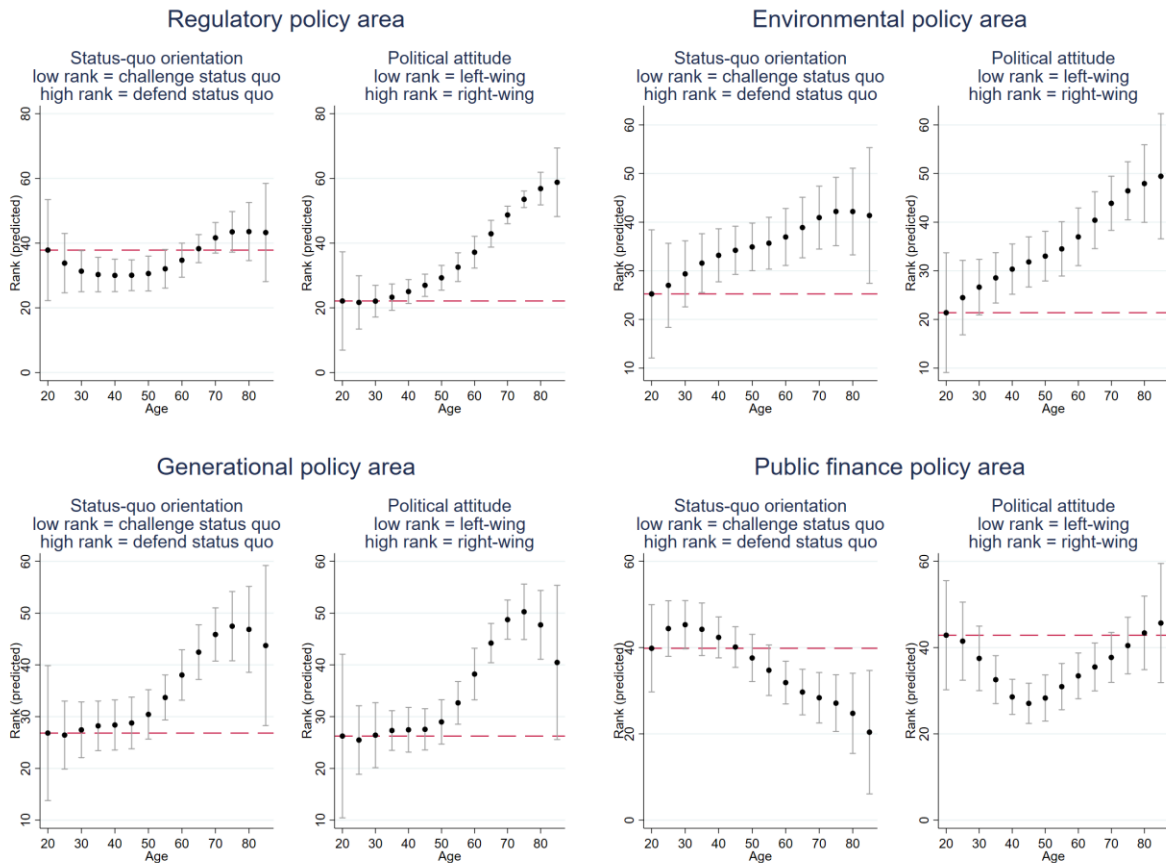


Fig. 4 Semi-non-parametric estimates of rank by age and policy area. All panels show the predicted rank from locally weighted polynomial regressions (LWR) of status-quo orientation [political attitude] rank against voter age controlling for cohort effects. LWRs are weighted by distance from an age bin (the black dots). Prior to the LWR, cohort effects are removed after running an auxiliary regression of the orientation [attitude] rank against cohort fixed effects. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age \times five-year period cells. Specifically, the status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals based on standard errors clustered on cohort fixed effects.

Overall, the age trends in attitude ranks controlling for cohort effects are consistent with the cross-sectional age effect on attitudes reported in Figure 1, once again suggesting that genuine aging effects drive the generation gap. A comparison between the age effects on the political attitude ranks and the status-quo orientation ranks within the regulatory and public finance policy areas suggests that the motivation behind the voters' shift in political attitudes is more likely to be utility-maximization than habituation. The strong retirement effect on generational attitudes further supports this interpretation. Nevertheless, given the strong collinearity between status-quo orientation and political

attitudes toward environmental and generational policies (see Table A4, Appendix I), it is difficult to formally reject the utility-maximization hypothesis in favor of the habituation hypotheses within these two policy areas.

6 Robustness and extensions

This section summarizes the results of several additional pieces of analysis and robustness checks. A detailed discussion is in Appendix I, Section 13.

6.1 Turnout

We focus on those who cast a vote in our main analyses, but our surveys also cover non-voters. The age distribution in the survey data, across all respondents, closely resembles the age distribution in the population. Within surveyed sample, voters tend to be older than non-voters. However, turnout increases in voter age at an almost identical rate across groups of voters who self-report themselves as belonging to the political left or right (data are available for all referenda from 1988 to 2017). Exploiting a question in which non-voters were asked how they would have voted (available for referenda between 1981 and 2017), we find very similar age effects on the political attitude of non-voters using an otherwise identical research design, whether we control for cohort effects or not. We conclude that age affects turnout, but the age effect is not biased with respect to political attitude.

6.2 Altruism

The theoretical argument that voters are less likely to support investment-like reform projects as they age (Messner and Polborn, 2004) hinges on the assumption that they are not fully altruistic. Intuitively, if (grand)parents care about their (grand)children, the age effect will be mitigated. Unfortunately, there is no information on children in the survey. However, as a crude approximation, we treat singles who are neither divorced nor widowed as childless. For this group of likely childless voters, we find almost identical results to the ones reported in the full sample. This implicitly suggest that voters are not fully altruistic and that altruism for children and grandchildren does not play a major role in shaping the aging effect on status-quo orientation and political attitudes. However, it is still possible that voters care about future generations in general terms (rather than specifically about their own children) and that without this generic altruism the generation gap in direct democracy would be even larger.

6.3 Cohort effects

Although age is a significant determinant of status-quo orientation and political attitude, the significant increase in the explanatory power of the models in Table 4 once cohort effects are added also suggests a role for cohort effects. A closer inspection of those cohort effects reveals variation in voters' political attitude and status-quo orientation that aligns with popular definitions of social generations. The traditionalists (until 1945) tend to support the status-quo and right-wing policies; the baby boomers (1946-1964) have the strongest inclination to support changes in legislation in general and left-wing policies in particular; generation X (1965-1976), and even more so generation Y (from 1977), are more similar to the traditionalists in terms of status-quo orientation and political attitude (Smola and Sutton, 2002). Notably, there is less variation in the mean political attitude ranks across cohorts once age is controlled for.

6.4 Measurement

To facilitate our empirical analyses, we create a mapping from votes (yes vs. no) in the 305 considered referenda to policy-area-specific political attitude (the four policy areas introduced in Table 1) and general political attitude (left-wing vs. right-wing). This is an ambitious exercise and while many cases are arguably straightforward, other cases are more ambiguous. Our main results are robust to the exclusion of referenda that are likely to pass with a large majority (where age-related costs and benefits might play a minor role) as well as ambiguous referenda that are not straightforward to assign to policy area-specific political attitudes. We also find similar results using a mapping based on voting recommendations by political parties. Intuitively, we consider a vote in line with the political left [right] if it is in line with the position left-wing [right-wing] national parties took in the respective referendum. Reassuringly, the two mappings are closely correlated. Finally, we obtain similar results if we avoid the mapping from votes to political attitudes altogether and encode and outcome variable based on the self-reported political attitude (left-wing vs. right-wing) available for most referenda from 1988 to 2017.

We conduct a battery of more specific robustness checks. First, we estimate the effects of aging on the political attitude rank, controlling for status-quo orientation rank (and cohort effects) and vice versa. The results substantiate that utility-maximization drives the generation gap. Second, we examine the serial correlation in cohorts' attitude and orientation ranks. While there is no significant serial correlation in the status-quo orientation ranks, we find that lagged political attitude ranks are strong predictors of contemporary political attitude ranks, suggesting a role for cohort effects. How-

ever, we also find that this serial correlation is largely attributable to serial correlation in age, providing further support for the importance of aging effects. Third, we show that in our data, the time-invariant components in political attitude and status-quo orientation ranks (cohort effects) are correlated with age. This is a source of bias in the cross-sectional analysis of age effects, highlighting the importance of exploring panel data to control for cohort effects. Fourth, we back out the implied effect of aging on status-quo orientation and political attitude levels combining the estimated aging effects on attitude [orientation] ranks (from Table 4, fourth column) with estimates of the relationship between attitude [orientation] ranks and attitude [orientation] levels. Accordingly, aging by one year reduces the probability of voting for change by 0.08 percentage points and the probability of voting for a left-wing policy by 0.13 percentage points. These effects are within the range of aging effects estimated in individual-level regressions of attitude levels against individual controls, referendum effects, and generation effects (defined in Figure A18 in Appendix I). Fifth, not controlling for period effects and instead controlling for arbitrary cohort effects results in aging effects on attitude levels that are substantially larger.

6.5 Impact of population aging on direct democracy outcomes

To quantify the effect population aging has had on voter orientations in Switzerland, we combine our preferred estimates of the aging effect with the change in the age distribution over our study period in Appendix I, Section 13.6. As expected, population aging increases the share of votes for the legal status quo as well as right-wing policies (see Figure A26). The effect on the latter is somewhat stronger than on the former. In relative terms, the effects are largest on referenda in the generational policy area. This is the combined effect of attitudes in this policy area is changing faster once voters age beyond 50 and the most populous cohorts aging from below 50 to above 50 over the course of our study period. Compared with the other policy areas, the effects on referendum outcomes in the public finance policy area differs in that there is a positive effect on the share of status-quo challenging votes.

Overall, the effects of population aging are quantitatively relevant. The support of left policies, on average, would have been 2.4% higher in 2017 if the age distribution had remained constant at 1981 levels. Considering the generational policy area, support for pro-young policies would have been 5.3% higher. Computing the counterfactual outcome without aging, we identify five referenda with a different counterfactual majority (the left-wing instead of right-wing position option would have been chosen). This is just 1.7% of the 305 referenda held since 1981 but 5.2% of the referenda held since 2004. In this context, it is worth recalling that the age effects we used in the counterfactual analysis are likely conservative estimates.

7 Conclusion

We document the existence of a generation gap in direct democracy outcomes across a wide range of topics using a pooled data set of postelection surveys covering 305 referenda held in Switzerland since 1981. Older voters express more conservative attitudes with regard to decisions on constitutional order, foreign affairs, or security policy. Older voters are also less likely to support policies that seek to protect the environment or benefit the working population, including families with children. Compared to younger and older voters, those in their 30s and 40s have the greatest taste for policies with progressive distributional consequences.

Our key contribution to the literature is to demonstrate that these differences in attitudes and orientations are causally related to aging. Different experiences shared by distinct generations are not sufficient to rationalize the generation gap. Utility maximization rather than habituation to a status quo seems to be driving the changes in attitudes over the lifecycle. One implication of our results is that population aging, one of the major global trends since the second half of the 20th century, is affecting direct democracy. Using a lower-bound estimate of the population aging effect, a counterfactual analysis identifies five referenda (5%) held since 2004 for which the majority vote would have been different if the age distribution had remained constant at the 1981 level. As population aging progresses, it will likely become more difficult to find support for reform projects that pay dividends in the long-run such as climate change mitigation policies or investments in durable infrastructure.

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The generation gap in direct democracy: Age vs. cohort effects

Appendix I

1 Introduction

This appendix provides additional information on the data used in this study, includes auxiliary results, and complements our primary analysis by adding robustness checks and model extensions. Although this appendix replicates some text from the main paper for reasons of clarity, we note that it is not meant to stand alone.

2 Direct democracy in Switzerland

Direct democracy has been an established tool for making collective decisions in Switzerland since 1848. Obligatory and facultative referenda are a form of the right to veto Acts of Parliament. Adjudications concerning changes to the constitution and the ratification of international treaties must, by law, be put to public votes. All other adjunctions may be subject to facultative referenda although their implementation requires the collection of at least 50,000 signatures of eligible voters within a 100-day period. Whereas obligatory referenda as well demand a double majority to be accepted, facultative referenda only require a simple majority of the electorate.¹

Citizens who want to implement a popular initiative that facilitates amendments to the constitution must gather at least 100,000 signatures of eligible voters within an 18-month period. Occasionally, government authorities propose a counter initiative or alternative version to the original initiative on the same referendum ballot. For either the popular initiative, counter initiative, or alternative proposal to be accepted, a double majority is required (a majority of the electorate and a majority of the cantons). Nevertheless, the electorate decides individually on each referendum. The acceptance of two alternative versions on the same ballot hereby builds a special case, whose implications are determined *ex ante* by governmental and electoral campaign authorities.

¹ Henceforth, the term referenda refers to all forms of public votes on the federal level in Switzerland – public initiatives, facultative referenda, and obligatory referenda.

In general, referenda on the federal level are held four times a year, with votes on three to five referenda on average. Citizens are not required to register, and prior to each vote, every eligible voter receives the respective ballot documentation by mail with detailed material on the relevant referenda. These information include *inter alia* the pro and con arguments for each proposition, the estimated benefits and financial consequences, and optional information on the parliamentary debate and outside opinions by interest groups. Consequently, Swiss citizens have easy access to information regarding each referendum both through distributed information material and general discussion in the media. We therefore assume that the electorate is able to make informed decisions regarding the referenda under consideration.

The Swiss democratic system is rooted far back in history; thus, the Swiss have more than 150 years of experience exercising their political rights at the federal level. Women had no voting rights until 1971, which was years before our study period begins. Before March 1991, the eligible voter had to be at least 20 years old. To accommodate this fact, we only consider survey answers by voters aged 20 years or older.

3 Data and empirical specification

3.1 Sources

Our empirical analysis uses standardized repeated cross-sectional sample surveys for each referendum. Beginning in 1977, VOX surveys were conducted in the form of representative samples (on the basis of the Swiss telephone book) of approximately 1,000 eligible voters following each referendum. These telephone interviews take place during the three weeks following a referendum and cover three different categories of variables. First, questions regarding people's actual voting behavior and decisions with regard to the referendum under consideration, e.g., whether the person voted, what the person voted for, and whether she was well informed on the matter. Second, questions regarding individual political attitudes and voting behavior in general, e.g., party identification, trust in the government, participation frequency. Third, information on socio-economic data, e.g., age, gender, education level, income, home ownership, household size, marital status and geographical variables.

The VOX surveys changed significantly over time, which leads to substantial problems when we consider a set of referenda from different periods. To render these surveys comparable across time, the department of political science at the University of Geneva standardized the VOX surveys. These so

called harmonized VoxIt surveys cover virtually all referenda since 1981. The data combine a standardized set of variables from the VOX surveys with official information regarding the corresponding referendum, e.g., results, turnout, government and party endorsement.

In 2016, the VOX project was replaced by the so-called VOTO surveys. The Swiss Federal Council announced public bidding, and the new institutions in charge of the postvote surveys were the Swiss Centre of Expertise in the Social Sciences (FORS), the Centre for Democracy Aarau (ZDA), and the LINK Institute for Market and Social Research. The VoxIt and VOTO surveys ask very similar questions. However, to include both survey data in our analysis, we harmonize the corresponding encoding of possible answers as presented in Section 3.3.²

It is important to emphasize that survey data suffer from several weaknesses. Moreover, voting behavior and policy preferences may be subject to specific bias and fallacies (Bertrand and Mullainathan, 2001; Fowler and Margolis, 2014; Krosnick, 1999). Survey respondents may not have acquired sufficient information or simply may not have formed an opinion regarding specific questions and thus may not respond at all. Moreover, although people are aware of their guaranteed anonymity, scientists have noted a tendency to reply in a “politically correct” manner (Adida et al., 2019; Morris, 2001). However, another advantage of the VOX surveys is that they allow specific questions to be answered by indicating “Not Specified” or “Don’t Know/Not Sure”. This should mitigate the probability of the aforementioned bias (Groothuis and Whitehead, 2002; Krosnick et al., 1989).

Due to the long tradition of extensive political rights in Switzerland, citizens are experienced and used to communicating and expressing their political beliefs in the form of public votes and opinion polls. Correspondingly, every eligible voter automatically receives detailed information on each referendum, which is why we assume that the electorate is able to make informed decisions on each referendum (Funk and Gathmann, 2015).

With regard to the extensively practiced form of direct democracy in Switzerland, we must also consider the possible effects of ‘vote fatigue’. Because of the long tradition and acceptance of public votes in combination with the rather small number of referenda per year, we assume the potential effects of vote fatigue to be of less concern to our analysis (Funk and Gathmann, 2015).

² FORS is the Swiss national Centre of Expertise in the Social Sciences. It maintains a national social science data archive and facilitates access to official statistical data. For more information on the VOX, VoxIt and VOTO surveys, see www.forscenter.ch and <http://www.voto.swiss>.

A great advantage of the postvote surveys is that we use only information on voting behavior associated with real political and financial implications instead of responses to hypothetical survey questions. The electorate therefore has an incentive to answer truthfully because the official postvote survey analysis can be expected to affect the government's future policy course. We furthermore restrict our analysis to the electorate who actually voted on the referenda under consideration. Hence, voters who answered the VOX surveys should not be prone to mask their true votes and political beliefs (Funk and Gathmann, 2015).

All data concerning the official referenda outcomes, e.g., voting results, turnout, topic, etc., come from the Federal Chancellery of Switzerland and can be found on their official web page (<https://www.bfs.admin.ch>). We also made use of the SWISSVOTES database, which provides the same data on Swiss referenda as the SFSO (<http://swissvotes.ch>). SWISSVOTES comprises several research projects. It is a service provided by the Institute of Political Science at the University of Bern and the Annual book of Swiss Politics (*Année Politique Suisse*). It was founded by the Swiss Confederation and the Swiss Federal Statistical Office (SFSO) and is supported by the Swiss National Science Foundation (SNSF).

We note that the minimum voter age in Switzerland was lowered from 20 to 18 in 1991. To maintain a consistent definition over the study period, we exclude responses from voters below the age of 20. Moreover, we treat two specific initiatives and their counter-proposals as not mutually exclusive (VoxIt Nr. 781, 782). This means that we code a double yes vote as well as a yes vote in either one of the initiatives as only one observation and drop the other. We also drop one of the observations for double no votes. We apply the same procedure to one "unofficial counter-proposal" (VoxIt Nr. 711 and 712).

Lastly, the surveys for the referenda until 1985 did not ask for an integer for the respondent's age, but for age classes of different intervals. There are 17 referenda included in our analysis subject to this matter. We predict an integer value of the individuals' age using a procedure that we describe in Section 3.2.

3.2 Imputation of age integers within age categories

We first apply a polynomial regression on an individual's age by education level, homeowner status, and further control variables for all 12 pooled VoxIt survey data from 1985. We then sort the observations by age class and predicted age. Individuals with a low predicted age are sorted in descending order within age classes, i.e. the lowest predicted age is at the top. We then estimate a trend for each

age class along the ranked order. Finally, we predict the individuals' age for the surveys before 1985 by the respective estimated age-trend together with the estimated coefficients for the control variables from step one. The age-trend should function as a strong instrument. This should also avoid potential problems concerning our two-stage APC regression model since we use these controls in the first stage as well.

For robustness tests and model extensions (see Section 13), we also use data on survey respondents that did not vote in a referendum. To avoid data on non-voters to impact our age prediction for voters, we impute voters' and non-voters' age separately. Figure A1 (Figure A2) shows the plots for age classes and predicted age for voters (non-voters) for all affected referenda.

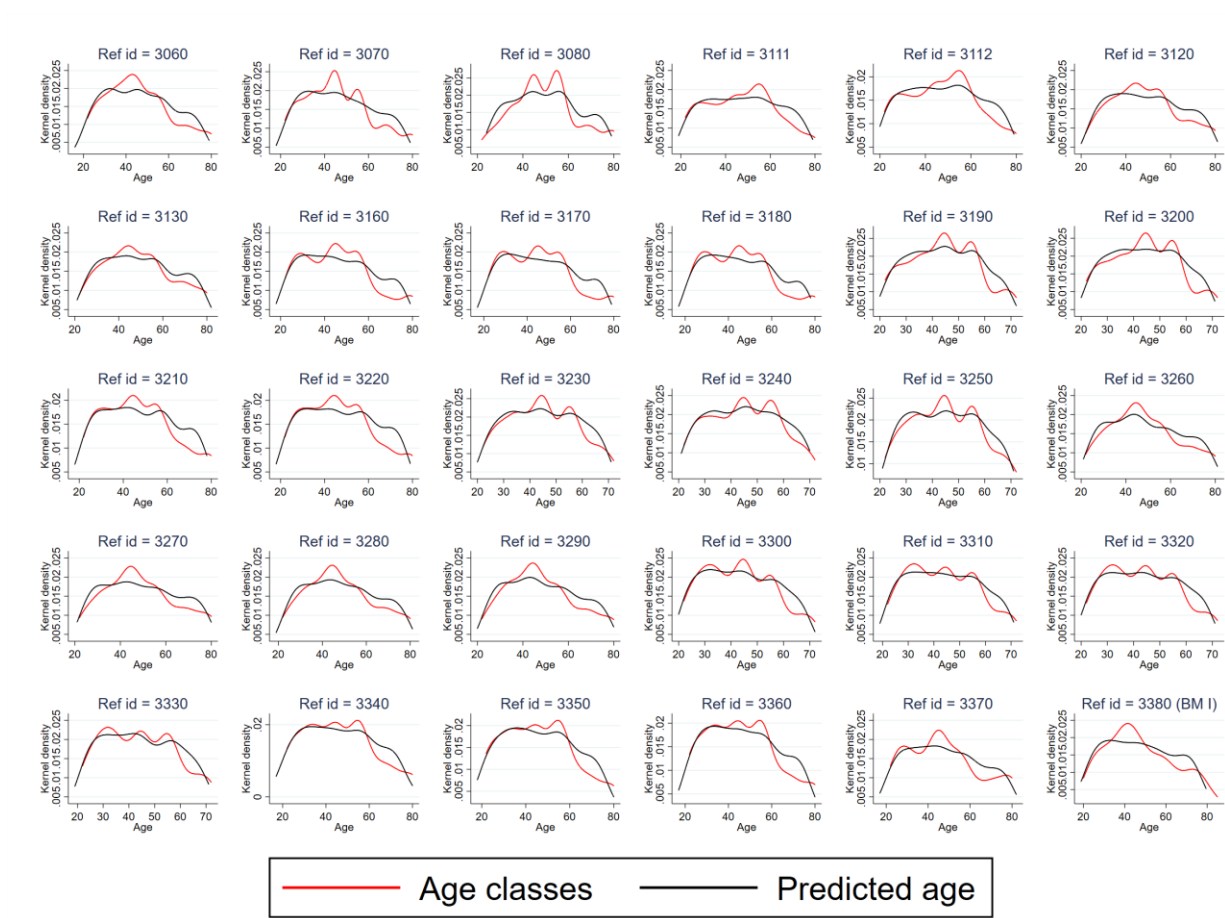


Fig. A1 Age prediction for voters for referenda that only ask for age classes, 1981-1985. Kernel is Gaussian. Predicted voters' age is recovered from regressions of age bins against covariates; see Section 3.3 and Section 6. Figure A1 shows the predictions for voters for the 17 referenda that only ask for age classes from 1981 to 1984 (Ref id=3060, ..., 3250) together with the predictions for our training data that comprise the 12 referenda that were held in 1985 (Ref id=3260, ..., 3379), and the first referendum held in 1986 (Ref id=3380) as benchmark and test set, respectively.

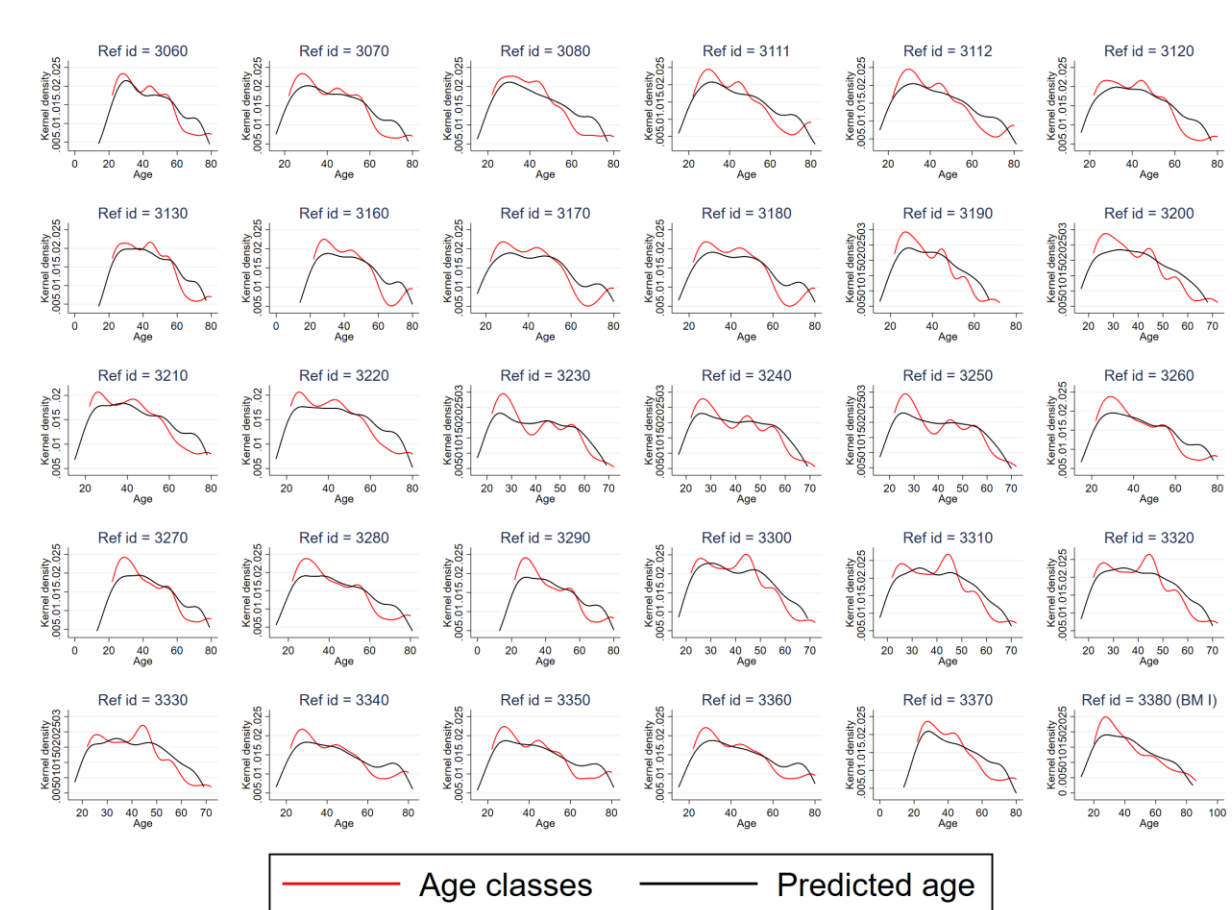


Fig. A2 Age prediction for non-voters for referenda that only ask for age classes, 1981-1985. Kernel is Gaussian. Predicted non-voters’ age is recovered from regressions of age bins against covariates; see Section 3.3 and Section 10. Figure A2 shows the predictions for non-voters for the 17 referenda that only ask for age classes from 1981 to 1984 (Ref id=3060, ..., 3250) together with the predictions for our training data that comprise the 12 referenda that were held in 1985 (Ref id=3260, ..., 3379), and the first referendum held in 1986 (Ref id=3380) as benchmark and test set, respectively.

3.3 VoxIt and VOTO survey data harmonization

The VoxIt and VOTO surveys ask very similar questions. However, to merge and include the data of both surveys in our analysis, we harmonize the corresponding encoding of possible answers as shown in Table A1.

Table A1 Post vote survey harmonization scheme

Variable	VOXIT	Recoding	VOTO	Recoding
Vote decision	a02x	vote	vote_1/_2/_3	vote
Referendum year	annee	year	year	year
Age	age	age	age	age=year-cohort
Cohort	cohort=year-age	cohort	birthyear	cohort
Gender	sexe	Sex	sex	sex
Female	0	0	2	0
Male	1	1	1	1
NS/Missing	9/.	9999	-	9999

Variable	VOXIT	Recoding	VOTO	Recoding
Living-Standard	nivmena	income	income	income
Low-Mid	3	0	5/6/7/8	0
Low	4	1	1/2/3/4	1
High-Mid	2	2	9/10/11/12	2
High	1	3	13/14/15	3
NS/Missing	9/.	9999	98/99/.	9999
Education-lvl	educ	education	educ	education
Low	2	0	1/10	0
Min	1	1	22/31/32	1
Low-Mid	3	2	33	2
High-Mid	4	3	40	3
High	5	4	51	4
Max	6	5	52/60	5
NS/Missing	9/.	9999	97/98/99/.	9999
Carownership/HH	voiture	car	auto_besitz	car
Car	1	0	2/3	0
No Car	0	1	1/4/3	1
NS/Missing	9/.	9999	8/9/.	9999
Confession	confess	confession	confess	confession
Protestant	1	0=0	1	0
Roman-Catholic	2	1=2/5	2	1
Christ-Catholic	5	2=3/4	3/4/5	2
Other	3	9999= 9999	9/.	9999
Atheist	4	-	-	-
NS/Missing	9/.	-	-	-
Employment	actilu	employed	acti	employed
Employed	1	0	1/2/3/4/6	0
Not Employed	2	1	5/7/8/9/10	1
NS/Missing	9/.	9999	98/99/.	9999
Employment lvl	actitaux	lvl_employed	workload	lvl_employed
30+ h/w	1	0	10	0
6-29 h/w	2	1	21/22	1
1-5 h/w	3	2	23	2
NS/Missing	9/.	9999	98/99/.	9999
Homeowner	statloge	homeowner	habitat	homeowner
Rent/Coop	2/3	0	1	0
Property	1	1	2	1
NS/Missing	9/.	9999	7/8/9/.	9999
Persons/HH	tmenage	pers_hh	hhsiz	Pers_hh
2 Persons	2	0	2	0
1 Person	1	1	1	1
3 Persons	3	2	3	2
4+ Persons	4/5/6	3	4	3
NS/Missing	9/.	9999	.	9999

Variable	VOXIT	Recoding	VOTO	Recoding
Marital Status/HH	etatciv	civil_status	maritalstatus	civil_status
Married	2	0	2	0
Single	1	1	1/7	1
Divorced	3	2	4	2
Widowed	4	3	3	3
Living w Partner	5	4	5/6	4
NS/Missing	7	7/9/.=9999	9/.	9999
Region	vilcamp	city1	inhabitants	city1
City	1	0	1/2/3	0
Rural	2	1	4/5/6	1
NS/Missing	9/.	9999	.	9999
Canton / Location	location_help	location	bigregion	location
0 ZH	3 Zurich	0 Middleland	1 Lake Geneva	0 Middleland
1 BE	1 Middleland	1 Central	2 Middleland	1 Central
2 LU	5 Central	2 Lake Geneva	3 North-West	2 Lake Geneva
3 UR	5 Central	3 East	4 Zurich	3 East
4 SZ	5 Central	4 North-West	5 East	4 North-West
5 OW	5 Central	5 Ticino	6 Central	5 Ticino
6 NW	5 Central	6 Zurich	7 Ticino	6 Zurich
7 GL	4 East	9999	9999	9999
8 ZG	5 Central	-	-	-
9 FR	1 Middleland	-	-	-
10 SO	1 Middleland	-	-	-
11 BS	2 North-West	-	-	-
12 BL	2 North-West	-	-	-
13 SH	4 East	-	-	-
14 AR	4 East	-	-	-
15 AI	4 East	-	-	-
16 SG	4 East	-	-	-
17 GR	4 East	-	-	-
18 AG	2 North-West	-	-	-
19 TG	4 East	-	-	-
20 TI	6 Ticino	-	-	-
21 VD	0 Lake Geneva	-	-	-
22 VS	0 Lake Geneva	-	-	-
23 NE	1 Middleland	-	-	-
24 GE	0 Lake Geneva	-	-	-
25 JU	1 Middleland	-	-	-
8888/9999 NS/Missing	9999	-	-	-
Participation	p01	particip	part2	particip
10/10	10	0	10	0
1/10	1	1	1	1
2/10	2	2	2	2

Variable	VOXIT	Recoding	VOTO	Recoding
3/10	3	3	3	3
4/10	4	4	4	4
5/10	5	5	5	5
6/10	6	6	6	6
7/10	7	7	7	7
8/10	8	8	8	8
9/10	9	9	9	9
NS/Missing	98/99/.	9999	98/99/.	9999
Party-identification	party_help	party	party	party
0 None	0	0	96	0
1 PCS/CSP	1/13/21	1	1	1
2 PDC/CVP	12	2	2	2
3 PEP/EVP	20/4	3	3	3
4 PRD/FDP	2	4	4	4
5 PdL/FPS	6/5	5	5	5
6 PES/GPS	19	6	6	6
7 AdI/LdU	7/18	7	7	7
8 Lega	3	8	8	8
9 PLS/LPS	8/9	9	9	9
10 PdT/PdA	30/31/10/11/14/15/ 16/17	10	90/97/10	10
11 DS/SD	32	11	95	11
12 PSS/SPS	8888/9999	9999	98/99/.	9999
13 UDC/SVP	-	-	-	-
14 FraP	-	-	-	-
15 AV/GB	-	-	-	-
16 AdG	-	-	-	-
17 UDF/EDU	-	-	-	-
18 PBD/BDP	-	-	-	-
19 GLP	-	-	-	-
20 PLR/FDP	-	-	-	-
21 PDC+PCS Group	-	-	-	-
22 Other Party	-	-	-	-
23 Other Parties	-	-	-	-
24 Specific Person	-	-	-	-
88889/9999	-	-	-	-
NS/Missing	-	-	-	-
Gov trust	a22	gov_trust	trust_1	gov_trust
Trust	1	0	6/7/8/9/10	0
Mistrust	2	1	1/2/3/4/5	1
NS/Missing	8/9/.	9999	98/99/.	9999
Ref type	typex	ref_type	-	ref_type
Initiative	1	0	-	0
Facultative Ref	2	1	-	1

Variable	VOXIT	Recoding	VOTO	Recoding
Mandatory Ref	3	2	-	2
Counter Ref	4	3	-	3
Gov recom	motcfx	recom	-	recom
Yes	1	1	-	1
No	0	0	-	0
NS/Missing	.	9999	-	9999

Notes: Data correspond to the Swiss VOXIT and VOTO post-vote referendum surveys. See <http://forscenter.ch> and <http://www.voto.swiss> for detailed information on each survey question.

4 Aging in Switzerland

Figure A3 shows the age distribution in the VoxIt and VOTO survey data with respect to different periods. In this context, it is important to note that we only considered voters who effectively participated in the respective referenda. Hence, the age distribution presented in Figure A3 is not representative of the overall Swiss population structure; instead, it represents the actual voting population. In addition to higher turnout rates for older voters (see Section 13.1), we further note that the minimum voter age in Switzerland was lowered from 20 to 18 in 1991. To maintain a consistent definition over the study period, we exclude responses from voters below the age of 20.

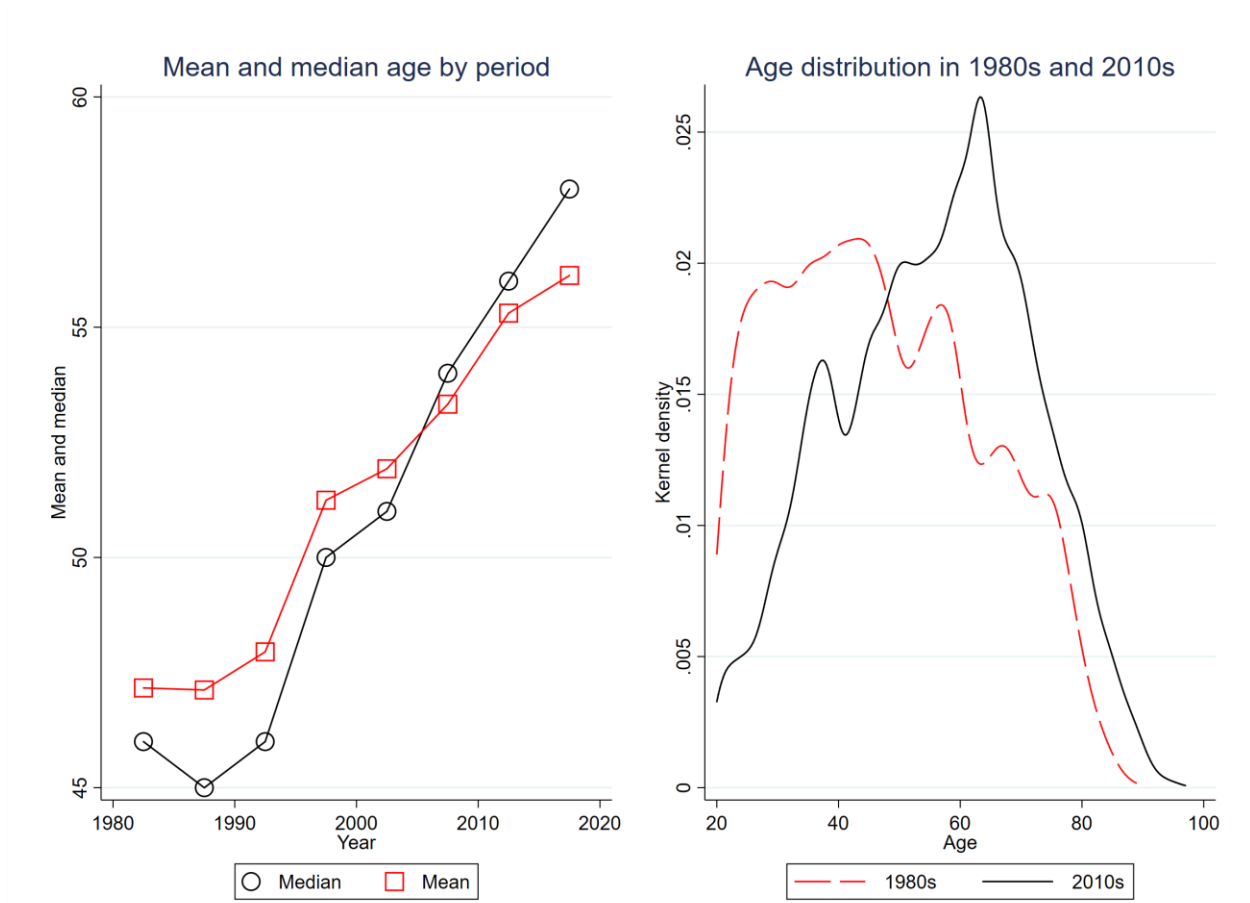


Fig. A3 Age distributions in survey data. Individual voting data on 177,791 observations from the VoxIt and VOTO post-vote surveys corresponding to 305 referenda from 1981 to 2017 in Switzerland. Kernel density plots (right panel) are computed using a Gaussian kernel. We restrict our data set to survey respondents who effectively casted a Yes or No vote in a referendum. In addition, we only consider voters who were 20 years or older. See Section 3 for further information.

5 Age effects on political attitude by theme

First, complementing Table 2 in the main text, we provide parametric estimates of a linear age effect on political attitude in Table A2. Concisely, we illustrate how the conditional mean political attitude controlling for voter characteristics and referendum effects changes by age for each of the 24 themes. For each theme, we first run OLS regressions of the political attitude against voter characteristics, referendum effects, and integer age-bin effects and then report the results of linear regressions of the latter against (integer) age.

Second, we complement Figure 1 in the main text, by extending the non-parametric analysis of the relationship between age and voting outcomes to themes. Glossing over the panels in Figure A4, a generation gap appears to be a feature of the majority of referendum themes. We find a statistically significant negative age effect in 17 of 24 theme-specific linear regressions (see Table A2), implying that younger voters are more likely to support the positions of the political left than are older voters.

For the remaining seven, the age effect is insignificant; no theme displays a significantly positive relationship between age and political attitude.

Table A2 Parametric age effects on political attitude by theme

#	Official categories (numbers) and defined themes (letters)	Regression estimates			Policy area
		Age (years)	Std. err.	r2	
-	01 Constitutional order	-.00005	(.00034)	0.000	-
1	A Pro liberal law system	.00027	(.00043)	0.005	Regulatory
2	B Pro direct democracy	-.00098***	(.00033)	0.109	Regulatory
-	02 Foreign affairs	.00056	(.00047)	0.020	-
3	A Pro international integration	.00056	(.00047)	0.020	Regulatory
-	03 Security policy	-.00215***	(.00037)	0.306	-
4	A Pro smaller military	-.00215***	(.00037)	0.306	Regulatory
-	04 Markets (regulation)	-.00197***	(.00038)	0.268	-
5	A Pro worker protection	-.00266***	(.00043)	0.339	Generational
6	B Pro protection of consumers	-.00082*	(.00048)	0.039	Regulatory
-	05 Agriculture	-.00143***	(.00039)	0.167	-
7	A Pro limiting intensive farming	-.00143***	(.00039)	0.167	Regulatory
-	06 Public finance	-.00058	(.00039)	0.029	-
8	A Pro progressive fiscal policy	-.00028	(.00043)	0.006	Public finance
9	B Pro fiscal expansion	-.00086*	(.00048)	0.042	Public finance
-	07 Energy	-.00266***	(.00043)	0.351	-
10	A Pro sustainable energy	-.00266***	(.00043)	0.351	Environmental
-	08 Transport and infrastructure	-.00192***	(.0005)	0.169	-
11	A Pro sustainable mode	-.00106***	(.00032)	0.131	Environmental
12	B Pro lower transport tolls and taxes	-.00249***	(.00066)	0.169	Public finance
-	09 Environment	-.00224***	(.00023)	0.561	-
13	A Pro-environment protection	-.00331***	(.00038)	0.522	Environmental
14	B Pro more housing supply	-.00104***	(.00039)	0.094	Regulatory
-	10 Social policy	-.00122***	(.00024)	0.262	-
15	A Pro liberal health policies	-.00157**	(.0006)	0.087	Regulatory
16	B Pro health expenditures	-.00062*	(.00033)	0.046	Public finance
17	C Pro state pension	-.00042	(.0005)	0.010	Public finance
18	D Pro lower retirement age	-.00432***	(.00071)	0.366	Generational
19	E Pro unemployment benefits	-.00338***	(.0005)	0.385	Generational
20	F Pro family allowances	-.00103*	(.00059)	0.041	Generational
21	G Pro liberal immigration policy	-.00071*	(.00041)	0.040	Regulatory
-	11 Research and education	-.00038	(.00048)	0.009	-
22	A Pro expenditures on education	.00037	(.00068)	0.004	Public finance
23	B Pro limiting in vivo studies	-.00015	(.00049)	0.001	Regulatory
-	12 Arts and culture	.00015	(.00046)	0.002	-
24	A Pro support of culture and media	.00015	(.00046)	0.002	Public finance
-	All referenda	-.00102***	(.00013))	0.168	-

Notes: This table summarizes the mean political attitude by voter age and 24 themes across 305 referenda from 1981 to 2017. Themes are our own definitions of subgroups of referenda within categories. Policy areas are our own definitions of contextual groups to which we aggregate themes. Themes are defined so that a voting outcome of zero is in line with the political right and an outcome of one is in line with the political left. For each theme, we regress the voting outcome against a battery of individual controls, referendum fixed effects and one-year-age-bin fixed effects. The point estimates are from linear regressions of the age-bin fixed effects against (integer) age (for the corresponding results using local polynomial regressions, see Figure A4). Standard errors in parentheses. * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

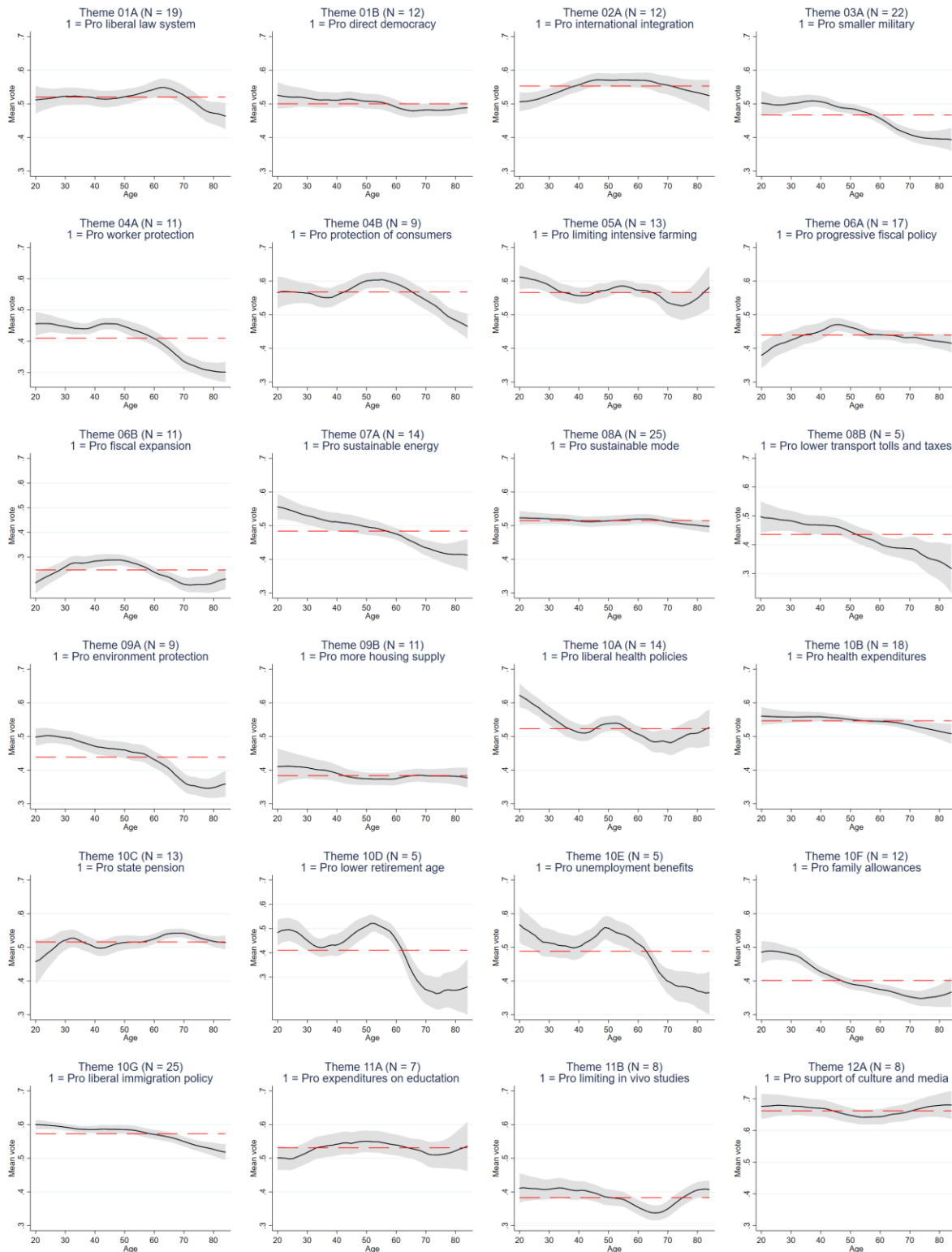


Fig. A4 Political attitude by age and theme. A voting outcome of zero [one] is in line with the political right [left]. For each theme, we regress the voting outcome against individual socio-economic and voting behavior controls, referendum fixed effects and one-year-age-bin fixed effects. Point estimates (solid lines) and 95% confidence intervals (gray-shaded areas) are from local polynomial regressions of the age-bin fixed effects against (integer) age. Dashed lines are the mean outcome across all age groups. N is the number of referenda within a theme.

6 Variation between status-quo orientation and political attitude

In Table A3, we cross-tabulate the two outcomes. Across all referenda, we find that a pro status quo vote is approximately twice as likely to be consistent with support for a right-wing policy outcome than a left-wing policy outcome. Evidently, the majority of referenda in Switzerland in recent decades have been concerned with “left” reform projects. Nevertheless, approximately 17.9% of all votes are in support of change and right-wing policies at the same time (a similar fraction votes for the status quo to preserve a left-wing policy), suggesting that status-quo orientation is an imperfect predictor of political attitude overall. There is a significant degree of variation in the correlation between the two outcome measures across policy areas. Within the regulatory policy area, a relatively large fraction of 20.9% voted for change to support a conservative (right-wing) position. A similarly large fraction of voters in referenda in the public finance policy area voted for change to support regressive (right-wing) fiscal policies. The same fractions are as low as approximately 10% in the environmental and generational policy areas, implying that it will be empirically difficult to distinguish between utility-maximization effects and habituation effects within these policy areas.

Table A3 Cross-tabulation of status-quo orientation and political attitude

	<i>All referenda</i>				<i>All referenda</i>		
	Right	Left	Total		Right	Left	Total
Status quo	58,753	32,209	90,962	Status quo	33.0%	18.1%	51.1%
Change	31,830	54,999	86,829	Change	17.9%	30.9%	48.8%
Total	90,583	87,208	177,791	Total	50.9%	49.0%	100.0%
N				N	177,851	Diagonal sum	64.0%
<i>Regulatory policy area</i>				<i>Environmental policy area</i>			
	Right	Left	Total		Right	Left	Total
Status quo	27.9%	20.9%	48.7%	Status quo	40.2%	10.7%	50.9%
Change	20.9%	30.3%	51.3%	Change	10.7%	38.4%	49.1%
Total	48.8%	51.2%	100.0%	Total	50.9%	51.2%	100.0%
N	83,591	Diagonal sum	58.2%	N	28,684	Diagonal sum	78.6%
<i>Generational policy area</i>				<i>Public finance policy area</i>			
	Right	Left	Total		Right	Left	Total
Status quo	48.1%	9.9%	58.0%	Status quo	30.9%	21.7%	52.6%
Change	10.0%	32.0%	42.0%	Change	20.7%	26.7%	47.4%
Total	58.1%	41.9%	100.0%	Total	51.6%	48.4%	100.0%
N	21,235	Diagonal sum	81.0%	N	44,281	Diagonal sum	57.6%

Notes: Survey data cover 305 referenda from 1981 to 2017. A voter’s status-quo orientation is encoded as status quo if her vote is in support of defending the status quo (often, but not always a no vote) and as challenging the status quo if her vote supports a change in legislation. A voter’s political attitude is encoded as right if her vote is in line with positions of the political right and as left if her vote is in line with the positions of the political left. A summary of left-wing attitudes by themes is in Table 1 in the main text.

Replicating the empirical approach that we use in Figure 1 (main text) and Figure A4, in Figure A5 we illustrate how the conditional mean status-quo orientation (left panel) and political attitude (middle panel) changes by age. We find a downward age trend in both outcomes although the age effect is stronger on political attitude. The right panel illustrates the same relationship as the middle panel, except that we control for the status-quo orientation in the first-stage regressions. Because the status-quo orientation is an endogenous variable, there is a risk of over-controlling with this approach. The variable may pick up the effects of unobserved characteristics, and if the correlation between the outcomes is too strong, there may not be sufficient conditional variation in the political attitude to identify an age effect. However, the age effect on political attitude is only marginally affected by holding status-quo orientation constant. One interpretation is that the differences in political attitudes between the young (relatively more inclined to left-wing policies) and the old (relatively more inclined to right-wing policies) cannot be solely attributed to a habitation-induced status-quo preference by the latter.

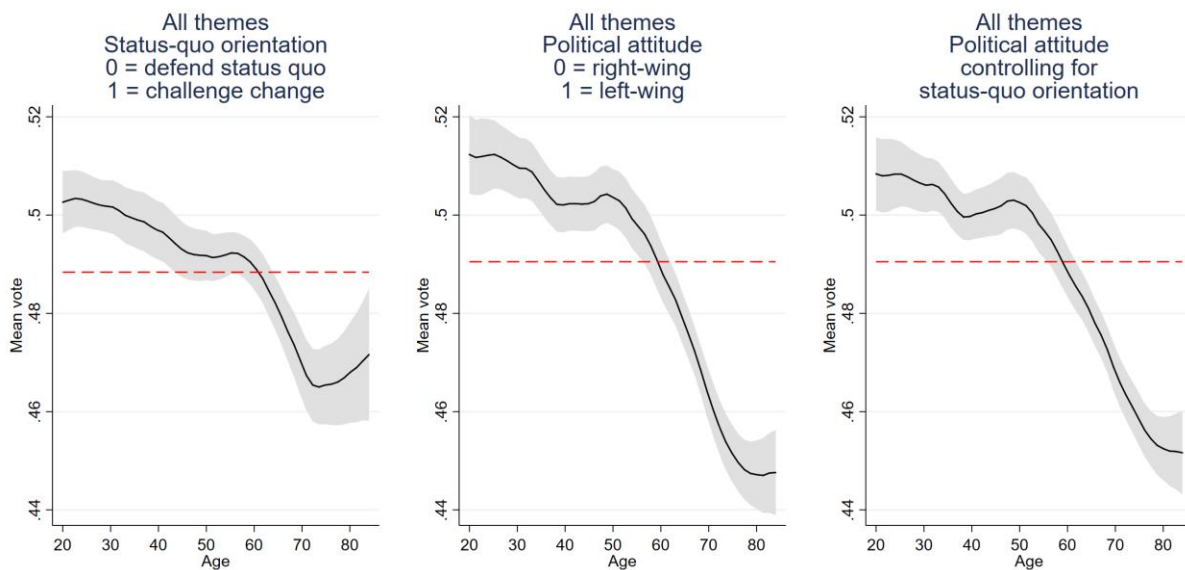


Fig. A5 Status-quo orientation and political attitude by age. The figure summarizes the mean vote by age and policy area across 305 referenda. In the left panel, the voting outcome is encoded as zero if the vote is in support of defending the status quo (often, but not always a no vote) and as one if the vote supports a change in legislation. In the two remaining panels, the voting outcome is encoded as zero if it is in line with the political right and one if it is in line with the political left. In the first two panels, we regress different voting outcomes against a battery of individual controls, referendum fixed effects and one-year-age-bin fixed effects. In the third panel, we use the political attitude outcome as the dependent variable and control for the status-quo orientation in addition to the other covariates. The point estimates (solid lines) and 95% confidence intervals (gray-shaded areas) are from local polynomial regressions (degree = 0) of the recovered age-bin fixed effects against (integer) age. Dashed lines are the mean outcome across all age groups.

7 Age vs. cohort effects

Figure A6 shows how the negative association between political attitude and age directly maps to a positive association between voters' political attitude and birth year.

Those born up until 1945 (traditionalists) on average, vote more consistently with the positions of the political right whereas baby boomers (1946-1964) are much more positively inclined to left-wing policies. Generations X (1965-1976) and Y (from 1977), compared with the baby boomers, tend to lean somewhat more to the political right. Although this pattern is consistent with the aforementioned social sciences literature, it is impossible to tell from a cross-sectional analysis if a generation gap is attributable to aging or cohort effects.

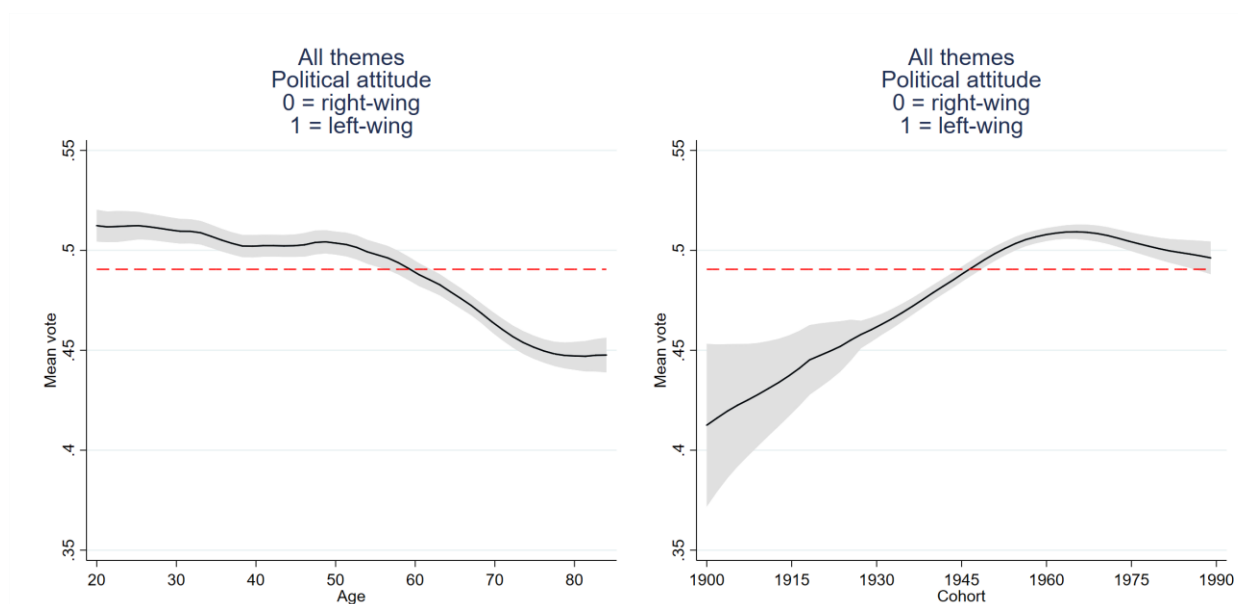


Fig. A6 Political attitude by age and by cohort. This figure summarizes the mean vote by age across 305 referenda. The voting outcome is encoded as zero if it is in line with the political right and one if it is in line with the political left. In each panel, we regress the voting outcome against a battery of individual controls, referendum fixed effects and one-year-age-bin fixed effects (left) or one-year-birth-cohort fixed effects (right). The point estimates (solid lines) and 95% confidence intervals (gray-shaded areas) are from local polynomial regressions (degree = 0) of the recovered fixed effects against age (left) and birth year (right). Dashed lines are the mean outcome across all age groups.

8 Voting results by age: Complementary evidence

To provide descriptive evidence of the existence of a generation gap in direct democracy in Switzerland, we show the distribution of voters' mean political attitudes by sex and age, period, and birth cohort defined by decades in Table 3 in the main text, Section 4. To complement Table 3, we show the total number of observations by age and other attributes in Table A4. A summary of left-wing attitudes by theme is presented in Table 1 (see main text, Section 3).

Table A4 Number of observations by age and other attributes

	Age								All
	20s	30s	40s	50s	60s	70s	80s	90s	
All	17,156	30,794	33,207	33,563	32,354	22,501	7,808	390	177,773
Status-quo vote	8,208	15,469	16,865	17,339	16,782	12,088	4,019	192	90,962
Change vote	8,948	15,333	16,346	16,227	15,572	10,416	3,789	198	86,829
Referendum won	7,936	13,744	15,279	15,136	14,523	10,115	3,516	188	80,437
Referendum failed	9,220	17,058	17,932	18,430	17,831	12,389	4,292	202	97,354
Female voter	7,769	15,920	17,227	16,578	14,650	10,170	3,591	187	86,092
Male voter	9,387	14,874	15,980	16,985	17,704	12,331	4,217	203	91,681
Period = 1980s	3,603	4,013	4,218	3,593	2,581	2,097	376		20,481
Period = 1990s	6,547	10,025	11,153	8,974	7,256	5,813	1,788	33	51,589
Period = 2000s	3,715	8,712	8,715	8,920	8,796	6,058	2,216	119	47,251
Period = 2010s	3,291	8,052	9,125	12,079	13,721	8,536	3,428	238	58,470
Cohort = 1900s							376	33	409
Cohort = 1910s						2,097	1,788	119	4,004
Cohort = 1920s					2,581	5,813	2,216	238	10,848
Cohort = 1930s				3,593	7,256	6,058	3,428		20,335
Cohort = 1940s			4,218	8,974	8,796	8,536			30,524
Cohort = 1950s		4,013	11,153	8,920	13,721				37,810
Cohort = 1960s	3,603	10,025	8,715	12,079					34,415
Cohort = 1970s	6,547	8,712	9,125						24,411
Cohort = 1980s	3,715	8,052							11,797
Cohort = 1990s	3,291								3,291

Notes: Data covers 305 referenda from 1981 to 2017. This table shows the total number of observations by age (columns) and other attributes (rows) and complements Table 3 (see main text, Section 4). A summary of left-wing attitudes by theme is presented in Table 1 (see main text, Section 3).

9 Period effects: Complementary analysis

The unconstrained rank model implicitly controls for period effects by including cohort-referendum effects in a first stage regression that shares similarities with Mincer regression (see Section 10 for details); however, the subsequent rank transformation removes cardinal information as (mean) orientations and attitudes are converted into an ordinal scale and, thus, period effects are removed. While we are primarily interested in estimating age effects conditional on arbitrary cohort effects, period effects can impact voting behavior as well, and thus, are typically of interest in their own right. Specifically, in addition to events and environments that can impact voting behavior independently from voters' age and birth cohort (e.g., technological innovations, war, recessions, etc.), there is also evidence that the general norms and values of (democratic) societies' have a tendency to progress in the direction of the political left. As a prominent example in the context of public spending, Wagner (1911) postulates a positive covariance between economic growth and increasing public expenditure and progressive public finance policies, respectively. While there are several concerns regarding the validity of previous empirical attempts to test Wagner's law (Henrekson, 1993; Peacock and Scott, 2000), more recent studies find robust evidence for the existence of a long-run positive

correlation between public expenditures and economic growth in many developing (Akitoby et al., 2006) and OECD countries (Lamartina and Zaghini, 2011). Similar trends can be observed in the context of social liberalization associated with the relaxation of laws relating to matters such as gender inequality, abortion, marriage, and divorce (Aidt and Dallal, 2008; Inglehart and Norris, 2003; Jones, 1997).

In the following, we provide a complementary analysis of period effects in which we attempt to control for age and cohort effects. It is the nature of the APC corundum that we cannot perfectly control for age and cohort effects when identifying period effects. We follow the literature and use unequal interval widths for age, period, and cohort groups to break their perfect multicollinear relationship (Fienberg and Mason, 1985). Specifically, we distinguish between four different model specifications: we regress voters' political attitude on seven-year-period-bin (1980-1985, 1986-1991, ..., 2016-2021) fixed effects (M1), a battery of individual socio-economic controls (M2), and ten-year-age-bin (20-29, 30-39, ..., 80-89) and twenty-year-cohort-bin (1900-1919, 1920-1939, ..., 1980-1999) fixed effects (M3) or two-year-age-bin (20-21, 22-23, ..., 84-85) and fifteen-year-cohort-bin (1900-1914, 1915-1929, ..., 1990-2004) fixed effects (M4). For each regression, we exclude the constant term and model APC fixed effects via least-squares-dummy variable (LSDV) regression. The corresponding period effects' coefficient estimates are presented in Figure A7.

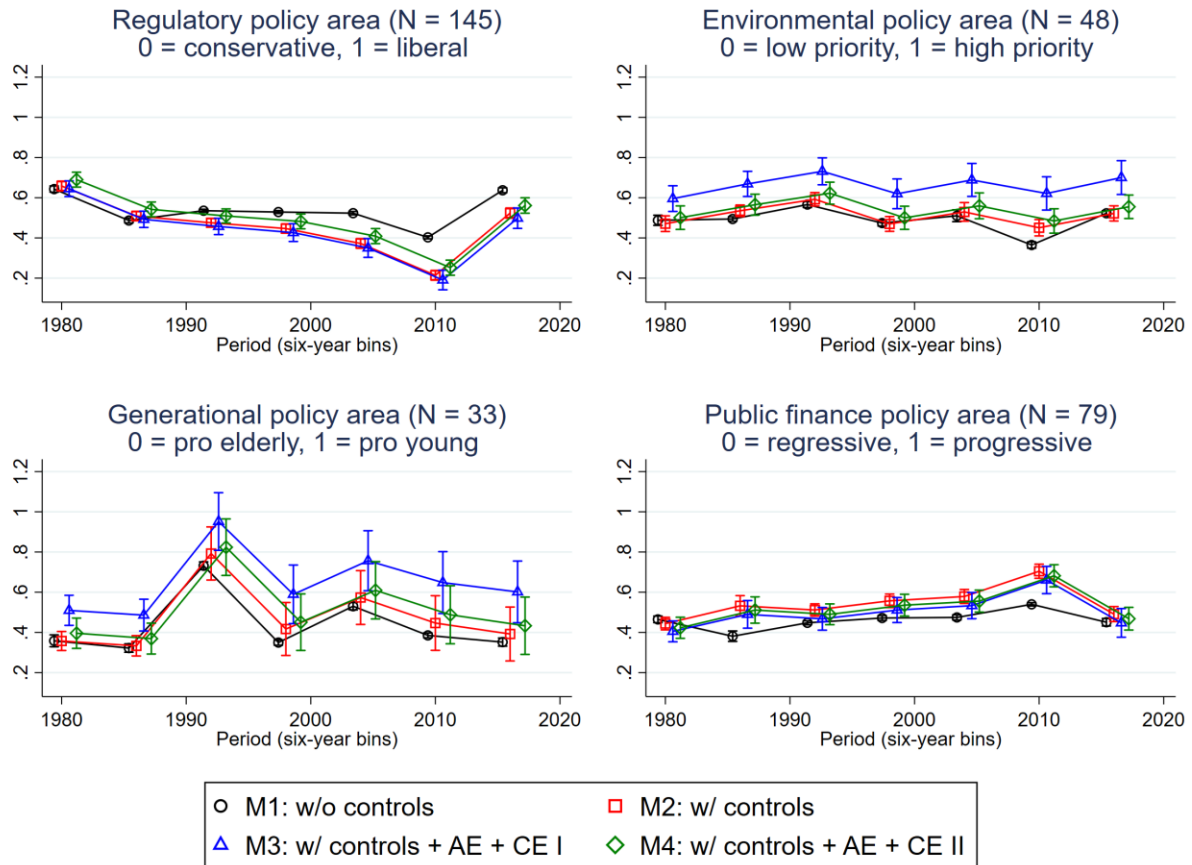


Fig. A7 Parametric period effects on political attitude. The figure is based on individual data from exit polls from 305 referenda from 1981 to 2017. We discard voters older than 85 years and voters born before 1900 because of limited repeated observations. A voting outcome of zero [one] is in line with the political right [left]. For each policy area, we regress the voting outcome against six-year-period-bin (1980-1985, 1986-1991, ..., 2016-2021) fixed effects (M1), individual socio-economic and voting behavior controls (M2), ten-year-age-bin (20-29, 30-39, ..., 80-89) and twenty-year-cohort-bin (1900-1919, 1920-1939, ..., 1980-1999) fixed effects (M3) or two-year-age-bin (20-21, 22-23, ..., 84-85) and fifteen-year-cohort-bin (1900-1914, 1915-1929, ..., 1990-2004) fixed effects (M4). Error bars correspond to 95% confidence intervals based on robust standard errors. Models' coefficient estimates are slightly shifted for better readability.

Summarizing the results presented in Figure A7, regulatory attitudes tend to monotonically shift from positions that are associated with the political left toward the political right until 2015. This trend is in line with evidence showing that Swiss citizens' attitudes towards immigration and joining the EU became more negative during the last decades (Ackermann & Freitag, 2015; Sarrasin et al., 2018); however, between 2016 and 2017, regulatory preferences shifted back toward more liberal policies. While our results suggest that the impact of period effects on environmental attitude does not significantly vary over time, period effects on voters' generational attitude show relatively large differences. At the beginning of our sample, period effects tend to promote a pro-elderly generational attitude; then, between 1992 and 1997, the period effects' estimates indicate a sharp increase in the propensity to vote in line with a pro-young attitude. In the subsequent years, however, period effects tend to start promoting a more right-wing generational attitude again. Last, within the public finance

policy area, the time trend indicates a monotonic increase on left-wing attitude until 2015. This attitude toward progressive public finance policies is also consistent with evidence on the validity on Wagner's law in Switzerland (Lamartina & Zaghini, 2011). Conversely, in 2016 and 2017, preferences for progressive policies appear to decrease to similar levels as in 1981.

Overall, it seems fair to conclude that trends in period effects are limited to specific periods and policy areas. Unlike for age, we do not find a universal trend in period effects that would be in line with norms and values deterministically progressing in the direction of the political left.

10 Recovering cohort-referendum effects

To control for other voter characteristics besides age that may change over the lifecycle, we employ a first-stage similar to a Mincerian wage equation:

Stage 1:
$$D_{i,c,r} = X_{i,c,r}b + V_{c,r} + \mu_{i,c,r}$$

$D_{i,b,r}$ represents the 0, 1 voting decision of a voter i associated with birth cohort c in referendum r . In our analysis, we only consider survey respondents who reported actually participating and voting in the referendum under consideration. X is a vector of control variables, including amongst other: education level, income, gender, home ownership, household structure, marital status and geographical variables. In general, we encode all control variables so that the baseline (0 value) refers to the voter with mean characteristics i over the entire sample period, i.e. the modus is subtracted from the observed outcome of the respective variable. We use categorical variables to control for observations with missing and not specified values as well as "don't know" responses. $V_{c,r}$ is a cohort-referendum specific fixed effect, which we recover and use as a measure of adjusted cohort-referendum voting preferences in the second stage analysis described in Section 2 in the main paper. Note that the first stage is conditional on voter age due to the collinearity with $V_{c,r}$. First-stage regression results are presented in Table A5.

Table A5 Age effects on political attitude - first stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude
<i>Gender</i>										
Male	-0.0106*** (0.0026)	-0.0051 (0.0037)	-0.0365*** (0.0065)	-0.0071 (0.0075)	-0.0055 (0.0051)	-0.0024 (0.0026)	-0.0060 (0.0037)	-0.0116* (0.0066)	0.0022 (0.0075)	0.0082 (0.0051)
NS/Missing	-0.1459 (0.1089)	-0.3975** (0.1754)	-0.0528 (0.1926)	0.0705 (0.2357)	0.4233 (0.4523)	-0.1072 (0.1091)	-0.2936* (0.1758)	-0.0474 (0.1949)	0.0755 (0.2369)	0.2134 (0.4532)
<i>Living standard</i>										
Low	0.0083 (0.0074)	0.0066 (0.0119)	-0.0174 (0.0129)	0.0660** (0.0303)	0.0364** (0.0162)	0.0032 (0.0075)	0.0152 (0.0119)	-0.0194 (0.0131)	0.0845*** (0.0304)	-0.0062 (0.0162)
High-Mid	-0.0154*** (0.0052)	0.0020 (0.0080)	-0.0322*** (0.0093)	-0.0512** (0.0201)	-0.0163 (0.0114)	-0.0090* (0.0052)	0.0035 (0.0080)	-0.0162* (0.0094)	-0.0635*** (0.0202)	-0.0017 (0.0115)
High	-0.0388*** (0.0077)	-0.0097 (0.0122)	-0.0852*** (0.0137)	-0.0895*** (0.0303)	-0.0278* (0.0169)	-0.0222*** (0.0078)	-0.0009 (0.0122)	-0.0598*** (0.0138)	-0.1113*** (0.0305)	0.0208 (0.0169)
NS/Missing	-0.0231** (0.0113)	-0.0104 (0.0187)	-0.0454** (0.0187)	-0.0875 (0.0717)	-0.0157 (0.0232)	-0.0241** (0.0114)	0.0047 (0.0187)	-0.0562*** (0.0189)	-0.0894 (0.0720)	-0.0161 (0.0232)
<i>Education level</i>										
Min	-0.0048 (0.0039)	-0.0034 (0.0057)	-0.0209** (0.0089)	0.0033 (0.0119)	0.0044 (0.0078)	-0.0131*** (0.0039)	-0.0115** (0.0057)	-0.0187** (0.0090)	-0.0083 (0.0119)	-0.0129* (0.0078)
Low-Mid	0.0391*** (0.0041)	0.0559*** (0.0060)	0.0534*** (0.0094)	0.0329*** (0.0122)	-0.0007 (0.0083)	0.0324*** (0.0041)	0.0306*** (0.0060)	0.0385*** (0.0095)	0.0242** (0.0123)	0.0357*** (0.0084)
High-Mid	0.0180*** (0.0038)	0.0251*** (0.0054)	0.0379*** (0.0114)	0.0161 (0.0106)	-0.0086 (0.0073)	0.0191*** (0.0038)	0.0245*** (0.0055)	0.0296** (0.0115)	0.0263** (0.0107)	-0.0020 (0.0073)
High	0.0191*** (0.0047)	0.0345*** (0.0068)	0.0094 (0.0131)	0.0036 (0.0132)	0.0001 (0.0092)	0.0174*** (0.0047)	0.0222*** (0.0068)	0.0302** (0.0133)	0.0175 (0.0132)	0.0002 (0.0092)
Max	0.0390*** (0.0032)	0.0489*** (0.0047)	0.0894*** (0.0084)	0.0294*** (0.0092)	-0.0070 (0.0063)	0.0291*** (0.0032)	0.0195*** (0.0047)	0.0468*** (0.0085)	0.0414*** (0.0093)	0.0269*** (0.0063)
NS/Missing	-0.0116 (0.0143)	-0.0275 (0.0206)	-0.0414 (0.0365)	0.0426 (0.0476)	0.0181 (0.0273)	-0.0222 (0.0144)	-0.0297 (0.0207)	-0.0457 (0.0370)	0.0852* (0.0478)	-0.0323 (0.0273)
<i>Car ownership</i>										
No Car	0.0447*** (0.0034)	0.0377*** (0.0049)	0.1240*** (0.0085)	0.0619*** (0.0098)	-0.0033 (0.0069)	0.0323*** (0.0034)	0.0104** (0.0049)	0.0831*** (0.0086)	0.0350*** (0.0098)	0.0390*** (0.0069)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude
NS/Missing	0.0022 (0.0122)	-0.0320* (0.0183)	0.0459 (0.0371)	0.0710* (0.0426)	0.0073 (0.0202)	0.0173 (0.0123)	0.0017 (0.0184)	0.0121 (0.0376)	0.0561 (0.0428)	0.0292 (0.0203)
<i>Confession</i>										
Roman-/Christ-Cath- olic	0.0059** (0.0026)	-0.0038 (0.0038)	0.0086 (0.0064)	0.0294*** (0.0082)	0.0146*** (0.0055)	-0.0011 (0.0027)	-0.0115*** (0.0038)	0.0120* (0.0065)	0.0154* (0.0083)	0.0018 (0.0055)
Other	0.0327*** (0.0038)	0.0198*** (0.0053)	0.0479*** (0.0099)	0.0437*** (0.0116)	0.0466*** (0.0079)	0.0229*** (0.0038)	0.0144*** (0.0053)	0.0324*** (0.0100)	0.0427*** (0.0116)	0.0239*** (0.0079)
NS/Missing	0.0297*** (0.0089)	0.0233 (0.0148)	0.0336** (0.0153)	0.0433 (0.0436)	0.0320* (0.0173)	0.0125 (0.0089)	0.0051 (0.0148)	0.0089 (0.0155)	-0.0063 (0.0438)	0.0334* (0.0174)
<i>Employment</i>										
Not Employed	0.0295** (0.0124)	0.0466** (0.0218)	0.0350* (0.0196)	-0.1197 (0.0900)	-0.0002 (0.0247)	0.0048 (0.0124)	-0.0092 (0.0219)	0.0182 (0.0198)	-0.0472 (0.0905)	0.0108 (0.0248)
NS/Missing	-0.0000 (0.0186)	0.0068 (0.0296)	0.0140 (0.0363)	-0.1656* (0.1003)	-0.0211 (0.0371)	0.0116 (0.0186)	-0.0031 (0.0297)	0.0131 (0.0367)	-0.0926 (0.1008)	0.0378 (0.0371)
<i>Employment level</i>										
6-29 h/w	0.0246*** (0.0035)	0.0234*** (0.0051)	0.0257*** (0.0089)	0.0263*** (0.0102)	0.0240*** (0.0070)	0.0164*** (0.0035)	0.0102** (0.0051)	0.0080 (0.0090)	0.0298*** (0.0102)	0.0275*** (0.0070)
1-5 h/w	0.0033 (0.0096)	0.0083 (0.0142)	-0.0406* (0.0237)	-0.0363 (0.0275)	0.0397** (0.0186)	0.0110 (0.0096)	0.0175 (0.0143)	0.0092 (0.0240)	-0.0342 (0.0277)	0.0212 (0.0187)
NS/Missing	-0.0173 (0.0126)	-0.0347 (0.0220)	-0.0285 (0.0202)	0.1376 (0.0902)	0.0103 (0.0250)	0.0044 (0.0126)	0.0124 (0.0220)	-0.0037 (0.0204)	0.0553 (0.0906)	0.0076 (0.0251)
<i>Homeowner</i>										
Property	-0.0226*** (0.0025)	-0.0176*** (0.0036)	-0.0252*** (0.0062)	-0.0330*** (0.0071)	-0.0235*** (0.0049)	-0.0160*** (0.0025)	-0.0121*** (0.0036)	-0.0222*** (0.0063)	-0.0208*** (0.0071)	-0.0175*** (0.0049)
NS/Missing	-0.0126 (0.0125)	-0.0056 (0.0186)	0.0211 (0.0287)	-0.0259 (0.0412)	-0.0370 (0.0246)	-0.0240* (0.0126)	-0.0041 (0.0187)	-0.0245 (0.0290)	-0.0117 (0.0414)	-0.0562** (0.0246)
<i>Persons/HH</i>										
1 Person	-0.0094 (0.0060)	-0.0040 (0.0086)	-0.0149 (0.0122)	-0.0311 (0.0194)	-0.0163 (0.0140)	-0.0104* (0.0060)	-0.0078 (0.0087)	-0.0085 (0.0123)	-0.0183 (0.0195)	-0.0183 (0.0140)
3 Persons	0.0059 (0.0059)	0.0231*** (0.0087)	-0.0088 (0.0114)	-0.0142 (0.0196)	0.0011 (0.0137)	-0.0104* (0.0059)	-0.0148* (0.0087)	-0.0065 (0.0115)	0.0007 (0.0197)	-0.0046 (0.0137)
4+ Persons	-0.0097* (0.0097)	-0.0029 (0.0097)	0.0130 (0.0130)	-0.0634*** (0.0130)	-0.0258** (0.0130)	-0.0100* (0.0130)	-0.0146* (0.0130)	0.0056 (0.0130)	-0.0352** (0.0130)	-0.0004 (0.0130)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude
NS/Missing	(0.0053) 0.0673 (0.0435)	(0.0078) 0.0505 (0.0592)	(0.0106) 0.1424* (0.0855)	(0.0176) -0.0384 (0.1518)	(0.0124) 0.1685 (0.1322)	(0.0053) 0.0714 (0.0436)	(0.0078) 0.1043* (0.0593)	(0.0107) 0.1119 (0.0865)	(0.0176) 0.0121 (0.1525)	(0.0124) -0.1283 (0.1324)
<i>Marital status</i>										
Single	0.0111*** (0.0038)	0.0129** (0.0055)	0.0163* (0.0095)	-0.0224** (0.0110)	0.0236*** (0.0074)	0.0046 (0.0038)	0.0025 (0.0055)	0.0118 (0.0096)	-0.0235** (0.0111)	0.0178** (0.0074)
Divorced	0.0011 (0.0050)	-0.0027 (0.0073)	-0.0293** (0.0139)	-0.0105 (0.0138)	0.0308*** (0.0095)	0.0036 (0.0050)	-0.0039 (0.0074)	-0.0099 (0.0141)	-0.0099 (0.0139)	0.0322*** (0.0095)
Widowed	-0.0049 (0.0053)	-0.0090 (0.0076)	-0.0162 (0.0154)	-0.0049 (0.0147)	0.0115 (0.0102)	-0.0066 (0.0053)	0.0003 (0.0076)	-0.0196 (0.0156)	0.0061 (0.0147)	-0.0170* (0.0102)
Partner	0.0056 (0.0059)	0.0107 (0.0083)	-0.0076 (0.0182)	-0.0136 (0.0158)	0.0116 (0.0116)	0.0006 (0.0059)	0.0008 (0.0083)	0.0096 (0.0184)	-0.0057 (0.0159)	-0.0016 (0.0117)
NS/Missing	-0.0280* (0.0155)	-0.0288 (0.0222)	0.0535 (0.0449)	-0.0494 (0.0462)	-0.0450 (0.0294)	-0.0220 (0.0155)	-0.0409* (0.0222)	0.0786* (0.0455)	-0.0931** (0.0465)	-0.0001 (0.0295)
<i>Region</i>										
Rural	-0.0124*** (0.0025)	-0.0147*** (0.0037)	-0.0434*** (0.0064)	-0.0070 (0.0075)	0.0079 (0.0050)	-0.0232*** (0.0025)	-0.0278*** (0.0037)	-0.0304*** (0.0065)	-0.0177** (0.0076)	-0.0128** (0.0050)
NS/Missing	0.0055 (0.0456)	-0.0326 (0.0696)	0.3519* (0.1877)	-0.0127 (0.0861)	0.0243 (0.1005)	-0.0387 (0.0457)	-0.0408 (0.0697)	0.2399 (0.1899)	-0.0074 (0.0865)	-0.1334 (0.1007)
<i>Location</i>										
Central	0.0234*** (0.0035)	0.0104** (0.0051)	-0.0009 (0.0093)	0.0654*** (0.0102)	0.0419*** (0.0070)	0.0036 (0.0035)	-0.0003 (0.0051)	0.0208** (0.0094)	0.0111 (0.0103)	-0.0025 (0.0070)
North-west	-0.0071* (0.0038)	-0.0199*** (0.0055)	0.0215** (0.0096)	-0.0314*** (0.0112)	0.0114 (0.0076)	-0.0096** (0.0038)	-0.0119** (0.0055)	0.0235** (0.0097)	-0.0433*** (0.0113)	-0.0100 (0.0076)
Ticino	0.0149** (0.0066)	0.0111 (0.0097)	-0.0088 (0.0158)	0.0598*** (0.0192)	0.0181 (0.0129)	0.0008 (0.0066)	0.0012 (0.0097)	-0.0109 (0.0160)	-0.0085 (0.0193)	0.0148 (0.0130)
East	-0.0063 (0.0038)	-0.0089 (0.0055)	0.0201** (0.0099)	-0.0144 (0.0112)	-0.0150* (0.0077)	-0.0103*** (0.0038)	-0.0104* (0.0055)	0.0059 (0.0101)	-0.0336*** (0.0113)	-0.0104 (0.0077)
Lake Geneva	-0.0001 (0.0033)	-0.0093* (0.0048)	0.0228*** (0.0085)	-0.0074 (0.0099)	0.0089 (0.0066)	-0.0102*** (0.0033)	-0.0146*** (0.0048)	0.0128 (0.0086)	-0.0329*** (0.0099)	-0.0045 (0.0066)
Zurich	0.0205*** (0.0049)	-0.0063 (0.0071)	0.0197 (0.0127)	0.0957*** (0.0136)	0.0313*** (0.0095)	0.0123** (0.0049)	0.0170** (0.0072)	0.0235* (0.0128)	0.0252* (0.0136)	-0.0098 (0.0095)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude
NS/Missing	-0.0055 (0.0093)	-0.0059 (0.0135)	-0.0305 (0.0250)	-0.0101 (0.0313)	0.0055 (0.0169)	0.0129 (0.0093)	-0.0057 (0.0135)	-0.0304 (0.0253)	-0.0264 (0.0314)	0.0630*** (0.0169)
<i>Political participation</i>										
1/10	0.0071 (0.0186)	0.0168 (0.0255)	-0.0118 (0.0481)	-0.0326 (0.0530)	0.0239 (0.0410)	-0.0019 (0.0186)	-0.0084 (0.0256)	-0.0258 (0.0487)	-0.0074 (0.0533)	0.0326 (0.0411)
2/10	-0.0061 (0.0131)	-0.0031 (0.0192)	-0.0069 (0.0291)	0.0196 (0.0388)	-0.0282 (0.0281)	-0.0016 (0.0131)	0.0029 (0.0192)	-0.0175 (0.0294)	-0.0231 (0.0390)	0.0114 (0.0281)
3/10	-0.0014 (0.0099)	0.0006 (0.0143)	-0.0216 (0.0239)	0.0060 (0.0285)	0.0032 (0.0208)	0.0021 (0.0099)	0.0043 (0.0143)	0.0266 (0.0241)	-0.0126 (0.0286)	-0.0156 (0.0208)
4/10	-0.0046 (0.0097)	-0.0188 (0.0139)	-0.0264 (0.0218)	0.0285 (0.0273)	0.0372* (0.0215)	-0.0218** (0.0097)	-0.0077 (0.0140)	-0.0397* (0.0220)	-0.0352 (0.0275)	-0.0293 (0.0216)
5/10	-0.0108** (0.0048)	-0.0076 (0.0068)	-0.0288** (0.0121)	-0.0151 (0.0135)	-0.0013 (0.0100)	0.0003 (0.0048)	0.0101 (0.0069)	-0.0079 (0.0122)	-0.0080 (0.0136)	-0.0133 (0.0100)
6/10	-0.0043 (0.0064)	-0.0019 (0.0093)	-0.0243 (0.0155)	0.0052 (0.0187)	-0.0010 (0.0132)	-0.0079 (0.0064)	-0.0041 (0.0093)	-0.0171 (0.0157)	-0.0256 (0.0188)	-0.0021 (0.0132)
7/10	0.0061 (0.0048)	0.0075 (0.0069)	-0.0150 (0.0124)	-0.0009 (0.0139)	0.0188* (0.0097)	-0.0042 (0.0048)	0.0005 (0.0069)	-0.0154 (0.0126)	-0.0119 (0.0139)	-0.0026 (0.0097)
8/10	0.0073** (0.0035)	0.0137*** (0.0050)	0.0124 (0.0088)	-0.0064 (0.0101)	-0.0028 (0.0069)	0.0081** (0.0035)	0.0142*** (0.0051)	0.0138 (0.0089)	-0.0019 (0.0101)	-0.0043 (0.0070)
9/10	0.0113*** (0.0037)	0.0103* (0.0055)	0.0380*** (0.0091)	-0.0044 (0.0112)	0.0011 (0.0074)	0.0095** (0.0038)	0.0083 (0.0055)	0.0247*** (0.0092)	-0.0058 (0.0113)	0.0070 (0.0074)
NS/Missing	0.0112 (0.0089)	0.0205 (0.0127)	-0.0292 (0.0254)	0.0108 (0.0282)	0.0130 (0.0164)	0.0200** (0.0089)	0.0318** (0.0127)	0.0023 (0.0257)	-0.0031 (0.0283)	0.0118 (0.0164)
<i>Party-identification</i>										
PCS/CSP/UDC/SVP/P DC	-0.0720*** (0.0079)	-0.0612*** (0.0133)	-0.0836*** (0.0132)	-0.1070*** (0.0263)	-0.0414** (0.0176)	-0.0501*** (0.0079)	-0.0291** (0.0133)	-0.1019*** (0.0133)	-0.1122*** (0.0264)	0.0386** (0.0176)
PSS/SPS	0.2443*** (0.0155)	0.1991*** (0.0308)	0.2301*** (0.0222)		0.2917*** (0.0307)	0.1249*** (0.0155)	0.1196*** (0.0308)	0.1838*** (0.0225)		0.0056 (0.0307)
PRD/FDP/PLR/FDP	-0.1328*** (0.0161)	-0.0151 (0.0320)	-0.1727*** (0.0232)		-0.1779*** (0.0318)	-0.0180 (0.0162)	0.0983*** (0.0321)	-0.0981*** (0.0234)		0.0123 (0.0319)
PDC/CVP	-0.0367* (0.0161)	-0.0025 (0.0320)	-0.0192 (0.0232)		-0.1147*** (0.0318)	0.0354* (0.0162)	0.1912*** (0.0321)	0.0025 (0.0234)		-0.0626 (0.0319)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude	Political attitude
PdL/FPS/PES/GPS	(0.0203) 0.3162***	(0.0410) 0.2016***	(0.0287) 0.3524***		(0.0403) 0.3103***	(0.0203) 0.1457***	(0.0411) 0.0465	(0.0290) 0.2520***		(0.0404) -0.0050
GLP	(0.0262) 0.1092***	(0.0543) 0.0839	(0.0362) 0.1882***		(0.0530) -0.0892	(0.0262) 0.1477***	(0.0544) 0.1462**	(0.0367) 0.2080***		(0.0531) -0.0080
Adi/LdU/PBD/BDP	(0.0333) 0.0134	(0.0704) 0.1765*	(0.0449) -0.0522		(0.0707) -0.0080	(0.0334) 0.0078	(0.0705) 0.0367	(0.0454) 0.0320		(0.0708) -0.0477
PEP/EVP	(0.0515) 0.1353**	(0.0995) 0.1000	(0.0747) 0.2375***		(0.1011) 0.0082	(0.0516) 0.0911	(0.0998) 0.1755	(0.0755) 0.1640*		(0.1013) -0.0790
Lega/PLS/LPS	(0.0590) -0.0528	(0.1114) -0.0471	(0.0891) -0.0704		(0.1105) -0.0408	(0.0591) 0.0843*	(0.1116) -0.0942	(0.0901) -0.0225		(0.1107) 0.3871***
Other Party	(0.0440) 0.0984***	(0.0909) 0.0424	(0.0646) 0.1127***		(0.0802) 0.1018**	(0.0441) 0.0567***	(0.0912) 0.0975**	(0.0653) 0.0720**		(0.0803) -0.0225
Specific Person	(0.0216) 0.0135	(0.0418) 0.0793	(0.0316) -0.0149		(0.0419) 0.0138	(0.0216) 0.0358	(0.0419) 0.1652**	(0.0319) 0.0342		(0.0420) -0.0829
NS/Missing	(0.0323) 0.0036	(0.0658) 0.0052	(0.0453) 0.0025	-0.0259**	(0.0641) 0.0142*	(0.0323) -0.0142***	(0.0659) -0.0042	(0.0458) 0.0195	-0.0190	(0.0642) -0.0389***
	(0.0046)	(0.0067)	(0.0128)	(0.0130)	(0.0085)	(0.0046)	(0.0067)	(0.0130)	(0.0131)	(0.0085)
<i>Trust in the Govern- ment</i>										
Misstrust	0.0021 (0.0025)	-0.0386*** (0.0036)	-0.0193*** (0.0063)	0.0449*** (0.0072)	0.0675*** (0.0049)	-0.0351*** (0.0025)	-0.0296*** (0.0036)	-0.0227*** (0.0064)	-0.0022 (0.0073)	-0.0705*** (0.0049)
NS/Missing	0.0241*** (0.0033)	0.0096** (0.0047)	0.0076 (0.0086)	0.0638*** (0.0095)	0.0403*** (0.0065)	0.0007 (0.0033)	0.0006 (0.0047)	-0.0048 (0.0087)	0.0281*** (0.0095)	-0.0116* (0.0065)
Constant	0.4356*** (0.0303)	0.4792*** (0.0423)	0.4120*** (0.0429)	0.4716*** (0.1266)	0.3090*** (0.1026)	0.4682*** (0.0304)	0.4610*** (0.0424)	0.4400*** (0.0434)	0.4967*** (0.1273)	0.5864*** (0.1028)
Policy area	All	Regulatory	Environ.	Gener.	Pub. finance	All	Regulatory	Environ.	Gener.	Pub. finance
Ref. x cohort effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	177791	83591	28684	21235	44281	177791	83591	28684	21235	44281
r2	.209	.215	.202	.178	.23	.205	.211	.184	.171	.226

Notes: Unit of observation is individual voting decision. Cohort effects are defined for five-year bin of birth cohort (e.g., 1900-1904). Status-quo orientation [political attitude] is 0 if pro status quo [right-wing] and 1 if pro change [left-wing]. Missing values in variables are set to zero and indicated by variable-specific 0,1 dummies (labeled NS/Missing). Standard errors (in parentheses) are clustered on cohort-referendum effects. * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

11 Imputation of missing cohort-referendum effects

As a matter of course, the VoxIt surveys do not cover all relevant chronological ages and birth cohorts across all 305 referenda. Although their number is negligible, we perform a data imputation and re-rank-ranking approach. This is to avoid a distortion across the entire distribution of higher ranks that would arise from one missing cohort in a referendum and to ensure the comparability of the rank measure across periods, respectively. It is reasonable that cohort effects do not differ excessively from adjacent birth cohorts. We therefore impute missing cohort fixed effects by linear interpolation of adjacent cohorts' estimated coefficients. We only impute missing cohort fixed effects if these missing cohort effects are adjacent to observed cohorts (ages), i.e. we do not extrapolate. If the oldest cohort is missing in the data, there will be no effect on higher ranks.

12 Unconstrained rank model

Throughout this section, we show the remaining results of variations of our unconstrained rank model approach that we discuss in Section 5 of the main text.

12.1 Semi-non-parametric effects by status-quo orientation and political attitude: Varying bandwidths

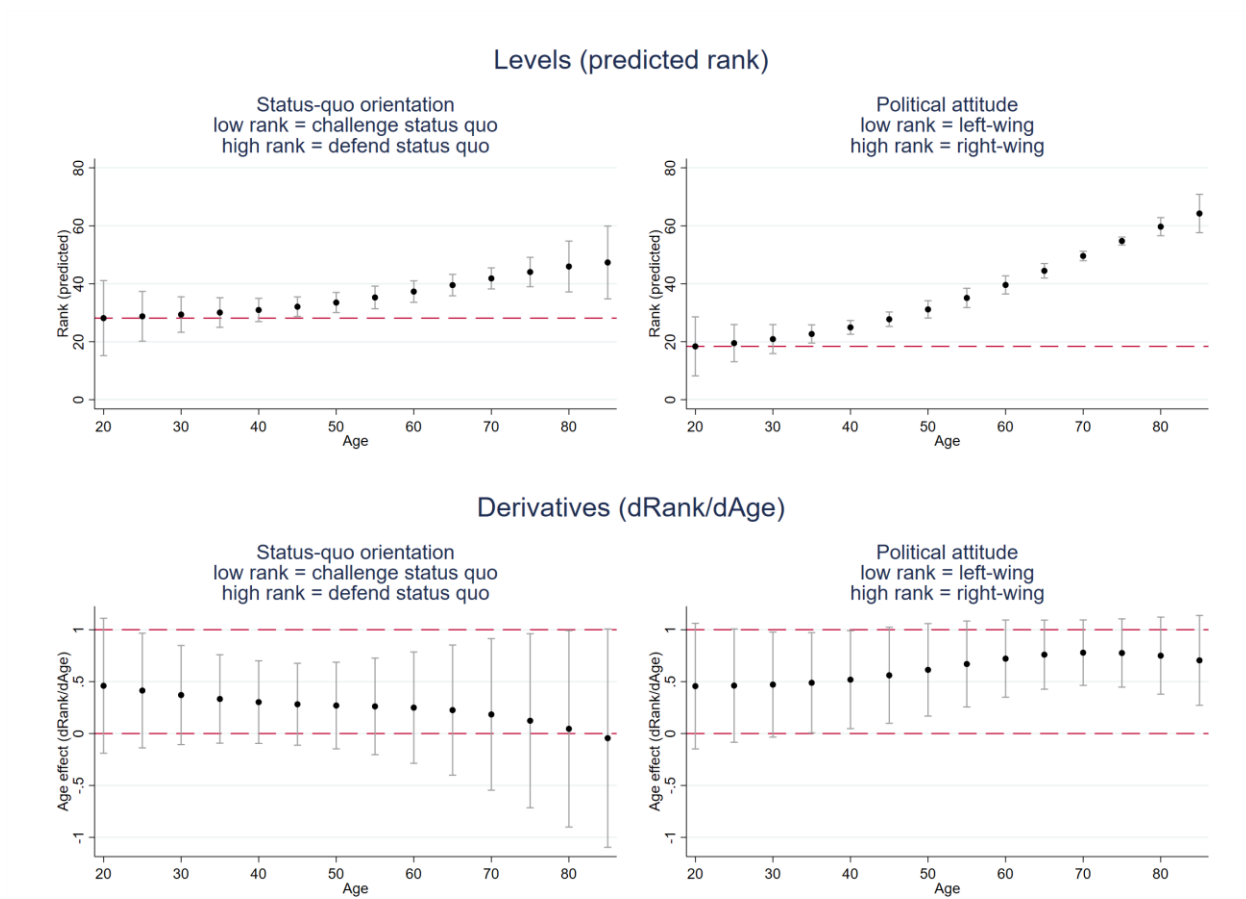


Fig. A8 Semi-non-parametric aging effect on status-quo orientation and political attitude rank: $\mu=2$. The figure is based on individual data from exit polls from 305 referenda from 1981 to 2017. Upper panels show the predicted rank from locally weighted polynomial (degree = 1) regressions (LWR) of status-quo orientation [political attitude] rank against voter age controlling cohort effects. Before running the LWR, cohort fixed effects are removed in auxiliary linear regression. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and twice the Silverman rule-of-thumb bandwidth. Bottom panels show the marginal effect of age on the orientation [attitude] rank. Individual data are aggregated to the age group – period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ..., 85-89) x five-year period (1980-1984, 1985-1989, ..., 2015-2017) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

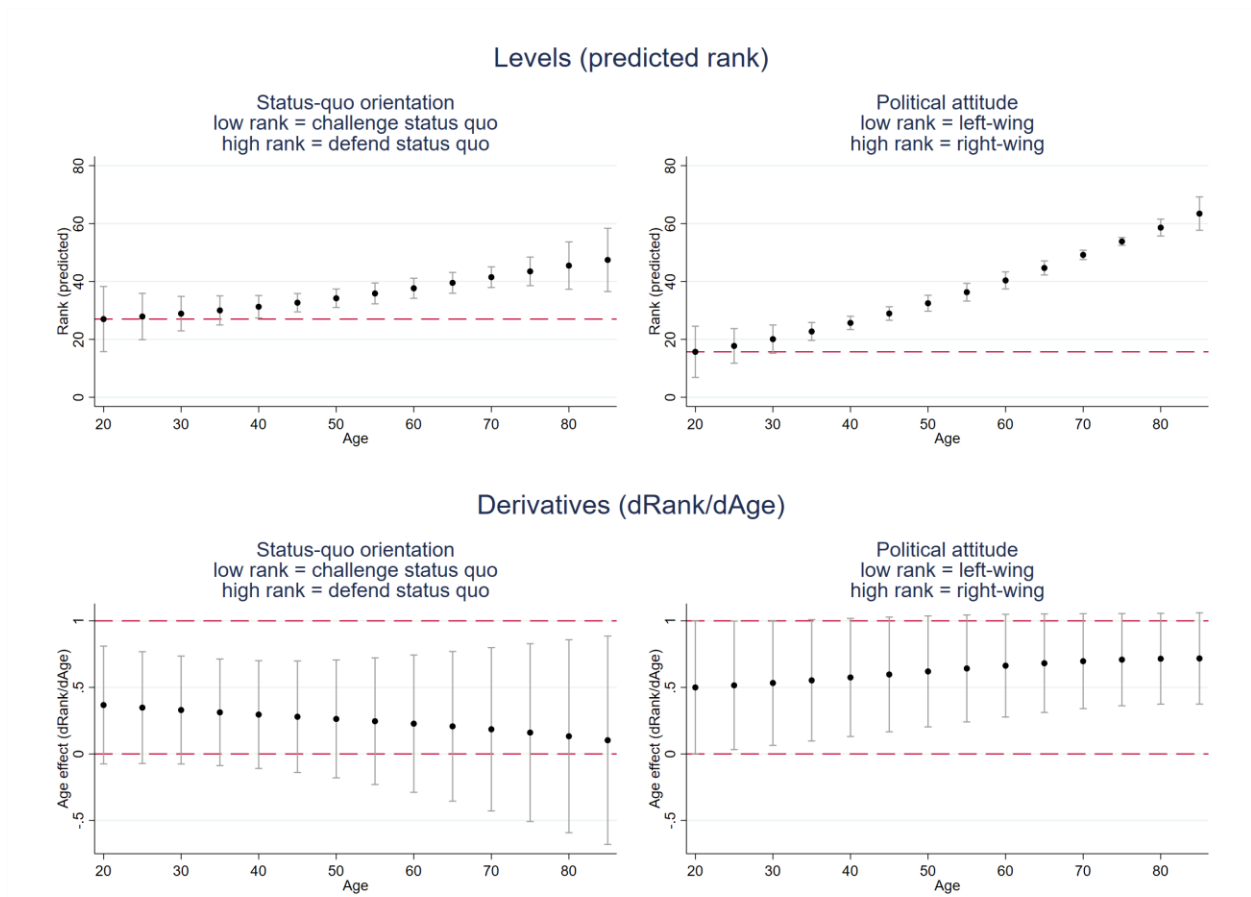


Fig. A9 Semi-non-parametric aging effect on status-quo orientation and political attitude rank: $\mu=3$. The figure is based on individual data from exit polls from 305 referenda from 1981 to 2017. Upper panels show the predicted rank from locally weighted polynomial (degree = 1) regressions (LWR) of status-quo orientation [political attitude] rank against voter age controlling cohort effects. Before running the LWR, cohort fixed effects are removed in auxiliary linear regression. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and three times the Silverman rule-of-thumb bandwidth. Bottom panels show the marginal effect of age on the orientation [political attitude] rank. Individual data are aggregated to the age group – period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ..., 85-89) x five-year period (1980-1984, 1985-1989, ..., 2015-2017) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

12.2 LWR estimates of marginal aging effects by policy areas

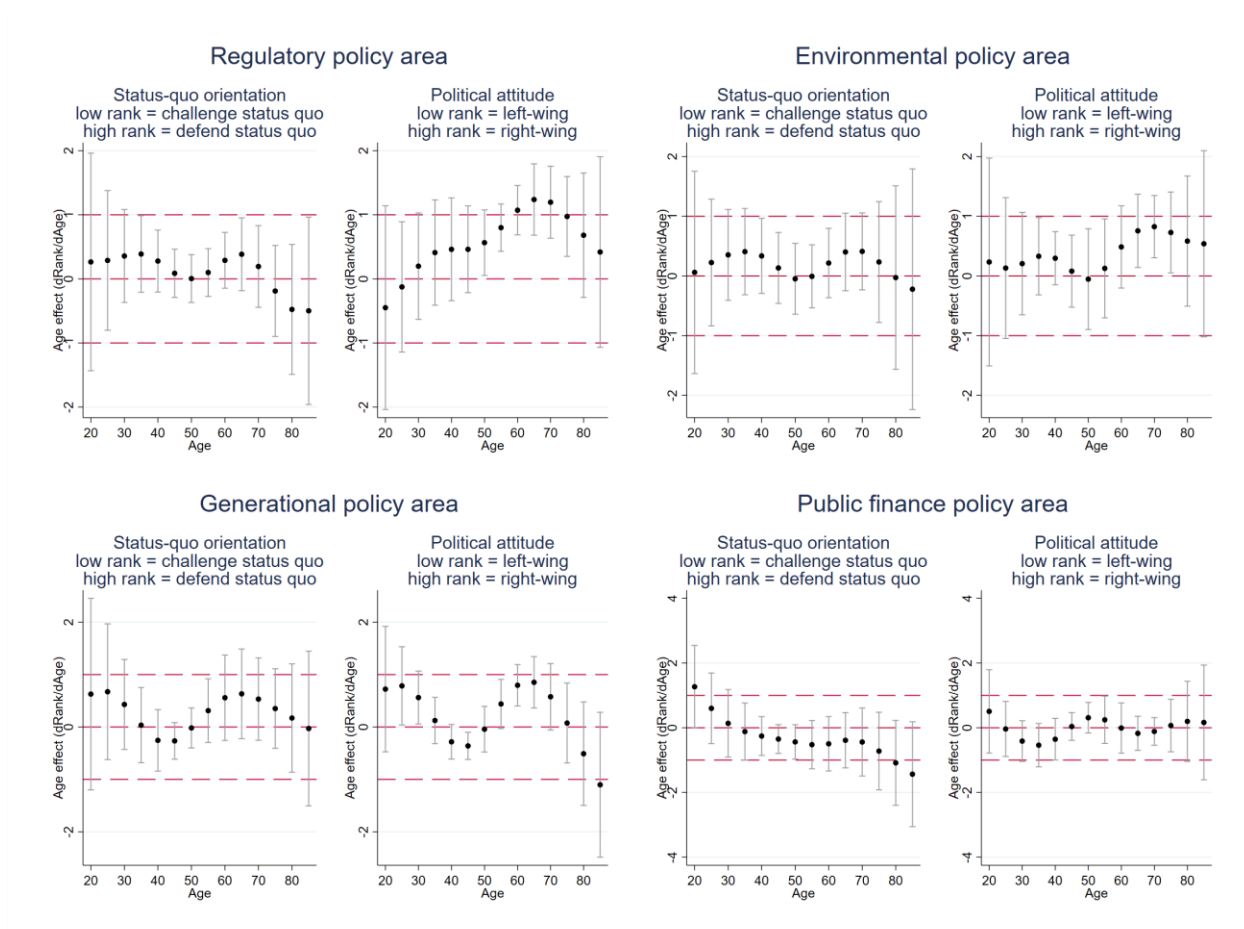


Fig. A10 Semi-non-parametric aging effects by policy area (Silverman-rule bandwidth). The figure is based on individual data from exit polls from 305 referenda from 1981 to 2017. All panels show marginal aging effects from locally weighted polynomial (degree = 1) regressions (LWR) of status-quo orientation [political attitude] rank against voter age controlling cohort effects. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and a Silverman rule-of-thumb bandwidth. Individual data are aggregated to the age-group-period level. Prior to the LWR, cohort effects are removed after running an auxiliary regression of the orientation rank against cohort fixed effects. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

12.3 Parametric aging effects by policy area and age group

Table A6 Parametric aging effects on status-quo and political attitude rank by policy area

<i>Policy area</i>	Regulatory	Environmental	Generational	Public finance
<i># of referenda</i>	145	48	33	79
<i>Status-quo orientation rank</i>	(1)	(2)	(3)	(4)
Age (years)	0.117 (0.166)	0.248* (0.134)	0.289 (0.174)	-0.418 (0.268)
r2	0.397	0.223	0.386	0.327
<i>Political attitude rank</i>	(7)	(8)	(9)	(10)
Age (years)	0.621** (0.240)	0.368* (0.208)	0.273* (0.150)	-0.032 (0.146)
r2	0.495	0.318	0.503	0.365
Cohort effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Ages	All	All	All	All
N	112	112	112	112

Notes: The output is inferred from individual data from exit polls from 305 referenda from 1981 to 2017. Data are aggregated to the age-group-period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] was adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. Standard errors clustered on cohort fixed effects. * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

Table A7 Age effects on status-quo orientation rank by policy area and age group

<i>Policy area</i>	Regulatory		Environmental		Generational		Public Finance	
<i># of referenda</i>	145		48		33		79	
<i>Status-quo orientation</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age (years)	0.371 (0.301)	0.036 (0.338)	0.314 (0.327)	0.193 (0.265)	0.160 (0.435)	0.536 (0.373)	0.206 (0.448)	-0.580 (0.391)
r2	0.397	0.399	0.305	0.151	0.262	0.379	0.175	0.403
<i>Political attitude</i>	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Age (years)	0.303 (0.508)	1.012*** (0.235)	0.211 (0.402)	0.679** (0.243)	0.411 (0.331)	0.473 (0.320)	-0.629 (0.410)	0.045 (0.224)
r2	0.163	0.556	0.228	0.379	0.369	0.501	0.544	0.259
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohorts	All	All	All	All	All	All	All	All
Ages	< 50	>= 50	< 50	>= 50	< 50	>= 50	< 50	>= 50
N	48	64	48	64	48	64	48	64

Notes: The output is inferred from individual data from exit polls from 305 referenda from 1981 to 2017. Data are aggregated to the age group – period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. Standard errors clustered on cohort fixed effects. * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

13 Robustness and extension

Throughout this section, we present complete results of complementary analyses summarized in Section 6 of the main text.

13.1 Turnout

The results for the main analysis we present could potentially capture turnout effects since we focus on actual voters, exclusively. If age was positively associated with turnout and the effect was stronger for those with a right-wing political attitude, selective turnout could rationalize our main results, at least to some extent. In this section, we provide a variety of robustness checks to address this concern. First, we compare the age distributions in the survey data across voters and non-voters to the age distributions in the Swiss population. Second, we show that the turnout rates for survey respondents with left and right-wing attitudes increase in age, but at a similar rate. Third, we exploit hypothetical vote decisions of survey respondents that did not vote in a referendum to show that age effects are similar for voters and non-voters.

13.1.1 Age effects on turnout

Figure A11 shows the age distribution in the VoxIt and VOTO survey data for voters and non-voters in comparison to the age distribution in the Swiss population. The left panel shows that the age distribution in the survey data closely resembles the age distribution in the Swiss population. The middle panel and the right panel show that younger voters tend to have lower turnout rates than older voters, which is in line with frequently observed voting patterns (Goerres, 2007).

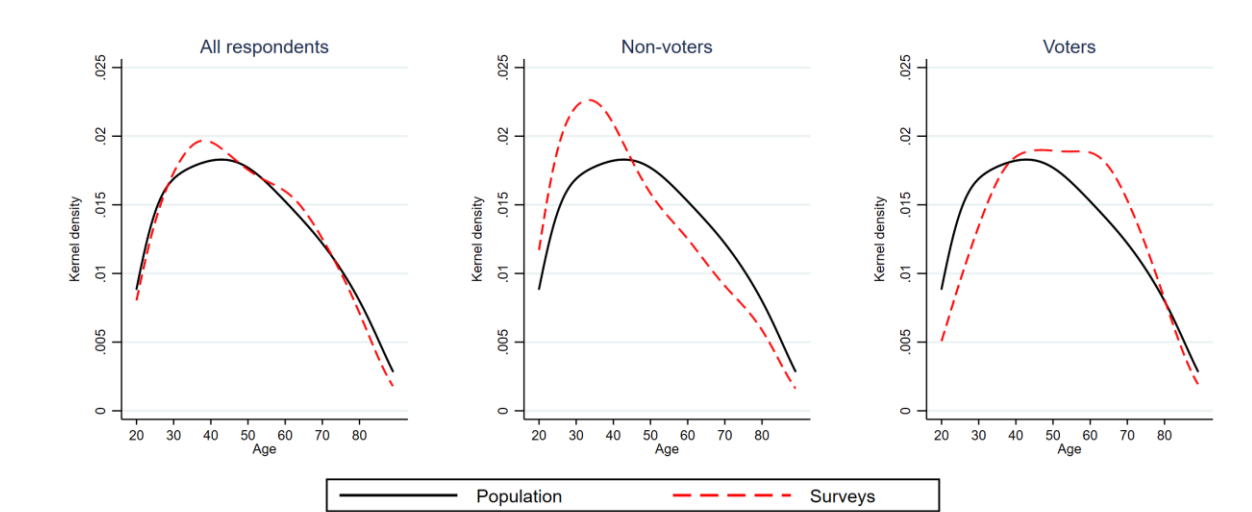


Fig. A11 Age distributions in survey data and official Swiss population data. This figure is based on individual survey data on 322,001 observations from the VoxIt and VOTO postvote surveys that correspond to 305 referenda from 1981 to 2017 in Switzerland. Survey data include 177,791 observations of survey respondents who effectively casted a Yes or No vote in a referendum and 144,210 observations of non-voters. Official population data include Swiss citizens from 1981 to 2017 and are weighted by the number of surveys per year. Kernel is gaussian using a bandwidth of 5. Furthermore, we only consider age distributions between ages of 20 to 89. See Section 3 for further information.

To disentangle age effects on turnout from cohort effects, we estimate our LWR rank regression model using survey respondents' decision to vote in a referendum as dependent variable. The corresponding results are presented in Figure A12 for the rule-of-thumb bandwidth ($\mu = 1$) and substantiate the impression that turnout increases in age. For a general discussion on age, period and cohort effects and political participation, see, e.g., Blais et al. (2004), Gallego (2009), and Goerres (2007).

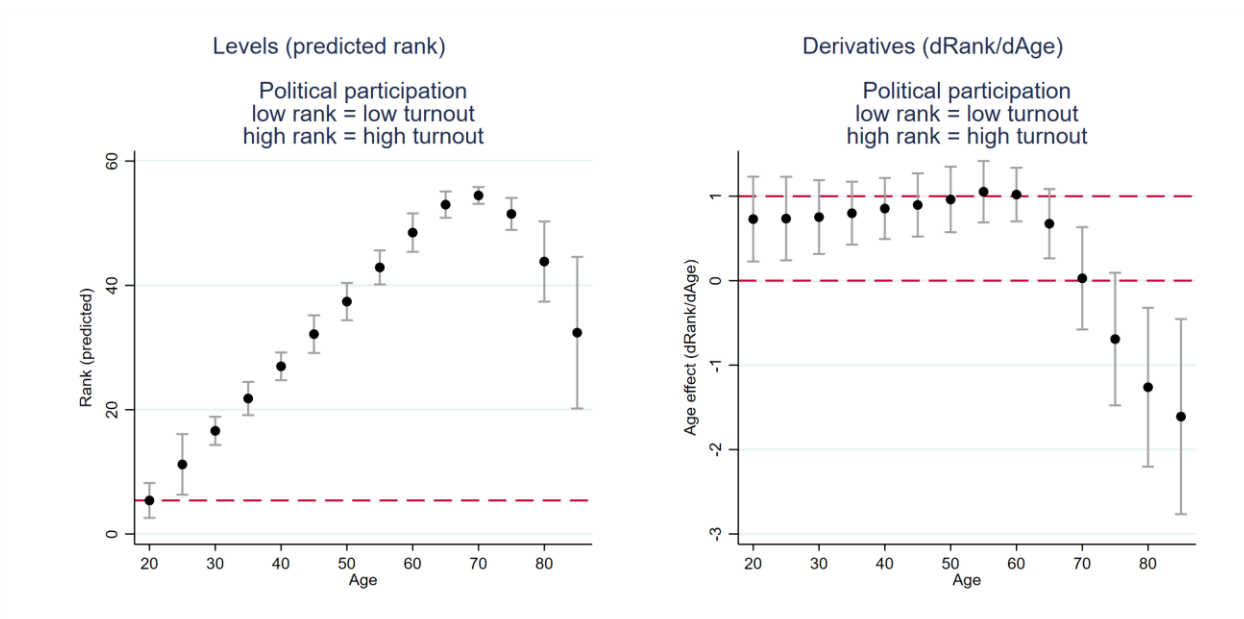


Fig. A12 Semi-non-parametric aging effect on political participation rank. This figure is based on individual data from exit polls from 305 referenda from 1981 to 2017. Survey data include 177,791 observations of survey respondents who casted a Yes or No vote in a referendum and 144,210 observations on non-voters. Left panel shows the predicted rank from locally weighted polynomial (degree = 1) regressions (LWR) of political participation rank against voter age while controlling for cohort effects. Before running the LWR, cohort fixed effects are removed in auxiliary linear regressions. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and a Silverman rule-of-thumb bandwidth. The left panel shows the marginal effect of age on the participation rank. Individual data are aggregated to the age-group-period level. Participation rank is the rank in the distribution of mean (adjusted) political participation within five-year age (20-24, 25-29,..., 85-89) x five-year period (1980-1984, 1985-1989,..., 2015-2017) cells. Political participation ranks are field ranks that increase in turnout. The political participation is encoded as zero if a survey respondent did not participate in the vote and one if she participated in the vote. The political participation is adjusted in a first-stage regression of the political participation against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

13.1.2 Political attitude bias in the age effect on turnout

In the second step of our turnout analysis, we plot the turnout rates for survey respondents with left and right-wing attitudes across age distributions. To this extent, we restrict our data set to surveys that asked for a respondent's self-reported left-right position (LRP), which is measured on a scale of 0 (extreme left) to 10 (extreme right). We classify respondents according to their answers into left (LRP<5) and right (LRP>5).



Fig. A13 Turnout by age and self-reported political attitude, 1988-2017. Individual survey data on 238,808 observations from the VoxIt and VOTO postvote surveys corresponding to 257 referenda from 1988 to 2017 in Switzerland. We restrict our data set to surveys that asked for a respondent's self-reported left-right position (LRP), which is measured on a scale of 0 (extreme left) to 10 (extreme right). We classified respondents according to their answers into left ($LRP < 5$) and right ($LRP > 5$). We further exclude reported centre attitudes ($LRP = 5$), resulting in 142,051 observations. The survey data include 90,904 observations of survey respondents who effectively casted a Yes or No vote in a referendum and 51,147 non-voters. Furthermore, we only consider age distributions between ages of 20 to 89. See Section 3 for further information.

Figure A13 confirms that turnout increases in age. More importantly, Figure A13 reveals that the trend is orthogonal to political attitude. Hence, heterogeneous age effects on turnout are unlikely to drive the results of our main analyses.

Next, we replicate our analysis of how the conditional mean political attitude changes by age for each of the four policy areas using hypothetical vote decisions of survey respondents that did not vote in a referendum (data are available for most referenda from 1988 to 2017). For each policy area, we first run OLS regressions of the political attitude against voter characteristics, referendum effects, and integer age-bin effects and then plot the results of local polynomial (degree = 0) regressions of the latter against age. Figure A14 overlays the results together with similar estimates for those who voted in the same set of referendums.

Furthermore, we estimate our LWR rank regression model using hypothetical vote decisions. Figure A15 presents the results together with the corresponding result for voters. The age effect on voters and non-voters turns out to be fairly similar: survey respondents' political attitudes become more

right-wing as cohorts age, although the effect on non-voters is quantitatively smaller. This is in line with Figure A14 which also suggests that the quantitative difference is driven by referenda in the environmental policy area.

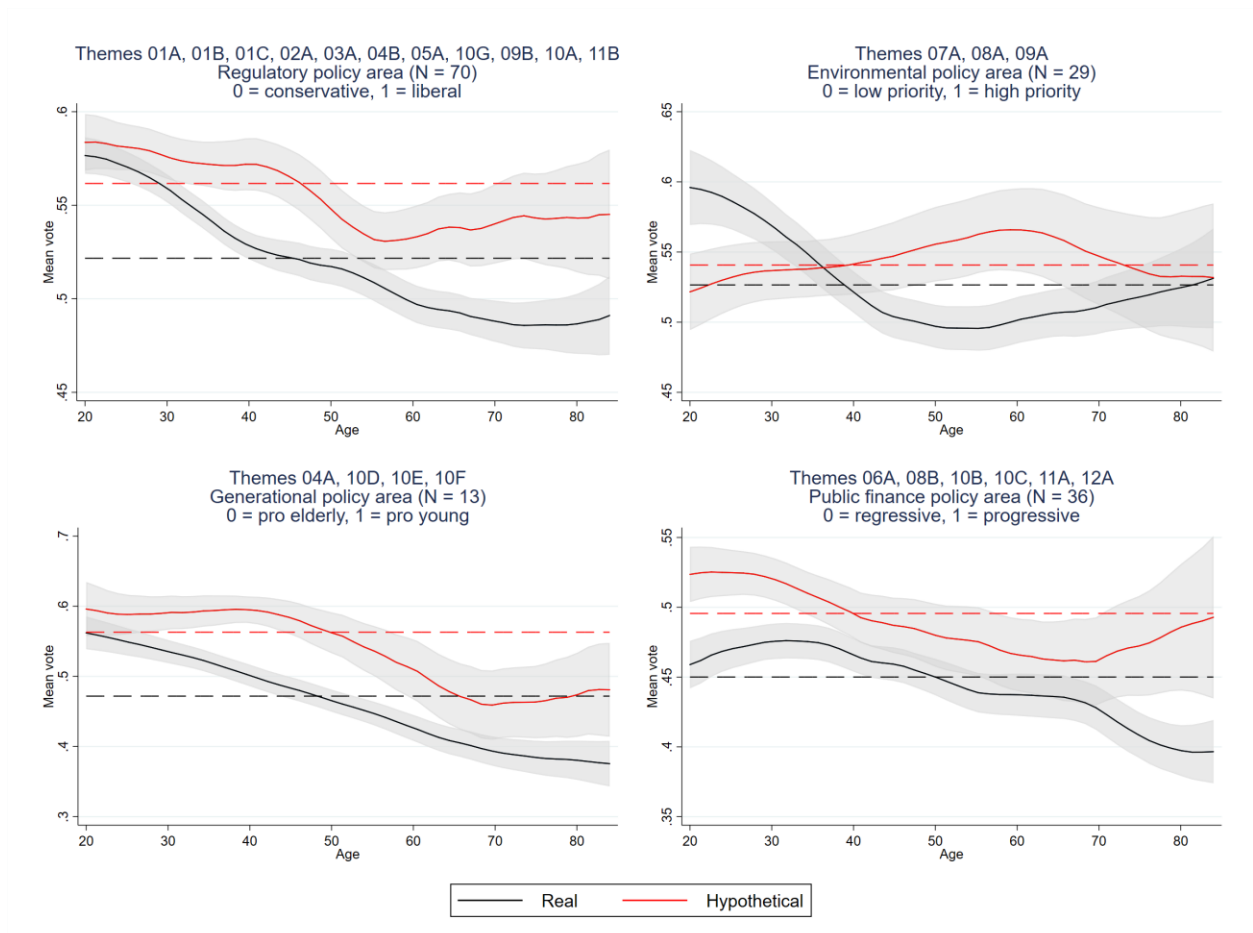


Fig. A14 Voting and hypothetical voting by age and policy area. This figure summarizes the mean vote by age and policy areas across 148 referenda from 1981 to 1999 using real (black) and hypothetical (red) vote decisions based on Swiss post-referendum surveys. We group the referenda into policy areas by the themes defined in Table 1 (see main text, Section 3). A voting outcome of zero is in line with the political right, while an outcome of one is in line with the political left. For each policy area, we regress the voting outcome (one if in support of the theme, zero otherwise) against a battery of individual controls, referendum fixed effects and one-year-age-bin fixed effects. The point estimates (solid lines) and 95% confidence intervals (gray-shaded areas) are from local polynomial regressions (degree = 0) of the age-bin fixed effects against (integer) age. Dashed lines are the mean outcomes across all age groups within policy areas. N is the number of referenda within a policy area.

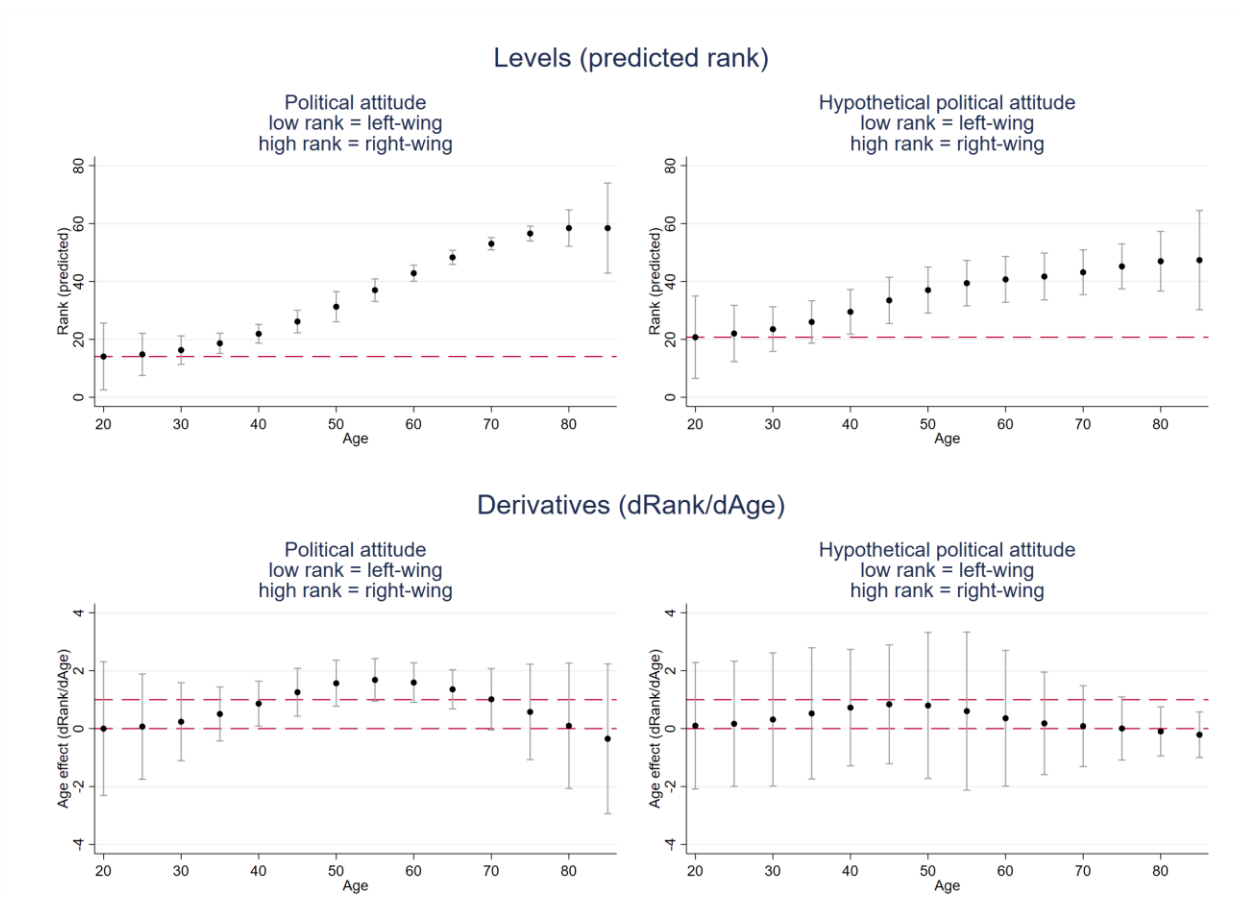


Fig. A15 Semi-non-parametric aging effect on hypothetical political attitude rank. The left panel corresponds to our main analysis of political attitude ranks that are derived from real voting decisions (see Figure 4 in the main text). The right panel shows the results for the same analysis but uses hypothetical political attitude as the dependent variable. To this extent, we use data on voters (left panel) and non-voters (right panel), but we restrict our data set to surveys that asked for non-voters' hypothetical vote decisions for both analyses. As a consequence, the reported results are based on individual data from exit polls from 148 referenda from 1981 to 1999 in Switzerland. Survey data consist of 33,395 observations of survey respondents who did not vote in a referendum but reported their hypothetical vote decisions and 72,070 survey respondents who voted in a referendum and reported their vote decisions. Upper panels show the predicted rank from locally weighted polynomial (degree = 1) regressions (LWR) of [hypothetical] political attitude rank against voter age while controlling for cohort effects. Before running the LWR, cohort fixed effects are removed in auxiliary linear regressions. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and a Silverman rule-of-thumb bandwidth. The lower panel shows the marginal effect of age on the [hypothetical] political attitude rank. Individual data are aggregated to the age-group-period level. [Hypothetical] political attitude rank is the rank in the distribution of mean (adjusted) [hypothetical] political attitude within five-year age (20-24, 25-29,..., 85-89) x five-year period (1980-1984, 1985-1989,..., 1995-2000) cells. [Hypothetical] political attitude ranks are field ranks that increase in right-wing attitude. The [hypothetical] political attitude is encoded as zero if the vote is in line with the [hypothetical] political right and one if the vote is in line with the political left. The [hypothetical] political attitude is adjusted in a first-stage regression of the [hypothetical] political attitude against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

13.2 Altruism

Another issue in our analysis concerns altruism. Concisely, the theoretical argument that voters are less likely to support investment-like reform projects as they age (Messner and Polborn, 2004) hinges on the assumption that they are not fully altruistic. Intuitively, if (grand) parents care about their (grand) children, the age effect will be mitigated. Unfortunately, there is no information on children in the survey data. However, as a crude approximation, we treat singles who are neither divorced nor widowed as childless. For this group, we find almost identical results to the ones reported in the full sample. Figure A16 and Figure A17 show the corresponding results for the LWR rank regression model for status-quo orientation and political attitude for voters without children across all referenda and separately for each policy area, respectively.

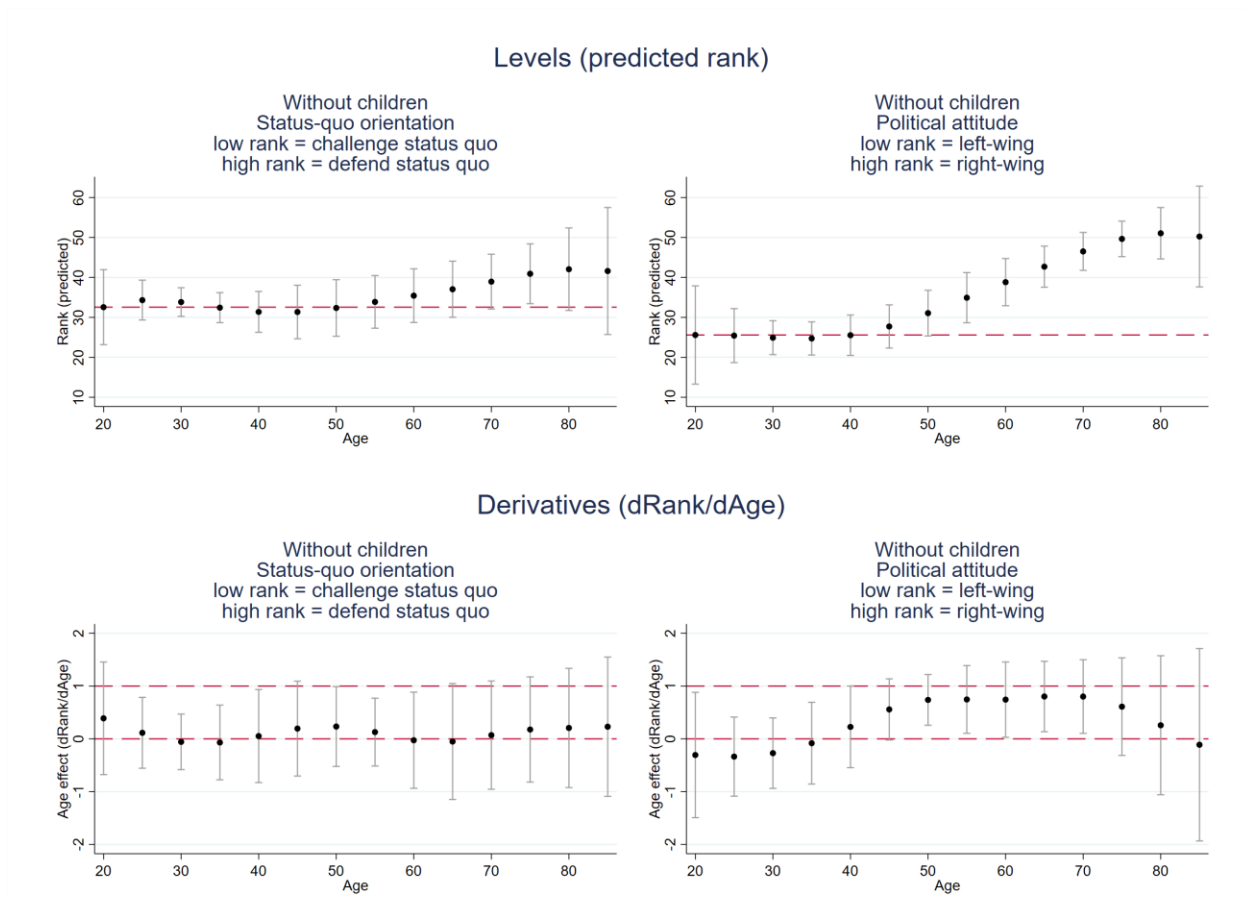


Fig. A16 Semi-non-parametric aging effect on status-quo orientation and political attitude rank. This figure is based on individual data from exit polls from 305 referenda from 1981 to 2017. Upper panels show the predicted rank from locally weighted polynomial (degree = 1) regressions (LWR) of status-quo orientation [political attitude] rank against voter age while controlling for cohort effects for voters without children. We treat singles who are neither divorced nor widowed as voters without children. Before running the LWR, cohort fixed effects are removed in auxiliary linear regressions. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and a Silverman rule-of-thumb bandwidth. Bottom panels show the marginal effect of age on the orientation [attitude] rank. Individual data are aggregated to the age-group-period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29,..., 85-89) x five-year period (1980-1984, 1985-1989,..., 2015-2017) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

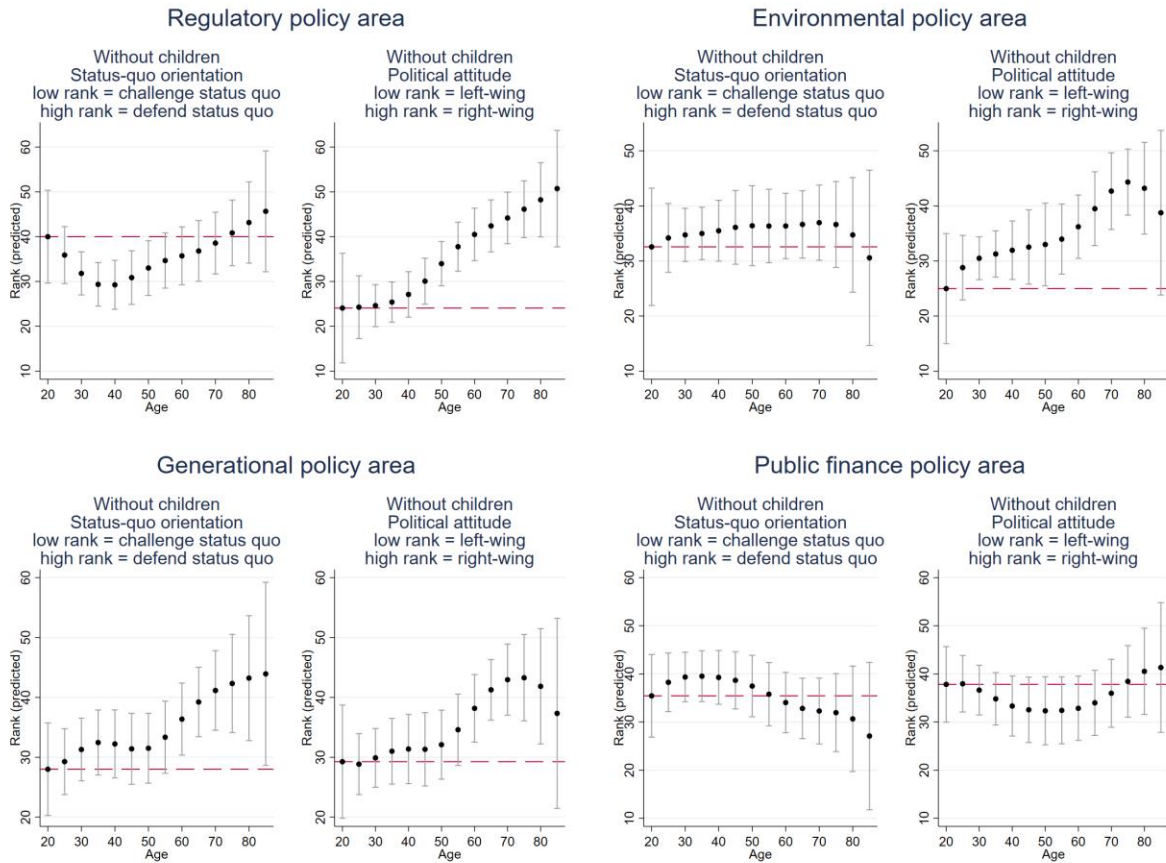


Fig. A17 Semi-non-parametric estimates of rank by age and policy area. This figure is based on individual data from exit polls from 305 referenda from 1981 to 2017. All panels show the predicted rank from locally weighted polynomial (degree 1) regressions (LWR) of status-quo orientation [political attitude] rank against voter age controlling for cohort effects for voters without children. We treat singles who are neither divorced nor widowed as voters without children. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and a Silverman rule-of-thumb bandwidth. Individual data are aggregated to the age-group-period level. Prior to the LWR, cohort effects are removed after running an auxiliary regression of the orientation [attitude] rank against cohort fixed effects. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects, in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

13.3 Cohort effects

Figure A18 illustrates the effects of cohort affiliation on status-quo orientation and political attitude. We report the unconditional mean status-quo orientation and political attitude (adjusted for individual characteristics) ranks by cohort group as well as the conditional means controlling for age. The latter are recovered from regressions of orientation/attitude ranks against age and cohort effects.

Figure A18 shows remarkable changes in voters' political attitude and status-quo orientation across cohort groups, which generally seem to coincide with popular definitions of social generations. The traditionalists (until 1945) tend to support the status-quo and right-wing policies; the baby boomers (1946-1964) have the strongest inclination to support changes in legislation in general and left-wing policies in particular; generation X (1965-1976), and even more so generation Y (from 1977), are more similar to the traditionalists in terms of status-quo orientation and political attitude (Smola and Sutton, 2002). Notably, there is less variation in the mean political attitude ranks across cohorts once age is controlled for. The implication is that a sizable fraction of the recently observed voting behavioral differences across generations are attributable to the generations' being in different stages in their lifecycles rather than differences in shared experiences. For example, much of the difference in political attitude between the traditionalists and the baby boomers can be attributed to the fact that the former, at any given point in time, are older than the latter. Nevertheless, even conditional on age effects, cohort effects remain quantitatively important. Controlling for age, traditionalists born in 1935-1939, compared with baby boomers born in 1955-1959, are, on average 20 steps higher in the political attitude rank distribution (more right-wing). At an average aging effect on the attitude rank of 0.62 (Table 4, model 10 in the main text), this cohort effect is equivalent to the effect of a cohort aging by 32 years (approximately half of a voting life).

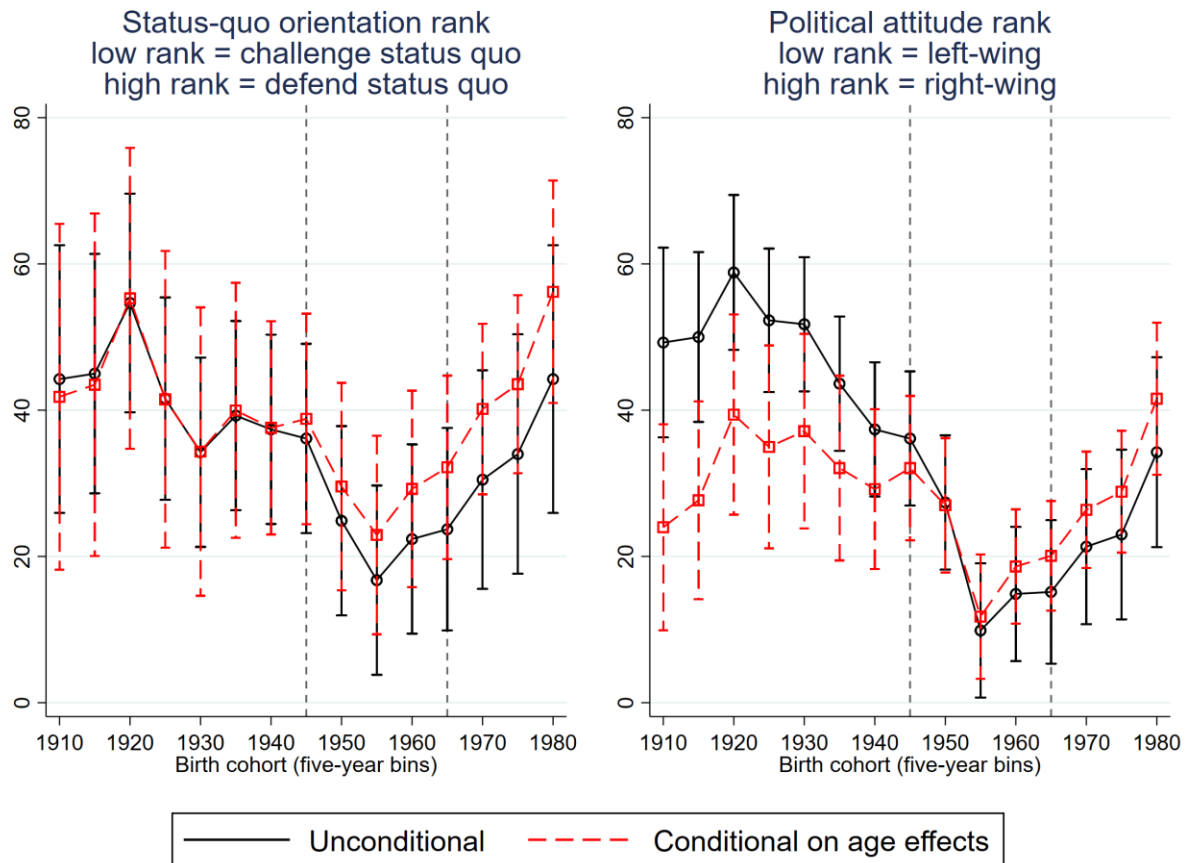


Fig. A18 Cohort effects on orientation and attitude ranks. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. Unconditional cohort effects are the mean orientation [attitude] ranks by cohort. Conditional cohort effects are recovered from regressions of orientation [attitude] ranks against age group dummies omitting the 40-44 group as reference category and cohort fixed effects. Vertical dotted lines bond the social generation of “baby boomers”. Earlier cohorts are “traditionalists”. Later cohorts belong to “generation X” and “generation Y”. Error bars indicate confidence intervals at the 95% level.

Analogous to Figure A18, we illustrate the conditional and unconditional mean cohort ranks by cohort and policy area in Figure A19. The distribution of unconditional mean regulatory attitude ranks by cohort is consistent with a conservative attitude that is often ascribed to the traditionalist generation (Pew Research Center, 2011). However, once we control for age effects, regulatory attitudes vary only moderately across cohorts, suggesting that the traditionalists’ conservative attitude – at least with regard to votes in Swiss referenda – is attributable to the generation’s age and not cohort-specific values. For the other policy areas, the cohort affiliation net of the age effect is more important. Starting with the baby boomers, cohorts have a stronger environmentalist attitude, possibly because of experiencing a more prominent public debate on environmental issues during their formative

years. A similar transition is evident for generational attitudes although at a smoother rate. From 1930 to the 1950, birth cohorts have gradually become more sympathetic to policies that – in relative terms – benefit the workforce and families with dependent children (the young). In terms of attitudes toward public finance policies, the baby boomers stand out because they, more than other generations, are willing to support progressive fiscal policies, possibly because of strong preferences for social equality. In general, these results substantiate descriptive evidence from US surveys (Pew Research Center, 2018).

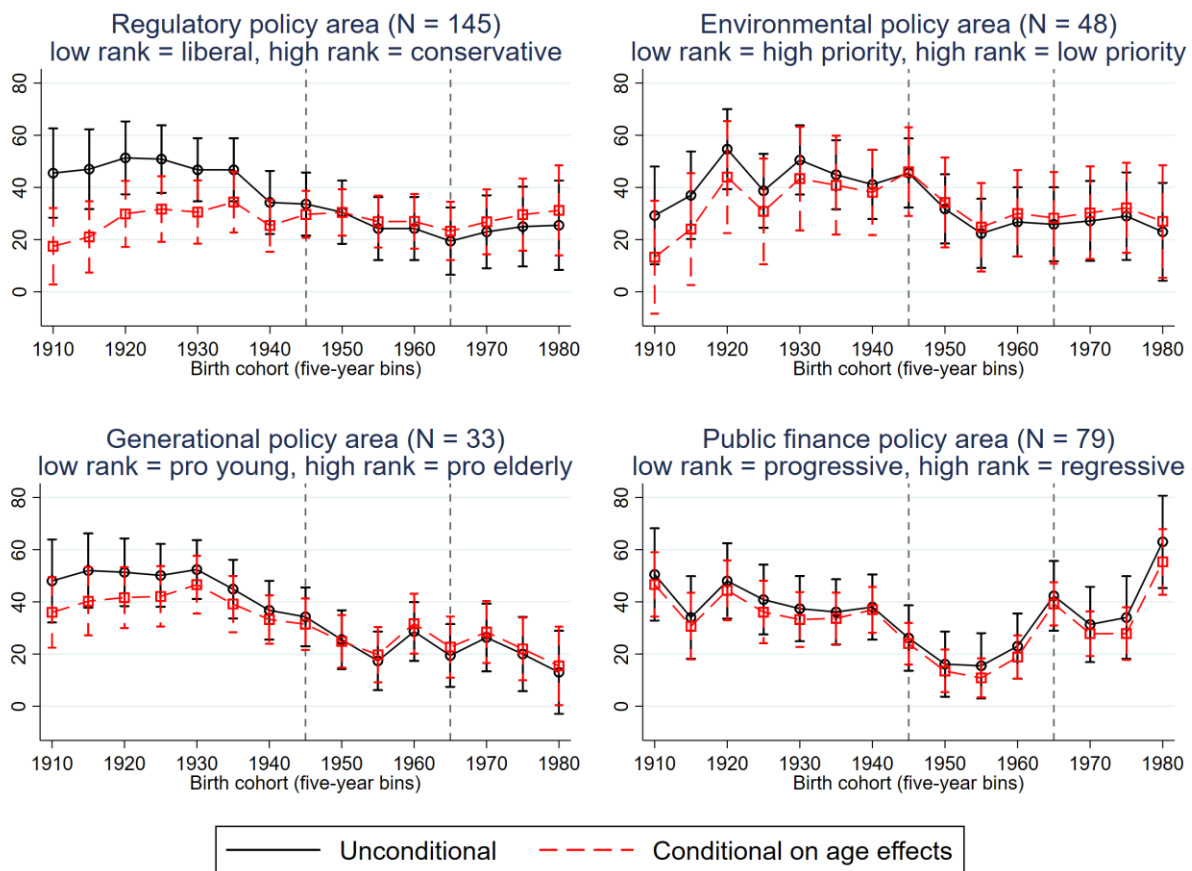


Fig. A19 Cohort effects on political attitudes by policy area. The output is inferred from individual data from exit polls from 305 referenda from 1981 to 2017. Data are aggregated to the age-group–period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects, in which the latter are used to generate the rank measures used here. Unconditional cohort effects are the mean orientation ranks by cohort. Conditional cohort effects are recovered from regressions of orientation [attitude] ranks against age group dummies omitting the 40-44 group as reference category and cohort effects. Vertical dotted lines bond the social generation of “baby boomers”. Earlier cohorts are “traditionalists”. Later cohorts belong to “generation X” and “generation Y”. N is the number of referenda per policy area. 95% confidence intervals based on standard errors clustered on cohort fixed effects. Error bars indicate confidence intervals at the 95% level based on cluster-robust standard errors.

13.4 Measurement

13.4.1 Excluding ambiguous referenda

In our empirical research design, we include data from all referenda surveys mainly for two reasons. First, to separately identify age and cohort effects, we require rich variation over time. Second, we avoid making subjective choices on which referenda to include in the analysis, which may influence the results. Not surprisingly, however, the allocation of referenda to the policy areas defined in Table 1 in the main paper (on which the mapping to political attitudes is based) is not straightforward for all referenda. In particular, the mapping from yes and no votes to policy area specific attitudes (liberal vs. conservative; high vs. low environmentalist attitudes; pro elderly vs. pro young; progressive vs. regressive) and general political attitude (left-wing vs. right-wing) is sometimes potentially controversial.

To rule out that our results are driven by these ambiguous referenda, we replicate our main stages of the analysis of aging effects on voting behavior using exclusively those referenda where we view the encoding as uncontroversial. This results in the exclusion of 54 out of a total of 305 referenda. To be fully transparent about the selection, we indicate the referenda for which we view the mapping as potentially controversial in Appendix II. In the remainder of this section, we present figures and tables generated in perfect analogy to their counterpart in the main paper, except for a restriction to the remaining 251 unambiguous referenda. Reassuringly, the relatively substantial alteration of the referendum the sample (almost 20%) has marginal effects on the results.

In Figure A20, we replicate the descriptive illustration of generation gaps by policy area from Figure 1 in the main paper.

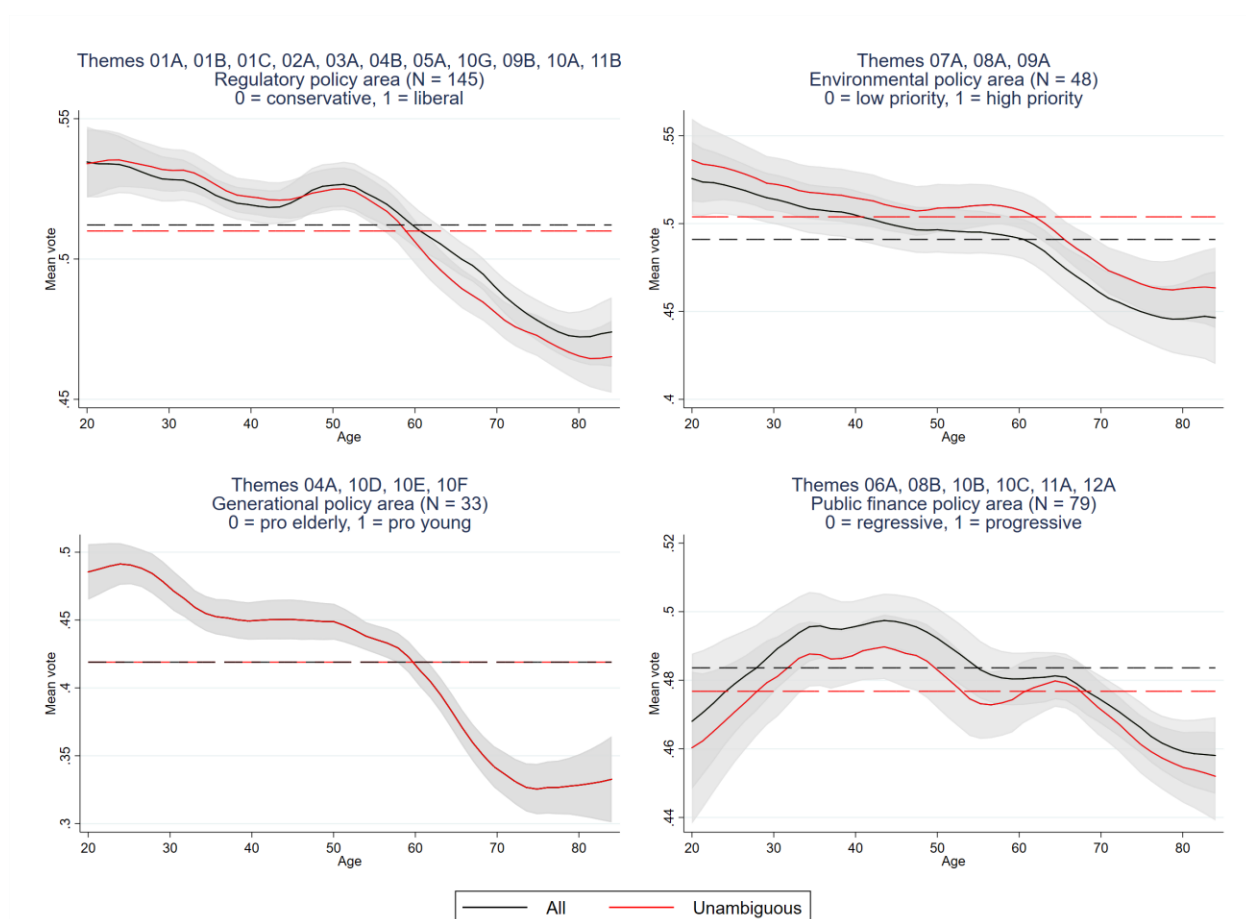


Fig. A20 Voting by age and policy area for unambiguous referenda. This figure summarizes the mean vote by age and policy area across all 305 referenda (black) and for 251 unambiguous referenda (red) from 1981 to 2017. We group the referenda into policy areas by the theme defined in Table 1 (see main text, Section 3). A voting outcome of zero is in line with the political right, while an outcome of one is in line with the political left. We note that we restrict the data to unambiguous referenda. For each policy area, we regress the voting outcome (one if in support of the theme, zero otherwise) against a battery of individual controls, referendum fixed effects and one-year-age-bin fixed effects. The point estimates (solid lines) and 95% confidence intervals (gray-shaded areas) are from local polynomial regressions (degree = 0) of the age-bin fixed effects against (integer) age. Dashed lines are the mean outcomes across all age groups within policy areas. N is the number of referenda within a policy area. The generational policy area referenda are the same for our main specification and the unambiguous referenda specification.

A comparison to Figure 1 in the main paper reveals that most of the referenda with a perhaps ambiguous mapping from voting decisions to attitudes fall into the regulatory (32) and public finance (16) policy area. Only six belong to the environmental policy area and none of the referenda in the generational policy area appears particularly controversial with respect to the interpretation of voting decisions. Yet, point estimates and confidence intervals remain close to the results reported in the main paper for all policy areas.

In Figure A21, we replicate the descriptive illustration of generation gaps by status-quo orientation and political attitude from Figure A5.

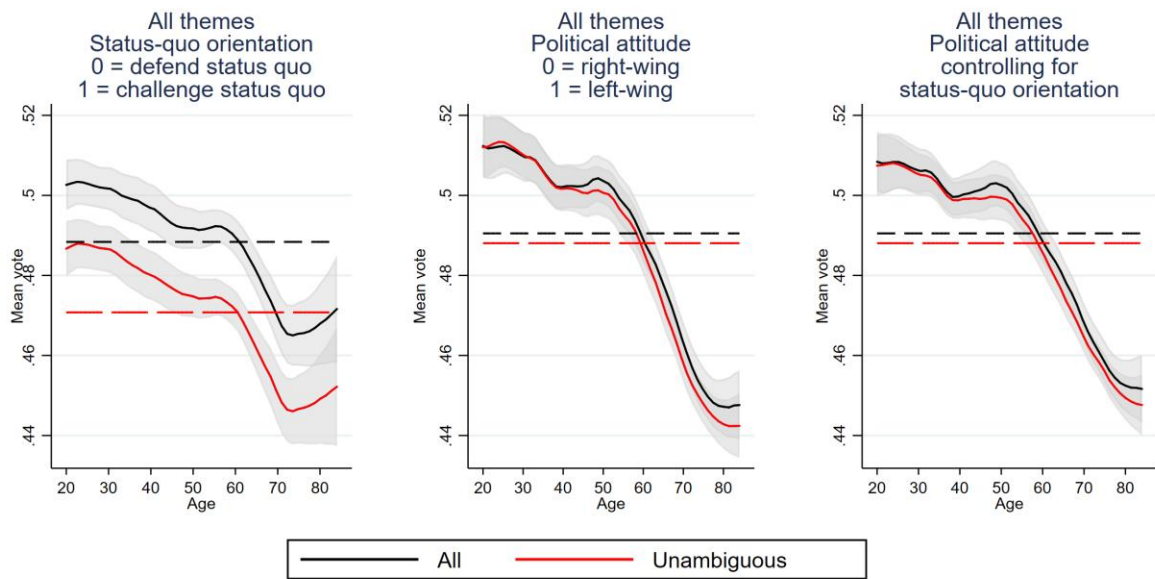


Fig. A21 Status-quo orientation and political attitude by age for unambiguous referenda. The figure summarizes the mean vote by age and policy areas across all 305 referenda (black) and for a subset of 251 unambiguous referenda (red) from 1981 to 2017. In the left panel, the voting outcome is encoded as zero if the vote is in support of defending the status quo (often, but not always a no vote) and as one if the vote supports challenging the status quo. In the two remaining panels, the voting outcome is encoded as zero if it is in line with the political right and one if it is in line with the political left. In the first two panels, we regress different voting outcomes against a battery of individual controls, referendum fixed effects and one-year-age-bin fixed effects. In the third panel, we use the political attitude outcome as the dependent variable and control for the status-quo orientation in addition to the other covariates. The point estimates (solid lines) and 95% confidence intervals (gray-shaded areas) are from local polynomial regressions (degree = 0) of the recovered age-bin fixed effects against (integer) age. Dashed lines are the mean outcome across all age groups.

The results from the replication of the analysis of the impact of age-related differences on status-quo orientation and political attitude also closely resemble the results using the unrestricted referendum sample.

Figure A22 directly corresponds to Figure 2 in Section 4.3 of the main text: the distribution of the unconditional within-period cohort's ranks in political attitude on the basis of unambiguous referenda only. Abstracting from some smaller differences for selected cohorts, the main insight that the cohort time-trends follow the 45-degree line remains unchanged.

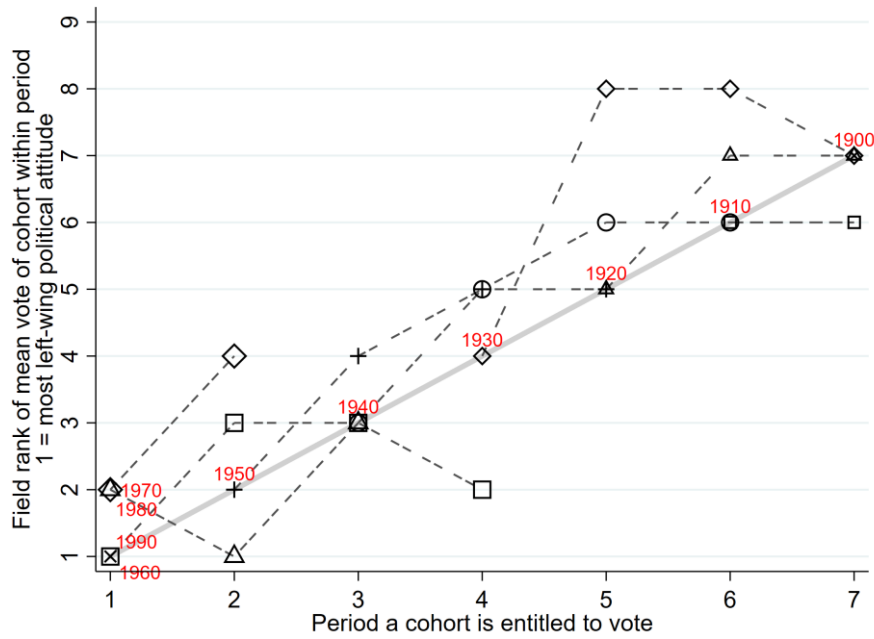


Fig. A22 Cohort rank in political attitude distribution by period for unambiguous referenda. Data cover 251 unambiguous referenda from 1981 to 2017 out of a total of 305 referenda. The field rank (lowest rank to highest value) is computed as the rank in the distribution of unconditional means in political attitude of cohorts within periods (see Section 4.3 in the main text for details). A summary of left-wing attitudes by themes is in Table 1 (see main text, Section 3). The temporal unit of observation is periods defined as decades. Our data cover four periods (1980s, 1990s, 2000s, and 2010s) and 10 birth cohorts (1900s, 1910s, ..., 1990s). During the first/second/.../seventh periods a cohort is entitled to vote, voters are in their 20s/30s/.../80s. We ignore the remaining periods because the data for voters aged 90 and above are sparse. Cohorts are labeled when they first appear in our data. For example, the 1950-cohort is observed first in their second voting period when they are in their 30s (during the 1980s) and then in three subsequent periods (3, 4, and 5) when they are in their 40s, 50s and 60s (during the 1990s, 2000s, and 2010s). Light thick line is the 45-degree line (the upper bound of the aging effect).

Lastly, to complete our sensitivity analysis, we present the results of parametric regressions of aging effects on status-quo orientation and political attitude ranks that correspond to Table 4 in the main paper in Table A8.

Table A8 Parametric aging effects on status-quo orientation and political attitude rank

Status-quo orientation rank	(1)	(2)	(3)	(4)	(5)	(6)
Age (years)	0.285*** (0.104)	0.144 (0.233)	0.276*** (0.105)	0.162 (0.224)	0.337 (0.428)	0.089 (0.511)
r2	0.081	0.260	0.076	0.320	0.408	0.253
Political attitude rank	(7)	(8)	(9)	(10)	(11)	(12)
Age (years)	0.718*** (0.078)	0.548*** (0.125)	0.743*** (0.069)	0.600*** (0.168)	0.491 (0.295)	0.789*** (0.164)
r2	0.516	0.755	0.553	0.780	0.465	0.827
Cohort effects	-	Yes	-	Yes	Yes	Yes
Controls	-	-	Yes	Yes	Yes	Yes
Ages	All	All	All	All	< 50	>= 50
N	112	112	112	112	48	64

Notes: The output is inferred from individual data from exit polls from 251 unambiguous referenda from 1981 to 2017 out of a total of 305 referenda. Individual data are aggregated to the age-group-period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Prior to the LWR, cohort effects are removed after running an auxiliary regression of the orientation [attitude] rank against cohort fixed effects where indicated. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The addition of controls means that the status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. Standard errors are clustered on cohort fixed effects where included. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Once more, the effect of restricting the referendum sample is relatively small. With respect to the aging effect on status-quo orientation, excluding the referenda that are very likely to be accepted (or rejected) decreases the point estimates from 0.333 (1) and 0.316 (3) (see Table 4) to 0.285 (1) and 0.276 (3). Controlling for socio-economic determinants and cohort effects, the estimated aging effect on political attitudes in terms of rank-steps per year is 0.743 (9) and 0.600 (10) in Table A8. The corresponding coefficient values exploiting all referenda are 0.738 (9) and 0.612 (10) (see main text, Section 5.2, Table 4). Only model (11) in Table A8 yields an insignificant aging effect on political attitude, whereas all other estimates remain highly statistically significant. This is in line with the central insight from the main analysis, that the marginal aging effect becomes empirically relevant once voters approach the retirement age.

13.4.2 Alternative mapping based on party recommendation

In addition to using a subset of unambiguous referenda, we evaluate an alternative referendum mapping that is based on Swiss party vote recommendations, which are included in the SWISSVOTES data (see Section 3.1 for details on data sources). To construct our alternative mapping, for each referendum we cast a vote by left- and right-wing parties on whether a Yes [No] vote implies a vote that is in line with a left-wing political attitude. We use the Swiss parties GPS (and their predecessor POCH),

SPS and PDA as left-wing parties and SVP, FPS and FDP as right-wing parties. If a left [right] party supports a Yes vote, we count voting with Yes [No] as left vote. If a left [right] party supports a No vote, we count voting with No [Yes] as a left vote. We then count the number of party recommendations implying that a Yes/No vote is in line with a left-wing political attitude and determine the mapping by a majority vote. If a party does not give a Yes or No vote recommendation, we treat that party's recommendation as absent. In case of a tie, we double-weight the vote recommendation of GPS (or POCH for early referenda). If there is still a tie (only for one referendum), we double-weight the vote recommendation of FPS. The resulting mapping differs in 102 referenda (out of a total of 305 referenda) from our original mapping. For 47 referenda a Yes vote is determined as a left vote in our alternative mapping that previously were determined as right votes, and for 55 referenda a No vote is determined as a left vote in our alternative mapping that previously were determined as right votes. At a tetrachoric correlation coefficient of 0.458 (ρ), the two mappings are positively (and statistically significantly) but imperfectly correlated.

The positive correlation between the two mappings support the choices we made in our baseline approach. More importantly, although the positive correlation is imperfect, the results of our LWR rank regression model using the alternative referendum mapping based on party recommendations presented in Figure A23 closely resemble the baseline (see Figure 3 in Section 5.2 in the main text). This further reassures us that our main results are not driven by a fuzzy assignment of voting behavior to political attitudes.

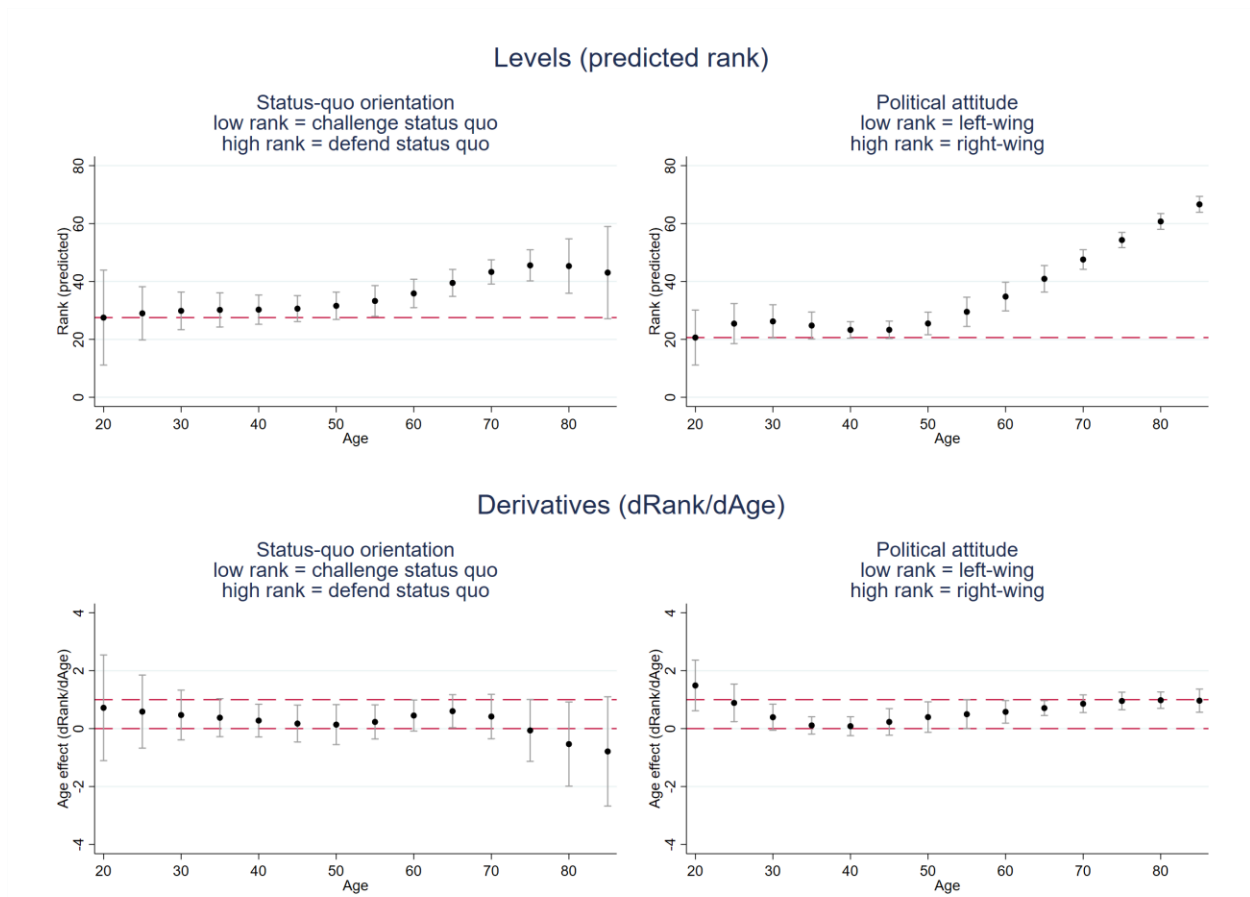


Fig. A23 Semi-non-parametric aging effect on status-quo orientation and political attitude ranks using an alternative referendum mapping. The figure shows the results for the same analysis as in Figure 3 in Section 5.2 in the main text but uses an alternative referendum mapping that is based on party vote recommendations (see text above for details). Results are based on individual data from exit polls from 305 referenda from 1981 to 2017. Upper panels show the predicted rank from locally weighted polynomial (degree = 1) regressions (LWR) of status-quo orientation [political attitude] rank against voter age while controlling for cohort effects. Before running the LWR, cohort fixed effects are removed in auxiliary linear regressions. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and a Silverman rule-of-thumb bandwidth. Bottom panels show the marginal effect of age on the orientation [attitude] rank. Individual data are aggregated to the age-group-period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ..., 85-89) x five-year period (1980-1984, 1985-1989, ..., 2015-2017) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The reform [political] orientation is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

13.4.3 Self-reported political attitude

As an additional robustness check, we use survey respondents' self-reported political attitude, which is measured on a scale of 0 (extreme left) to 10 (extreme right) as an alternative outcome. To this extent, we use data on voters and non-voters, but we have to restrict our data set to surveys that asked for a respondent's self-reported left-right attitude (1988 to 2017). We estimate our LWR rank regression model using self-reported political attitude as dependent variable and present the results

together with the results of the corresponding baseline in Figure A24 for the rule-of-thumb bandwidth ($\mu = 1$).

Concisely, Figure A24 shows that the results for the self-reported political attitude measure closely resemble our main results, even though the analysis covers voters and non-voters and is completely independent of the referendum mappings discussed above.

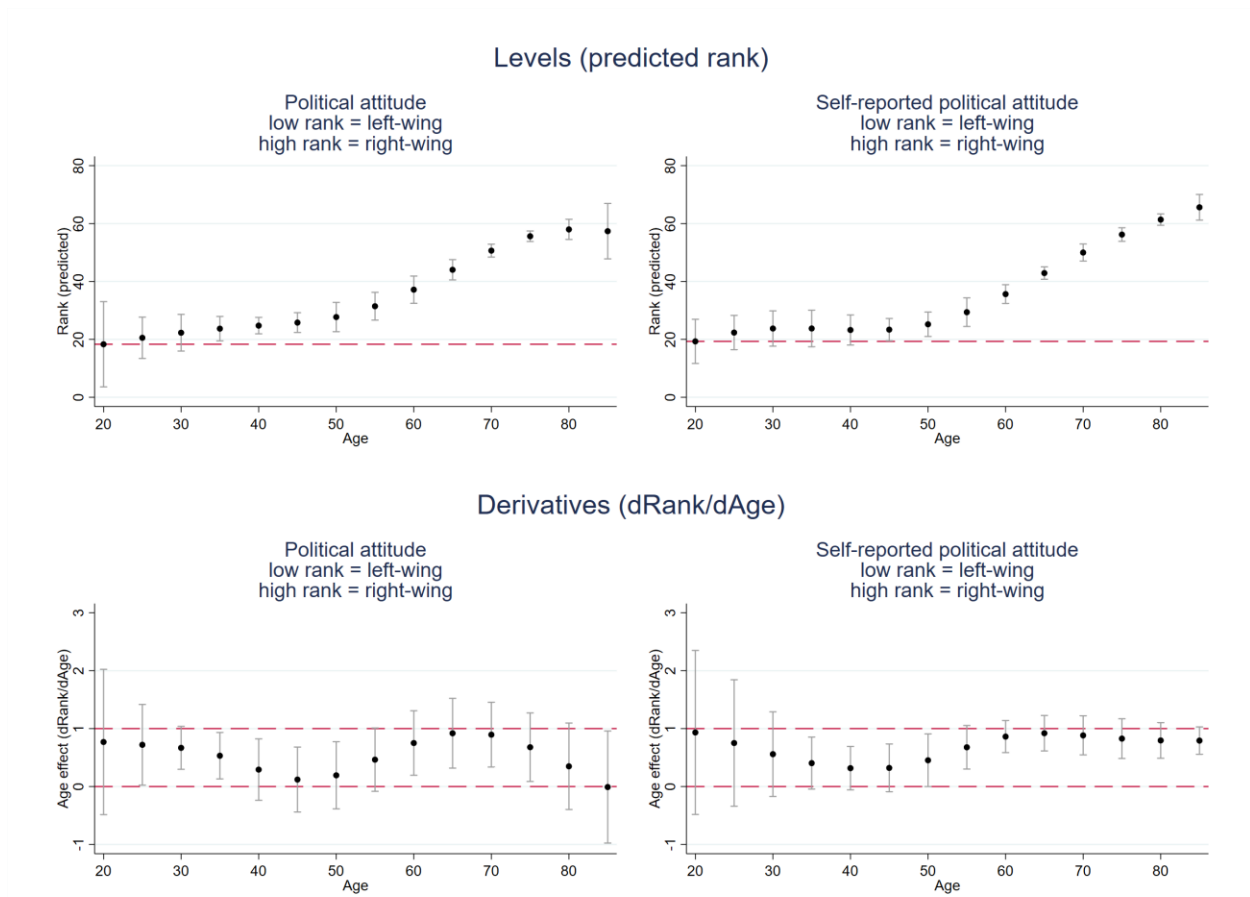


Fig. A24 Semi-non-parametric aging effect on political attitude rank. The left panel of this figure corresponds to our main analysis of political attitude ranks that are derived from real voting decisions. The right panel shows the results for the same analysis but uses self-reported political attitude as the dependent variable. To this extent, we use data on voters (left panel), and data on voters and non-voters (right panel). For both analyses we restrict our data set to surveys that asked for a respondent's self-reported left-right attitude, which is measured on a scale of 0 (extreme left) to 10 (extreme right). The results are based on individual data from exit polls from 257 referenda from 1988 to 2017 in Switzerland. Survey data consist of 239,377 observations of survey respondents who reported their left-right-wing attitudes (self-reported political attitude), including 143,095 observations on voters and 96,262 observations on non-voters. Upper panels show the predicted rank from locally weighted polynomial (degree = 1) regressions (LWR) of [self-reported] political attitude rank against voter age while controlling for cohort effects. Before running the LWR, cohort fixed effects are removed in auxiliary linear regressions. LWRs are weighted by distance from an age bin (the black dots) using a Gaussian kernel and a Silverman rule-of-thumb bandwidth. The lower panel shows the marginal effect of age on the [self-reported] political attitude rank. Individual data are aggregated to the age-group-period level. [Self-reported] political attitude rank is the rank in the distribution of mean (adjusted) [self-reported] political attitude within five-year age (20-24, 25-29,..., 85-89) x five-year period (1985-1989,..., 2015-2017) cells. [Self-reported] political attitude ranks are field ranks that increase in right-wing orientation. The [self-reported] political attitude is adjusted in a first-stage regression of the [self-reported] political attitude against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. 95% confidence intervals (bars) based on standard errors clustered on cohort fixed effects.

13.5 Further robustness checks

13.5.1 Age effect on political attitude conditional on status-quo orientation

In the table below, we present estimates of the aging effect on the political attitude rank, controlling for the status-quo orientation rank. Models (1) and (3) replicate models (9) and (10) from Table 4 in the main paper. In models (2) and (4), we add the political attitude rank. In keeping with the cross-sectional results presented in Figure A5, the additional control has a small effect on the aging effect, especially if cohort effects are controlled for (model 4 vs. 3). A status-quo orientation that increases in age, thus, is an insufficient explanation for the change in political attitude from left-wing to right-wing over the course of voters' life cycle.

In model (5) we, replicate model (4) from Table 4, in which we estimate the aging effect on the status-quo orientation rank conditional on cohort effects. Further controlling for the political attitude rank in model (6) reduces the already small and insignificant aging effect by approximately 40%. These results further substantiate the impression that compared with the habituation hypothesis, the utility-maximization hypothesis has more support in the data with regard to explaining the generation gap in direct democracy.

Table A9 Age effects on political attitude rank conditional on status-quo orientation rank

	(1)	(2)	(3)	(4)	(5)	(6)
	Political attitude rank	Political attitude rank	Political attitude rank	Political attitude rank	Political attitude rank	Political attitude rank
Age (years)	0.738*** (0.071)	0.651*** (0.080)	0.612*** (0.194)	0.591*** (0.194)	0.237 (0.241)	0.099 (0.269)
Status-quo orientation rank		0.276*** (0.079)		0.087 (0.080)		
Political attitude rank						0.226 (0.215)
Policy area	All	All	All	All	All	All
Cohort effects	-	-	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Ages	All	All	All	All	All	All
N	112	112	112	112	112	112
r2	0.545	0.613	0.744	0.749	0.333	0.346

Notes: The output is inferred from individual data from exit polls from 305 referenda from 1981 to 2017. Individual data are aggregated to the age-group-period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Prior to the LWR, cohort effects are removed after running an auxiliary regression of the orientation [attitude] rank against cohort fixed effects where indicated. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. Addition of controls means that the status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. Standard errors clustered on cohort fixed effects where included. * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

13.5.2 Serial correlation in political attitude ranks

If cohort effects are a strong determinant of voters' political attitudes and status-quo orientations, the lagged rank of a cohort will be a strong predictor of the contemporary rank since the cohort effect is time-invariant. In Table A10, we test this hypothesis by regressing the orientation [attitude] rank against its own lag (one period is equivalent to five years). We find no significant serial correlation in the status-quo orientation ranks, regardless of whether we control for age or period effects.

By contrast, we find strong and positive serial correlation in political attitude ranks. However, lagged effect becomes insignificant once we control for age. This suggests that the serial correlation in political attitude is largely attributable to serial correlation in age. The aging effect is within close range of the benchmark estimate in Table 4, column (4) in the main paper.

Table A10 Serial correlation in political attitude ranks

	(1) Status-quo orientation rank	(2) Status-quo orientation rank	(3) Status-quo orientation rank	(4) Political attitude rank	(5) Political attitude rank	(6) Political attitude rank
Lagged (by one period) orientation/attitude rank	-0.011 (0.112)	-0.090 (0.111)	-0.080 (0.118)	0.635*** (0.134)	0.206 (0.192)	0.226 (0.198)
Age (years)		0.242 (0.163)	0.269 (0.171)		0.536*** (0.170)	0.533*** (0.175)
Period effects	Yes	-	Yes	Yes	-	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	91	91	91	91	91	91
r2	.0104	.0673	.0842	.551	.603	.612

Notes: The output is inferred from individual data from exit polls from 305 referenda from 1981 to 2017. Individual data are aggregated to the age-group-period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Prior to the LWR, cohort effects are removed after running an auxiliary regression of the orientation [attitude] rank against cohort fixed effects where indicated. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political right]. The addition of controls means that the status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. Standard errors clustered on cohort fixed effects where included. * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

13.5.3 Correlation between age and cohort effects

Table 4 in the main paper reveals that controlling for cohort effects reduces the age effect on the status-quo orientation rank and to a relatively more limited extent, the age effect on the political attitude rank. This indicates a positive correlation between cohort effects and age. The time-invariant component in status-quo and political attitude should be larger (leaning toward the status quo and the political right) for those who are old when we observe them in our data. This correlation, which leads to biased estimates of aging effects in the cross-section, is illustrated in Figure A25. As expected, the correlation is positive, illustrating the importance of controlling for cohort effects when estimating aging effects on political outcomes, especially if the longitudinal dimension of a data set is limited (covering less than a voting life).

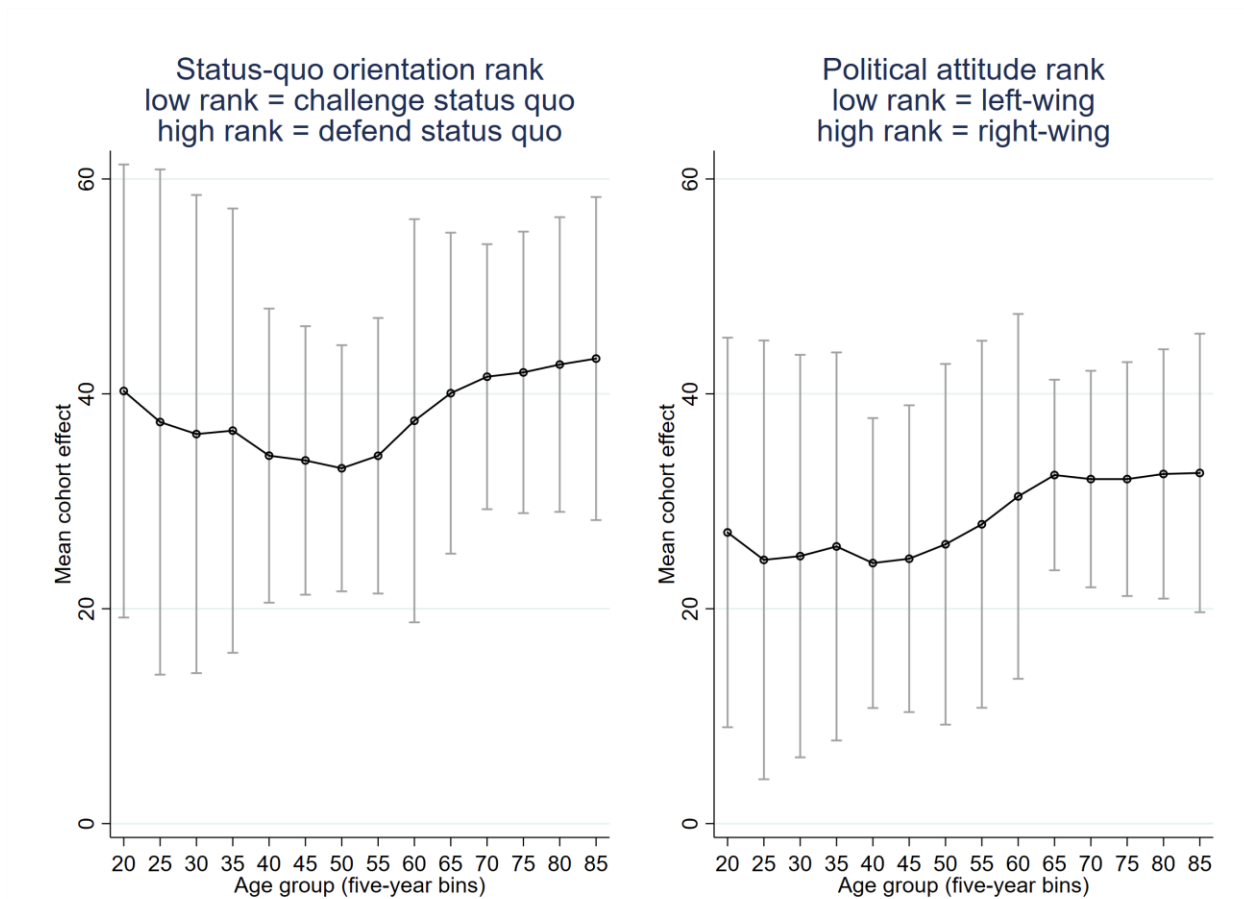


Fig. A25 Mean status-quo orientation and political attitude ranks by age group. The output is inferred from individual data from exit polls from 305 referenda from 1981 to 2017. Data are aggregated to the age-group-period level. Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ..., 2010-2014) cells. Status-quo orientation [political attitude] ranks are field ranks that increase in status-quo orientation [right-wing attitude]. The status-quo orientation [political attitude] is encoded as zero if the vote is in line with the status quo [the political right] and one if the vote is in line with a vote for change [the political left]. The status-quo orientation [political attitude] is adjusted in a first-stage regression of the status-quo orientation [political attitude] against a battery of first-stage controls and referendum-age-bin fixed effects in which the latter are used to generate the rank measures used here. Unconditional cohort effects are the mean orientation [attitude] ranks by cohort. Cohort effects are recovered from regressions of orientation [attitude] ranks against age and cohort effects. Mean cohort effects are the means within age groups, and the vertical error bars are the associated standard deviations.

13.5.4 Age effects on status-quo orientation and political attitude

The focus of our econometric analysis has been to distinguish between aging effects and cohort effects on attitude and orientation ranks because the APC effects on levels cannot be separately identified without further constraints.

In the table below, we complement the analysis by exploring the relationship between voters' status-quo orientation and political attitude and APC effects in levels. Unlike in the rank analysis, the unit of observation is an individual voting decision. We begin with cross-sectional models that exclude and include individual controls in the first two columns and add referendum effects in the third column.

The age effect decreases as the controls are being added. The models in the third column (3 and 9) are the parametric equivalents to Figure A5. Consistent with that figure, the probability of voting for a change in the legal status quo over a 60-year voting life declines by $0.0006 \times 60 = 0.036$ percentage points. Likewise, the probability of supporting left-wing policies declines by $0.001 \times 60 = 0.06$.

By controlling for referendum effects, we assume that differences in the mean vote across referenda are attributable to different NPVs of the proposed referenda and not to average increases in age. Alternatively, we can assume that the NPV of the proposed reforms does not follow a time trend and that there are no period effects. In this case, we can omit referendum effects, and, instead, control for arbitrary cohort effects, as in the fourth column. The aging effect increases significantly by a factor of 4 (political attitude) to 7 (status-quo orientation).

In the fifth column, we combine the control for referendum effects with a control for social generation effects (as defined in Figure A11), so that the aging effect is identified by aging within generations. This is our preferred model because it identifies the aging effect conditional on arbitrary period (referendum) effects and a large fraction of the time-invariant variation across birth cohorts. A regression of the cohort effects in the status-quo orientation ranks and the political attitude ranks displayed in Figure A11 against generation fixed effects yields an r^2 of 66% (status-quo orientation) and nearly 80% (political attitude). Accordingly, aging by one year reduces the probability of voting for change by 0.08 percentage points and the probability of voting for a left policy by 0.13 percentage points.

To compare these aging effects on orientation [attitude] levels to the effects implied by our rank models, we estimate the relationship between orientation [attitude] ranks and levels in the last column. The marginal effect on the orientation level implied by a rank model equals the product of the age effect on the rank (from Table 4, fourth column 4 in the main paper) and the rank effect on the level (last column in the table below). The result is that per year of aging, the probability of voting for change decreases by 0.03 while the probability of voting for a left-wing policy decreases by 0.13 percentage points.

Reassuringly, aging effects on levels from both approaches are within the same range although the implied level effects from the rank models are somewhat smaller, possibly due to the stronger control for correlated cohort effects. One insight from all models reported below is that our benchmark aging effects are conservative in the sense that we potentially overcontrol for the effect of aging on the average vote (as reflected by the large estimates reported in the fourth column).

Table A11 Age effects on status-quo orientation and political attitude

<i>Status-quo orientation</i>	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.0008*** (0.00007)	-0.0008*** (0.00010)	-0.0006*** (0.00016)	-0.0047*** (0.00023)	-0.0008*** (0.00026)	
Status-quo orientation rank						-0.0014*** (0.00033)
Marginal age effect on orientation	-	-	-	-	-	-.0003
r2	.000699	.0123	.176	.0154	.176	.169
<i>Political attitude</i>	(7)	(8)	(9)	(10)	(11)	(12)
Age	-0.0015*** (0.00007)	-0.0012*** (0.00010)	-0.0010*** (0.00015)	-0.0037*** (0.00024)	-0.0013*** (0.00024)	
Political attitude rank						-0.0018*** (0.00026)
Marginal age effect on attitude	-	-	-	-	-	-.0011
r2	.00255	.0155	.181	.0174	.181	.358
Controls	-	Yes	Yes	Yes	Yes	Yes
Referendum effects	-	-	Yes	-	Yes	-
Cohort effects	-	-	-	Yes	-	Yes
Generation effects	-	-	-	-	Yes	-
Ages	All	All	All	All	All	All
N	177,791	177,791	177,791	177,791	177,791	112

Notes: Unit of observation is individual voting decision throughout columns (1-4) and age bin-period in column (5). Cohort effects are defined for integer birth years. Generation effects are defined for traditionalists (birth years up to 1945), baby boomers (1946-1964), generation X (1965-76), and generation Y (from 1977 on). The marginal effect of aging on outcome in models (6) and (12) is the rank effect on orientation [attitude] multiplied by the aging effect on rank from Table 4, model (4) and model (10). Status-quo orientation [political attitude] rank is the rank in the distribution of mean (adjusted) status-quo orientation [political attitude] within five-year age group (20-24, 25-29, ...) x five-year period (1980-1984, 1985-1989, ...) cells. Status-quo orientation [political attitude] is 0 if pro status quo [right-wing] and 1 if pro change [left-wing]. Ranks increase from the largest pro change [left-wing] to the smallest pro status quo [right-wing] status-quo orientation [political attitude] value. In models (6) and (12), orientations are adjusted in first-stage regressions of orientation [attitude] against a battery of individual controls and cohort-referendum effects. Standard errors are generally clustered on referendum fixed effects where included and on cohort effects in models (4) and (10). * $p < 0.1$, ** $p < 0.5$, *** $p < 0.01$.

13.6 Impact of population aging on direct democracy outcomes

To gauge the quantitative relevance of population aging in a rapidly aging country such as Switzerland, it is useful to approximate the effect that population aging had on voters' political attitude over the course of our study period.

We begin by presenting the average voting outcome $\bar{V}_{a,t}$ of age group a in period t as a function of AGE_a and an arbitrary age group-period effect $b_{a,t}$:

$$\bar{V}_{a,t} = b_{a,t} + g(AGE_{a,t}) \quad (1)$$

The mean vote in the voting population is defined by:

$$\bar{V}_t = \sum_a n_{a,t} \bar{V}_{a,t}, \quad (2)$$

where $n_{a,t} = N_{a,t}/N_t$ and $N_{a,t}$ is the number of voters within age group a in period t and $N_t = \sum_a N_{a,t}$ is the number of voters in a period. In our thought experiment, we compare the average vote to a counterfactual average vote \hat{V}_t in a hypothetical scenario in which the population does not age.

$$\hat{V}_t = \sum_a \hat{n}_a \bar{V}_{a,t}, \quad (3)$$

where $\sum_a \hat{n}_a = \sum_a n_{a,t} = 1$ and \hat{n}_a are time-invariant shares of age groups within the total number of voters. The effect of a change in the age distribution on the average vote is then simply the difference between the counterfactual vote and the observed average vote.

$$\Delta V_t = \hat{V}_t - \bar{V}_t, \quad (4)$$

Substituting equations (2-4) into (4) yields:

$$\Delta V_t = \sum_a (\hat{n}_a - n_{a,t}) g(AGE_a) \quad (5)$$

In Section 2 in the main text, we discussed at length that $g(AGE_a)$ cannot be estimated without constraints. However, we estimated the causal effect of age on the orientation [attitude] rank, i.e., the rank a cohort occupies in the distribution of votes within a period. Since the orientation [attitude] rank is a function of the orientation [attitude] (the mean vote), we can describe the average relationship (across all periods) between the orientation [attitude] rank \bar{R}_a and age as $\bar{R}_a = R(\bar{V}_a(AGE_a)) = \bar{m}(AGE_a)$. Solving for $\bar{V}_a = R^{-1}(\bar{m}(AGE_{c,t}))$ and substituting into equations (3) and (4) and then into (5) yields

$$\Delta V_t = \sum_c (\hat{n}_a - n_{a,t}) R^{-1}(\bar{m}(AGE_a)) \quad (6)$$

Consistent with the analysis in Section 5 in the main text, we analyze the data at the level of five-year bins; i.e., periods are defined as $t = (1980-1984, 1985-1989, \dots, 2015-2017)$ and age groups are defined as $a = (20-24, 25-29, \dots, 85-89)$. To quantitatively assess the impact of population aging on status-quo orientation and political attitude, we hold the counterfactual age distribution constant at the levels of the first period, i.e., $\hat{n}_a = n_{c,t=1980-1984}$. As an approximation of $\bar{m}(AGE_a)$ we use the predicted values from the LWR estimates displayed in Figure 3 (all referenda) and Figure 4 (by policy area) in the main text. Further, we approximate $R^{-1}(\bar{m}(\cdot))$ in a local polynomial (degree = 0) regression of the adjusted orientation [attitude] (the mean vote controlling for individual covariates) against the orientation [attitude] rank measures used throughout Section 5 in the main text. Note that

in computing \hat{n}_a and n_a , we use the age distribution as recorded in the survey data (as opposed to the aging of the total population) because in this manner, we implicitly account for the potential effects of aging on voter turnout (Goerres, 2007).

The aging effects ΔV_t by period and policy areas are illustrated in Figure A26. As expected, given the evidence in Section 5 in the main text, the effect of population aging was to increase the share of votes for the legal status quo as well as right-wing policies. The effect on the latter is somewhat stronger than on the former. In relative terms, the effects are greatest on referenda in the generational policy area. This is the combined effect of attitudes in this group changing sharply once voters age beyond 50 and the most populous cohorts aging from below 50 to above 50 over the course of our study period. Compared with the other policy areas, the effects on referendum outcomes in the public finance policy area differs in that there is a positive effect on the share of pro-change votes.

Overall, the effects of population aging are quantitatively relevant. In relative terms, the support of left policies, on average, would have been 2.4% higher in 2017 (relative to the mean share) if the age distribution had remained constant at 1981 levels. Within the generational policy area, support for pro-young policies would have been 5.3% higher. To further assess the effect population aging had on direct democracy outcomes in Switzerland over the past four decades, we merge the effects displayed in the right panel of Figure A18 with the actual referendum outcomes by period and policy area. Computing the counterfactual outcome without aging, we identify five referenda for which the outcome would have been different (the left-wing instead of right-wing position option would have been chosen), all of which occurred since 2004. This is just 1.7% of the 305 referenda held since 1981 but 5.2% of the referenda held since 2004. Thus, the effects of population aging are limited and have not been decisive until recently. However, the effects will accumulate as population aging progresses unless the established age-attitude relationship changes. As discussed at the end of Section 5 in the main text, it is also worth recalling that the aging effects we used in the counterfactual analysis are likely conservative estimates.

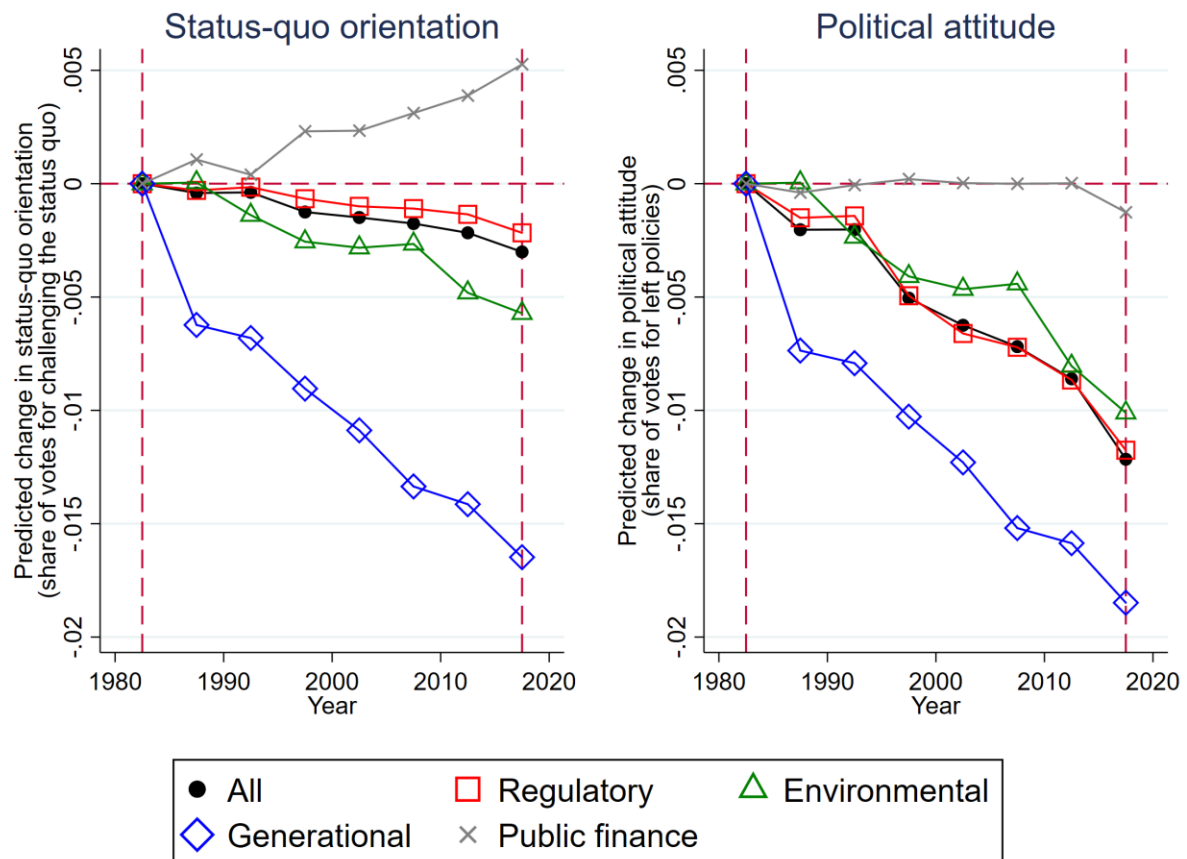


Fig. A26 Predicted effect of population aging on status-quo orientation and political attitude by policy area. We analyze the micro data at the level of five-year bins; i.e., periods are defined as $t = (1980-1984, 1985-1989, \dots, 2015-2017)$ and age groups are defined as $a = (20-24, 25-29, \dots, 85-89)$. The predicted orientation [attitude] is the difference in the mean predicted vote by age groups weighted by the shares of total voters between a scenario with the actual age distribution and a counterfactual scenario in which the age distribution is set to the 1980-84 level. Predicted votes are generated using the non-linear effect of age on the orientation [attitude] rank (see Figures 3 and 4 in the main text), and a non-linear mapping of orientation [attitude] ranks to orientations [attitudes] obtained using pooled local polynomial (degree = 0) regressions. Age group shares are from the representative VoxIt surveys.

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The generation gap in direct democracy: Age vs. cohort effects Appendix II

1 Introduction

This appendix complements the main paper by providing a concise list of the Swiss referenda considered in this study in Table 1. Between June 14, 1981 and May 21, 2017, 312 public referenda took place at the federal level in Switzerland. We include all 305 referenda in our analysis for which there exist survey data. These referenda fall into 12 officially defined contextual *categories* (*Ebene-1 Deskriptoren*). Within each category, we define subcategories of contextually homogenous referenda, which we refer to as *themes*. In total, we define 24 themes, which we then aggregate to four *policy areas*. The regulatory policy area comprises referenda on questions that concern the constitutional order, foreign affairs and security policy and relate to voters' beliefs and values in such a manner that a voter decision can be described as either conservative or liberal. The environmental policy area comprises referenda in which voters' decisions have direct consequences for the protection of the environment, e.g., by affecting carbon emissions or protecting natural habitats. In the generational policy area, we include referenda on policies that are specifically targeted at certain age groups, e.g., allowances for families (with dependent children) or labor market regulations (e.g., regarding maximum working hours) that affect those who are not yet retired. Finally, the public finance policy area includes referenda in which voters have the choice between options that have distributional consequences that can be described as either progressive (e.g., relatively more important income tax) or regressive (e.g., relatively more important tolls and user fees). In the interest of a transparent empirical analysis, we define policy areas to render them mutually exclusive.

Table 1 Referenda included in the analysis

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
1	151	1981	Equal rights for men and women	01A	Yes	Challenge	Left-wing	Regulatory
2	152	1981	Consumer protection	04B	Yes	Challenge	Left-wing	Regulatory
3	161	1981	Continuation of the financial order	06A	Yes	Defend	Right-wing	Public finance
4	181	1982	Consumer protection	04B	Yes	Challenge	Left-wing	Regulatory
5	182	1982	Consumer protection	04B	Yes	Challenge	Left-wing	Regulatory
6	191	1983	Regulation of fuel tax	08B	Yes	Challenge	Right-wing	Public finance
7	192	1983	Federal energy act	07A	Yes	Challenge	Left-wing ^a	Environmental
8	211	1984	Imposition of a heavy vehicle charge	08A	Yes	Challenge	Left-wing	Environmental
9	212	1984	Charges for use of national roads	08B	Yes	Challenge	Right-wing	Public finance
10	213	1984	Introduction of a civilian service	03A	Yes	Challenge	Right-wing	Regulatory
11	221	1984	Against the misuse of banking secrecy	06A	Yes	Challenge	Left-wing	Public finance
12	222	1984	Against the sell-off of the home land	09B	Yes	Challenge	Left-wing	Regulatory
13	232	1984	Moratorium on nuclear power plants	07A	Yes	Challenge	Left-wing	Environmental
14	231	1984	Energy supply	07A	Yes	Challenge	Left-wing	Environmental
15	241	1984	Protection of motherhood	10F	Yes	Challenge	Left-wing	Generational
16	242	1984	Radio and television article	12A	Yes	Challenge	Left-wing ^a	Public finance
17	243	1984	Compensation to victims of violent crime	01A*	Yes	Challenge	Left-wing ^a	Regulatory
18	252	1985	Repeal contributions for primary schools	11A	Yes	Challenge	Left-wing ^a	Public finance
19	253	1985	Abolition of federal contributions to health care	06B	Yes	Challenge	Right-wing	Public finance
20	254	1985	Federal education contributions	11A	Yes	Challenge	Right-wing	Public finance
21	251	1985	Extension of paid holidays	04A	Yes	Challenge	Left-wing	Generational
22	261	1985	Abortions and the right to live	10A	Yes	Challenge	Right-wing	Regulatory
23	262	1985	Canton's share of the net yield of stamp taxes	06B	Yes	Defend	Right-wing	Public finance
24	263	1985	Redistribution of net income from spirits	06B	Yes	Defend	Right-wing ^a	Public finance
25	264	1985	Subsidies for self-sufficiency in grain	05A	Yes	Challenge	Left-wing ^a	Regulatory
26	271	1985	Coordination of school year period	11A	Yes	Challenge	Left-wing ^a	Public finance
27	272	1985	Innovation risk guarantee for companies	04A	Yes	Challenge	Left-wing	Generational

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
28	273	1985	Changes to the Swiss Civil Code	01A	Yes	Challenge	Left-wing	Regulatory
29	281	1985	Abolition of vivisection	11B	Yes	Challenge	Right-wing	Regulatory
30	291	1986	Accession to the United Nations	02A	Yes	Challenge	Left-wing	Regulatory
31	301	1986	'Culture initiative'	12A	Yes	Challenge	Left-wing	Public finance
32	302	1986	Alternative draft 'Culture initiative'	12A	Yes	Challenge	Left-wing	Public finance
33	303	1986	Support of education and retraining	11A	Yes	Challenge	Left-wing	Public finance
34	304	1986	Domestic sugar industry	05A	Yes	Challenge	Right-wing ^a	Regulatory
35	321	1987	Asylum Act	10G	Yes	Challenge	Right-wing	Regulatory
36	322	1987	Residence and establishment of foreigners	10G	Yes	Challenge	Right-wing	Regulatory
37	323	1987	People's rights in military expenses	03A	Yes	Challenge	Left-wing	Regulatory
38	324	1987	Counter-proposals and public votes	01B	Yes	Challenge	Left-wing	Regulatory
39	341	1987	'Concept Train 2000'	08A	Yes	Challenge	Left-wing	Environmental
40	342	1987	Health insurance	10F	Yes	Challenge	Left-wing	Generational
41	343	1987	Protect the moors - Rothenthurm initiative	09A	Yes	Challenge	Left-wing	Environmental
42	351	1988	Coordinated transport policy	08A	Yes	Challenge	Left-wing ^a	Environmental
43	352	1988	Decrease in retirement age	10D	Yes	Challenge	Left-wing	Generational
44	361	1988	Against land speculation	09B	Yes	Challenge	Left-wing	Regulatory
45	362	1988	Shorter working hours	04A	Yes	Challenge	Left-wing	Generational
46	363	1988	Limiting immigration	10G	Yes	Challenge	Right-wing	Regulatory
47	371	1989	Factory farming and ecological agriculture	09A	Yes	Challenge	Left-wing	Environmental
48	382	1989	Defense policy	03A	Yes	Challenge	Left-wing	Regulatory
49	381	1989	Reducing speed limit	08A	Yes	Challenge	Left-wing	Environmental
50	391	1990	Limiting road construction	08A	Yes	Challenge	Left-wing	Environmental
51	392	1990	Limiting road construction	08A	Yes	Challenge	Left-wing	Environmental
52	393	1990	Limiting road construction	08A	Yes	Challenge	Left-wing	Environmental
53	394	1990	Limiting road construction	08A	Yes	Challenge	Left-wing	Environmental
54	395	1990	Viticulture	05A	Yes	Challenge	Left-wing ^a	Regulatory
55	396	1990	Federal Legal Administration	01A	Yes	Challenge	Left-wing ^a	Regulatory
56	401	1990	Exit nuclear energy	07A	Yes	Challenge	Left-wing	Environmental

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
57	402	1990	Moratorium on nuclear power plants	07A	Yes	Challenge	Left-wing	Environmental
58	403	1990	Energy Article	07A	Yes	Challenge	Left-wing	Environmental
59	404	1990	Road traffic	08A	Yes	Challenge	Right-wing	Environmental
60	411	1991	Reducing voting age	01B	Yes	Challenge	Left-wing	Regulatory
61	412	1991	Support public transport	08A	Yes	Challenge	Left-wing ^a	Environmental
62	421	1991	Reorganization of federal finances	06A	Yes	Challenge	Right-wing ^a	Public finance
63	422	1991	Military Penal Code	03A	Yes	Challenge	Left-wing	Regulatory
64	431	1992	Support affordable health insurance	10B	Yes	Challenge	Right-wing	Public finance
65	432	1992	Against animal experiments	11B	Yes	Challenge	Left-wing	Regulatory
66	441	1992	Access to Bretton Woods	02A	Yes	Challenge	Left-wing	Regulatory
67	442	1992	Water Protection Act	09A	Yes	Challenge	Left-wing	Environmental
68	443	1992	Water protection	09A	Yes	Challenge	Left-wing	Environmental
69	444	1992	Reproductive and genetic engineering	11B	Yes	Challenge	Left-wing	Regulatory
70	445	1992	Introduction of a civilian service	03A	Yes	Challenge	Left-wing	Regulatory
71	446	1992	Swiss Penal Code and Military Penal Code	01A	Yes	Challenge	Right-wing ^a	Regulatory
72	461	1992	Swiss railway ('Alpentransit')	08A	Yes	Challenge	Left-wing	Environmental
73	462	1992	Commercial Traffic Act	01A	Yes	Challenge	Left-wing ^a	Regulatory
74	463	1992	Compensation Act	01A	Yes	Challenge	Left-wing ^a	Regulatory
75	464	1992	Infrastructure Act	01A	Yes	Challenge	Left-wing ^a	Regulatory
76	465	1992	Swiss federal stamp tax	06A	Yes	Challenge	Right-wing	Public finance
77	466	1992	Farming land rights	05A	Yes	Challenge	Left-wing ^a	Regulatory
78	471	1992	European Economic Area	02A	Yes	Challenge	Left-wing	Regulatory
79	481	1993	Increase in fuel tax	08B	Yes	Challenge	Right-wing	Public finance
80	482	1993	Abolition of the ban on casinos	10C*	Yes	Challenge	Left-wing ^a	Public finance
81	483	1993	Against animal experiments	11B	Yes	Challenge	Left-wing	Regulatory
82	491	1993	Environmental protection in the military	03A	Yes	Challenge	Left-wing	Regulatory
83	492	1993	Military expenses on aircraft	03A	Yes	Challenge	Left-wing	Regulatory
84	501	1993	Law on fire arms	01A	Yes	Challenge	Right-wing	Regulatory
85	502	1993	Reallocation of administrative districts	01B	Yes	Challenge	Left-wing ^a	Regulatory

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
86	503	1993	Introduction of a new public holiday	04A	Yes	Challenge	Left-wing	Generational
87	504	1993	Health Insurance	10B	Yes	Challenge	Right-wing	Public finance
88	505	1993	Unemployment insurance	10E	Yes	Challenge	Left-wing	Generational
89	511	1993	Financial order	06A	Yes	Challenge	Right-wing ^a	Public finance
90	512	1993	Recovery of federal finances	06A	Yes	Challenge	Right-wing	Public finance
91	513	1993	Support social insurance	10C	Yes	Challenge	Left-wing	Public finance
92	514	1993	Special excise taxes	06A	Yes	Challenge	Right-wing	Public finance
93	515	1993	Reducing alcohol problems	10A	Yes	Challenge	Right-wing	Regulatory
94	516	1993	Reducing tobacco problems	10A	Yes	Challenge	Right-wing	Regulatory
95	521	1994	Continuation of the national road tax	08B	Yes	Defend	Right-wing	Public finance
96	522	1994	Continuation of the heavy vehicle charge	08A	Yes	Defend	Left-wing	Environmental
97	523	1994	Special heavy vehicle charge	08A	Yes	Challenge	Left-wing	Environmental
98	524	1994	Protection of Alpine area	08A	Yes	Challenge	Left-wing	Environmental
99	525	1994	Aviation Act	08A	Yes	Challenge	Right-wing ^a	Environmental
100	532	1994	Cultural promotion article	12A	Yes	Challenge	Left-wing ^a	Public finance
101	533	1994	Revision of civil rights regulation	10G	Yes	Challenge	Left-wing	Regulatory
102	531	1994	Peacekeeping Operations (BTFO)	02A	Yes	Challenge	Left-wing	Regulatory
103	541	1994	Abolition of domestic grain subsidies	05A	Yes	Challenge	Left-wing	Regulatory
104	542	1994	Antiracism and criminal code	10G	Yes	Challenge	Left-wing	Regulatory
105	551	1994	Revision of health insurance	10B	Yes	Challenge	Right-wing	Public finance
106	552	1994	For sound health insurance	10B	Yes	Challenge	Left-wing	Public finance
107	553	1994	Compulsory measures in the Aliens Act	10G	Yes	Challenge	Left-wing	Regulatory
108	561	1995	For environmentally sound agriculture	09A	Yes	Challenge	Left-wing	Environmental
109	562	1995	Dairy Decision 1988 (MWB)	05A	Yes	Challenge	Left-wing ^a	Regulatory
110	563	1995	Agriculture Act	05A	Yes	Challenge	Right-wing ^a	Regulatory
111	564	1995	Federal expenditure caps	06B	Yes	Challenge	Right-wing	Public finance
112	571	1995	Age insurance	10C	Yes	Challenge	Left-wing	Public finance
113	572	1995	Support age and disability insurance	10C	Yes	Challenge	Left-wing	Public finance
114	573	1995	Acquisition of land by persons abroad	09B	Yes	Challenge	Right-wing	Regulatory

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
115	581	1996	Revision language article	12A	Yes	Challenge	Left-wing ^a	Public finance
116	582	1996	Reallocation of administrative districts	01B	Yes	Challenge	Left-wing ^a	Regulatory
117	583	1996	Cantonal military expenses	06B	Yes	Challenge	Right-wing ^a	Public finance
118	584	1996	Issues in federal expenses and subsidies	05A	Yes	Challenge	Left-wing ^a	Regulatory
119	585	1996	Issues in federal expenses and subsidies	08A	Yes	Challenge	Left-wing	Environmental
120	591	1996	Environmentally sound agriculture	05A	Yes	Challenge	Right-wing	Regulatory
121	592	1996	Administration Organization Act (RVGO)	06A	Yes	Challenge	Right-wing ^a	Public finance
122	601	1996	Against illegal immigration	10G	Yes	Challenge	Right-wing	Regulatory
123	602	1996	Working conditions in industry	04A	Yes	Challenge	Right-wing	Generational
124	611	1997	People's rights in EU accession negotiations	01B	Yes	Challenge	Left-wing	Regulatory
125	612	1997	Prohibition of military exports	03A	Yes	Challenge	Left-wing	Regulatory
126	613	1997	Gun powder production and distribution	03A	Yes	Challenge	Left-wing ^a	Regulatory
127	622	1997	Financing unemployment insurance	10E	Yes	Challenge	Right-wing	Generational
128	621	1997	'Youth Without Drugs'	10A	Yes	Challenge	Right-wing	Regulatory
129	632	1998	Federal expenses and budget balancing	06B	Yes	Challenge	Right-wing	Public finance
130	631	1998	Reproductive and genetic engineering	11B	Yes	Challenge	Left-wing	Regulatory
131	633	1998	State surveillance and political persecution	03A	Yes	Challenge	Left-wing	Regulatory
132	641	1998	Special heavy vehicle charge	08A	Yes	Challenge	Left-wing	Environmental
133	642	1998	Food prices and ecological farming	05A	Yes	Challenge	Right-wing	Regulatory
134	643	1998	Revision age insurance	10D	Yes	Challenge	Left-wing	Generational
135	651	1998	Support public transport	08A	Yes	Challenge	Left-wing	Environmental
136	652	1998	Temporary new grain article	05A	Yes	Challenge	Left-wing ^a	Regulatory
137	653	1998	Reasonable drug policy	10A	Yes	Challenge	Left-wing	Regulatory
138	654	1998	Working conditions in industry	04A	Yes	Challenge	Right-wing	Generational
139	661	1999	Requirements for eligibility in the Bundesrat	01A	Yes	Challenge	Left-wing	Regulatory
140	664	1999	Transplantation medicine	10A	Yes	Challenge	Right-wing	Regulatory
141	662	1999	Residential property	09B	Yes	Challenge	Left-wing	Regulatory
142	663	1999	Spatial planning	09B	Yes	Challenge	Right-wing	Regulatory
143	671	1999	New federal constitution	01A	Yes	Challenge	Left-wing ^a	Regulatory

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
144	681	1999	Asylum Act	10G	Yes	Challenge	Right-wing	Regulatory
145	682	1999	Asylum policy and Aliens Act	10G	Yes	Challenge	Right-wing	Regulatory
146	683	1999	Medical prescription of heroin	10A	Yes	Defend	Left-wing	Regulatory
147	684	1999	Disability insurance	10B	Yes	Challenge	Right-wing	Public finance
148	685	1999	Mother insurance	10F	Yes	Challenge	Left-wing	Generational
149	691	2000	Judicial reform	01A	Yes	Challenge	Left-wing ^a	Regulatory
150	692	2000	Acceleration of direct democracy	01B	Yes	Challenge	Left-wing	Regulatory
151	693	2000	Contingent of women in federal authorities	01A	Yes	Challenge	Right-wing	Regulatory
152	694	2000	Reproductive technology	10A	Yes	Challenge	Right-wing	Regulatory
153	695	2000	Limiting road traffic	09A	Yes	Challenge	Left-wing	Environmental
154	701	2000	Sectoral agreements with the EU	02A	Yes	Challenge	Left-wing	Regulatory
155	712	2000	Support solar energy	07A	Yes	Challenge	Left-wing	Environmental
156	712	2000	Support renewable energy	07A	Yes	Challenge	Left-wing	Environmental
157	713	2000	Pigouvian tax on energy	07A	Yes	Challenge	Left-wing	Environmental
158	714	2000	Regulation of immigration	10G	Yes	Challenge	Right-wing	Regulatory
159	715	2000	Referendums and counter-proposals	01B	Yes	Challenge	Left-wing	Regulatory
160	721	2000	Against increasing retirement age	10D	Yes	Challenge	Left-wing	Generational
161	722	2000	Flexible age insurance with 62	10D	Yes	Challenge	Left-wing	Generational
162	723	2000	Military expenses and defense policy	03A	Yes	Challenge	Left-wing	Regulatory
163	724	2000	Lower hospital costs	10B	Yes	Challenge	Right-wing	Public finance
164	725	2000	Federal personnel law	01A	Yes	Challenge	Left-wing ^a	Regulatory
165	731	2001	Accession to the EU	02A	Yes	Challenge	Left-wing	Regulatory
166	732	2001	Lower medicine prices	10B	Yes	Challenge	Left-wing	Public finance
167	733	2001	Reducing speed limit	10F*	Yes	Challenge	Left-wing	Generational
168	741	2001	Military Administration (armament)	03A	Yes	Challenge	Right-wing	Regulatory
169	742	2001	Military Administration (education)	03A	Yes	Challenge	Right-wing ^a	Regulatory
170	743	2001	Construction of dioceses	12A	Yes	Challenge	Left-wing ^a	Public finance
171	751	2001	Federal expenses and debt caps	06B	Yes	Challenge	Right-wing	Public finance
172	752	2001	Secure age insurance by taxing energy	10C	Yes	Challenge	Right-wing	Public finance

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
173	753	2001	Defense policy	03A	Yes	Challenge	Left-wing	Regulatory
174	754	2001	Alternative civilian service	03A	Yes	Challenge	Left-wing	Regulatory
175	755	2001	Capital gains tax	06A	Yes	Challenge	Left-wing	Public finance
176	761	2002	Accession to the UN	02A	Yes	Challenge	Left-wing	Regulatory
177	762	2002	Shorter working hours	04A	Yes	Challenge	Left-wing	Generational
178	771	2002	Abortion law	10A	Yes	Challenge	Left-wing	Regulatory
179	772	2002	Protection of motherhood	10F	Yes	Challenge	Left-wing	Generational
180	782	2002	Excessive gold reserves for age insurance	10C	Yes	Challenge	Left-wing	Public finance
181	783	2002	Electricity Market Act	04B	Yes	Challenge	Right-wing	Regulatory
182	791	2002	Against asylum abuse	10G	Yes	Challenge	Right-wing	Regulatory
183	792	2002	Unemployment insurance	10E	Yes	Defend	Left-wing	Generational
184	801	2003	Changes to the people's rights	01B	Yes	Challenge	Left-wing ^a	Regulatory
185	802	2003	Cantonal contribution to hospital costs	10B	Yes	Challenge	Right-wing ^a	Public finance
186	811	2003	Military administration	03A	Yes	Challenge	Left-wing	Regulatory
187	812	2003	Civil protection	03A	Yes	Challenge	Left-wing	Regulatory
188	821	2003	Social tenancy law	09B	Yes	Challenge	Right-wing	Regulatory
189	813	2003	Limiting road traffic	08A	Yes	Challenge	Left-wing	Environmental
190	814	2003	Support health insurance	10B	Yes	Challenge	Left-wing	Public finance
191	815	2003	Equality of treatment for the disabled	10B	Yes	Challenge	Left-wing	Public finance
192	822	2003	Exit nuclear energy	07A	Yes	Challenge	Left-wing	Environmental
193	823	2003	Moratorium on nuclear power plants	07A	Yes	Defend	Left-wing	Environmental
194	824	2003	For sufficient vocational training	11A	Yes	Challenge	Left-wing	Public finance
195	831	2004	Safe and efficient motorways	08A	Yes	Challenge	Right-wing	Environmental
196	832	2004	Code of Obligations (tenancy)	04B*	Yes	Challenge	Right-wing	Regulatory
197	833	2004	Confinement of nontreatable pedophiles	01A	Yes	Challenge	Right-wing ^a	Regulatory
198	841	2004	Revision age insurance	10C	Yes	Challenge	Right-wing	Public finance
199	842	2004	Increasing VAT for age insurance	10C	Yes	Challenge	Left-wing	Public finance
200	843	2004	Issues in private taxation	10F	Yes	Challenge	Left-wing	Generational
201	851	2004	Naturalization of young foreigners	10G	Yes	Challenge	Left-wing	Regulatory

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202	852	2004	Citizenship of third generation foreigners	10G	Yes	Challenge	Left-wing	Regulatory
203	853	2004	Postal service	04B*	Yes	Challenge	Left-wing ^a	Regulatory
204	854	2004	Income Substitution Act (EOG)	10F	Yes	Challenge	Left-wing	Generational
205	861	2004	Federal and cantonal revenue equalization	06B	Yes	Challenge	Right-wing ^a	Public finance
206	862	2004	New federal order	06B	Yes	Defend	Right-wing ^a	Public finance
207	863	2004	Research on embryonic stem cells	11B	Yes	Challenge	Right-wing	Regulatory
208	871	2005	Schengen and Dublin agreements	02A	Yes	Challenge	Left-wing	Regulatory
209	872	2005	Partnership Act	01A	Yes	Challenge	Left-wing	Regulatory
210	881	2005	Free movement of persons	02A	Yes	Challenge	Left-wing	Regulatory
211	891	2005	Genetic engineering and agriculture	05A	Yes	Challenge	Left-wing	Regulatory
212	892	2005	Working time regulations	04A	Yes	Challenge	Right-wing	Generational
213	901	2006	Constitutional provisions on education	11A	Yes	Challenge	Left-wing	Public finance
214	911	2006	Central bank profits for age insurance	10C	Yes	Challenge	Left-wing	Public finance
215	912	2006	Aliens Act	10G	Yes	Challenge	Right-wing	Regulatory
216	913	2006	Changes to the law on foreign nationals	10G	Yes	Challenge	Right-wing	Regulatory
217	921	2006	Cooperation with Eastern Europe states	02A	Yes	Defend	Left-wing	Regulatory
218	922	2006	Support family income	10F	Yes	Challenge	Left-wing	Generational
219	931	2007	Social health insurance fund	10B	Yes	Challenge	Left-wing	Public finance
220	941	2007	Revision Disability insurance	10B	Yes	Challenge	Right-wing	Public finance
221	951	2008	Against jet fighter noise in tourism areas	03A	Yes	Challenge	Left-wing	Regulatory
222	952	2008	Corporate Tax Reform Act	06A	Yes	Challenge	Right-wing	Public finance
223	961	2008	Democratic naturalizations	10G	Yes	Challenge	Right-wing	Regulatory
224	962	2008	Distributed information on public votes	01B	Yes	Challenge	Right-wing ^a	Regulatory
225	963	2008	Quality and efficiency of health insurance	10A	Yes	Challenge	Left-wing	Regulatory
226	973	2008	Stricter laws on sexual offenses	01A	Yes	Challenge	Right-wing ^a	Regulatory
227	971	2008	Flexible age insurance	10D	Yes	Challenge	Left-wing	Generational
228	972	2008	Associations' right of appeal	09B	Yes	Challenge	Left-wing	Regulatory
229	974	2008	Cannabis policy and youth protection	10A	Yes	Challenge	Left-wing	Regulatory
230	975	2008	Narcotics and psychotropic substances	10A	Yes	Challenge	Right-wing	Regulatory

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
231	981	2009	Free movement of persons	02A	Yes	Defend	Left-wing	Regulatory
232	991	2009	Support complimentary medicine	10B	Yes	Challenge	Left-wing	Public finance
233	992	2009	Exchange of passport information	02A	Yes	Challenge	Left-wing ^a	Regulatory
234	1001	2009	Disability insurance	06A	Yes	Challenge	Right-wing	Public finance
235	1002	2009	General popular initiatives	01B	Yes	Challenge	Right-wing ^a	Regulatory
236	1011	2009	Financing aviation tasks	08A	Yes	Challenge	Right-wing ^a	Environmental
237	1012	2009	Prohibition of military exports	03A	Yes	Challenge	Left-wing	Regulatory
238	1013	2009	Against the construction of minarets	10G*	Yes	Challenge	Right-wing	Regulatory
239	1021	2010	Regulations on human research	11B	Yes	Challenge	Right-wing	Regulatory
240	1022	2010	Legal protection of animals	09A	Yes	Challenge	Left-wing	Environmental
241	1023	2010	Age insurance	10B	Yes	Challenge	Right-wing	Public finance
242	1031	2010	Unemployment insurance	10E	Yes	Challenge	Right-wing	Generational
243	1042	2010	Expulsion of criminal foreigners	10G	Yes	Challenge	Right-wing	Regulatory
244	1042	2010	Expulsion of criminal foreigners	10G	Yes	Challenge	Right-wing	Regulatory
245	1043	2010	Support tax fairness	06A	Yes	Challenge	Left-wing	Public finance
246	1051	2011	Protection against armed violence	01A*	Yes	Challenge	Right-wing	Regulatory
247	1061	2012	Limiting construction of second homes	09B	Yes	Challenge	Right-wing	Regulatory
248	1062	2012	Tax-privileged home purchase savings	09B	Yes	Challenge	Left-wing	Regulatory
249	1063	2012	Support more leave days paid	04A	Yes	Challenge	Left-wing	Generational
250	1064	2012	Regulation of money games	06A	Yes	Challenge	Left-wing	Public finance
251	1065	2012	Book price fixing	12A	Yes	Challenge	Right-wing	Public finance
252	1071	2012	Home purchase savings	09B	Yes	Challenge	Left-wing	Regulatory
253	1072	2012	People's rights in foreign policy	01B	Yes	Challenge	Left-wing	Regulatory
254	1073	2012	Health Insurance (Managed Care)	10B	Yes	Challenge	Right-wing	Public finance
255	1083	2012	Support youth music promotion	12A*	Yes	Challenge	Left-wing	Public finance
256	1082	2012	'Support old age living/residency'	10C	Yes	Challenge	Left-wing	Public finance
257	1081	2012	Protection against passive smoking	09A	Yes	Challenge	Left-wing ^a	Environmental
258	1091	2012	Animal Disease Act	05A	Yes	Challenge	Right-wing ^a	Regulatory
259	1101	2013	Family policy	10F	Yes	Challenge	Left-wing	Generational

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
260	1102	2013	Consumer protection	04B	Yes	Challenge	Left-wing	Regulatory
261	1103	2013	Spatial Planning Act	09B	Yes	Challenge	Right-wing ^a	Regulatory
262	1111	2013	People's election of the Federal Council	01B	Yes	Challenge	Left-wing	Regulatory
263	1112	2013	Urgent changes to the Asylum Act	10G	Yes	Challenge	Right-wing	Regulatory
264	1121	2013	Abolition of the military service	03A	Yes	Challenge	Left-wing	Regulatory
265	1122	2013	Epidemics Act	10A	Yes	Challenge	Right-wing ^a	Regulatory
266	1123	2013	Labor law	04A	Yes	Challenge	Right-wing	Generational
267	1131	2013	Fair wages	04B	Yes	Challenge	Left-wing	Regulatory
268	1132	2013	Family policy: Tax reduction	10F	Yes	Challenge	Left-wing	Generational
269	1133	2013	National Road Expense Article	08B	Yes	Challenge	Right-wing	Public finance
270	1141	2014	Support railway infrastructure	08A	Yes	Challenge	Left-wing	Environmental
271	1142	2014	Excluding abortion cost from basic insurance	10B	Yes	Challenge	Right-wing	Public finance
272	1143	2014	Against mass immigration	10G	Yes	Challenge	Left-wing	Regulatory
273	1151	2014	Issues in basic Health Insurance	10B	Yes	Challenge	Left-wing	Public finance
274	1152	2014	Against pedophiles working with children	01A	Yes	Challenge	Right-wing ^a	Regulatory
275	1153	2014	Rise in minimum wage	04A	Yes	Challenge	Left-wing	Generational
276	1154	2014	Fund for the procurement of jet fighters	03A	Yes	Challenge	Right-wing	Regulatory
277	1161	2014	Taxes in hospitality industry	06B	Yes	Challenge	Left-wing	Public finance
278	1162	2014	Public health insurance	10B	Yes	Challenge	Left-wing	Public finance
279	1171	2014	Abolition of flat-rate taxation	06A	Yes	Challenge	Left-wing	Public finance
280	1172	2014	Against overpopulation	10G	Yes	Challenge	Right-wing	Regulatory
281	1173	2014	National Bank's gold storage in Switzerland	06B*	Yes	Challenge	Left-wing	Public finance
282	1181	2015	Tax free child benefit and training bonus	10F	Yes	Challenge	Left-wing	Generational
283	1182	2015	Higher energy taxes instead of VAT increases	07A	Yes	Challenge	Left-wing	Environmental
284	1191	2015	Reproductive and genetic engineering	11B	Yes	Challenge	Right-wing	Regulatory
285	1192	2015	Support scholarships	11A	Yes	Challenge	Left-wing	Public finance
286	1193	2015	Increasing inheritance tax for age insurance	10C	Yes	Challenge	Left-wing	Public finance
287	1194	2015	Changes to the Radio and Television Article	06A*	Yes	Challenge	Right-wing ^a	Public finance
288	1201	2016	Family and marriage policy	10F	Yes	Challenge	Left-wing	Generational

#	VOXIT/ VOTO id	Year	Subject	Theme	Vote	Status-quo orientation	Political attitude	Policy area
289	1202	2016	Expulsion of criminal foreigners	10G	Yes	Challenge	Right-wing	Regulatory
290	1203	2016	Against financial speculation on food prices	04B	Yes	Challenge	Left-wing	Regulatory
291	1204	2016	Reconstruction of the Gotthard road tunnel	08A	Yes	Challenge	Right-wing	Environmental
292	1211	2016	Public services	06A*	Yes	Challenge	Left-wing	Public finance
293	1212	2016	Unconditional basis income	10E	Yes	Challenge	Left-wing	Generational
294	1213	2016	'Fair funding of transport'	08A	Yes	Challenge	Right-wing	Environmental
295	1214	2016	Reproductive Medicine Act	10A	Yes	Challenge	Left-wing	Regulatory
296	1215	2016	Changes to the Asylum Act	10G	Yes	Challenge	Left-wing	Regulatory
297	100001	2016	Support 'green economy'	09A	Yes	Challenge	Left-wing	Environmental
298	100002	2016	Support age insurance	10C	Yes	Challenge	Left-wing	Public finance
299	100003	2016	Revision intelligence service	03A	Yes	Challenge	Right-wing	Regulatory
300	100004	2016	Exit nuclear energy	07A	Yes	Challenge	Left-wing	Environmental
301	100005	2017	Support immigration	10G*	Yes	Challenge	Left-wing	Regulatory
302	100006	2017	Fund for national roads and urban traffic	08A	Yes	Challenge	Right-wing	Environmental
303	100007	2017	Corporate Tax Reform Act	06A	Yes	Challenge	Right-wing	Public finance
304	100008	2017	Federal Energy Act	07A	Yes	Challenge	Left-wing	Environmental

Notes: To save space, we only list the mapping of a yes vote to the status-quo orientation and the political attitude. A no vote mechanically maps to the opposite orientation (e.g., defend status-quo if yes vote implies challenging the status quo and right-wing if a yes vote implies a left-wing political attitude). Themes are defined in Table 1 in the main paper. After consulting with Swissvotes (the consortium providing Swiss referendum data), we assign 12 referenda to themes that do not match the primary official category defined by the Swiss Statistical Office (SFSO) where indicated by *. This was to ensure the best contextual fit and a mutually exclusive definition of themes and policy areas. Furthermore, with reference to the robustness checks in Section 12.3.1 of Appendix I, we indicate 54 referenda where we view the mapping from a yes vote to political attitudes as potentially controversial by ^a.