Milestones in the History of the Swiss Pension System: 
A Politico-Economic Analysis

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1. INTRODUCTION

The public choice theory of pay-as-you-go public pension systems, pioneered by AARON (1966) and BROWNING (1975), predicts a very high level of both pension benefits and taxes. The reason is that the middle-aged median voter (aged approximately 45) faces a relatively short span in which she has to pay social security contributions, but has the full retirement span ahead of her. For a middle-aged voter, the present value of future benefits exceeds the present value of remaining contributions by far, even if the system is financed by distortionary taxes, or offers an internal rate of return much smaller than the real interest rate. The empirical puzzle is, why existing programs are not larger.

More realistic multi-period simulation models, as in CONESA and KRUEGER (1999) and BÜTLER (1999) for example, introduce additional features of pay-as-you-go systems, such as insurance aspects and induced labour supply distortions, but still fail to explain the observed stability of pension systems, and even less the willingness of the population to downsize the program. Theoretical models of course neglect a number of important determinants of the size of social security programs, in particular altruistic feelings towards descendants, ideologies, and potential interactions with other government expenditures.

Votes in a direct democracy offer a unique opportunity to test the predictions of theoretical models, and to reveal additional determinants of voting outcomes. While such an exercise is interesting on its own account, a good comprehension of past voting behaviour may also lead to improvements in policy design. An economically desirable reform is of little use, if it will not find a majority of votes in a referendum.

This paper is a first attempt to complement the public choice literature on public pension systems by providing some evidence on the two most important votes of social security changes in Switzerland: The first is the foundation of the pay-as-you-go system AHV/AVS in 1948 (vote in 1947), the second the major structural reform – the so-called 10th reform – in 1995. Although the Swiss public pension system had undergone a num-

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ber of revisions prior to the 10th revision, its structure stayed remarkably stable.¹ Both
the introduction of the system and its 10th revision involved substantial changes to the
structure of social security in Switzerland. In both cases, some winners and losers can
easily be identified, which in turn should facilitate an interpretation of the empirical find­
ings.

The paper’s main finding is that voting outcomes can be relatively well explained by
a combination of demographic factors, such as age and family structure, and socio­eco­
nomic variables, such as language and religion. While the former is hardly surprising
given the theoretical predictions, the latter is harder to interpret, but potentially more in­
teresting. A striking feature of all estimations is the importance of language, especially
as there has been an apparent shift in either preferences or economic conditions in the
last 50 years. Regions with a French speaking majority were more sceptical to the intro­
duction of a public pension system in 1947, but also more reluctant in reforming the
structure of basically the same system 50 years later. Another interesting aspect of the es­
timation results is that simple correlations can be misleading. The differences in the 1947
vote shares, for example, have been explained by differences in religion (with Catholic
regions opposing) and language. Our estimations show that religion has a different sign
than expected. Language, on the other hand, turns out to be important despite the fact that
the linguistic composition of cantons is uncorrelated with approving vote shares.

The remainder of the paper is organised as follows. Section 2 presents a theoretical
model of individual and aggregate voting behaviour, and discusses its main empirical
implication for the two investigated changes of the Swiss pension system. Section 3 de­
scribes the data set and the used estimation strategy. The empirical evidence is presented
in section 4. Section 5 draws some conclusions and suggests extensions.

2. THEORY AND EMPIRICAL PREDICTIONS

2.1. Theory

Over the life-cycle, individual preferences change. The public choice literature on pub­
lic pensions emphasises the fact that the desired size of the program increases with age,
as elderly agents face only a relatively short contribution period, but still the full benefit

¹ Only one of them – the (small) 9th revision in 1978 – was (unsuccessfully) challenged by a referendum.
Since the substantial increase in the size of the program in the late 60’s and early 70’s (both payroll tax
and pension benefits approximately doubled), the payroll tax rate has remained unchanged, and ratio be­
tween average pension benefits and average per capita wages has remained almost constant. The linkage
between pre-retirement earnings and the benefit level, however, has become considerably weaker in the
last two decades. A large majority of (potential) beneficiaries with a full contribution period are entitled
to maximum benefits, so that earnings history only matters for people with low average wages and/or
contribution gaps. In 1998, for example, an average married couple received more than 92% of maxi­
mum benefits.
The age distribution is therefore a crucial determinant in public pension votes.\(^2\) The benefit structure, moreover, often depends on an individual’s income history, his marital status, and/or the number of children.

In a vote the individual’s choice is binary, yes or no. An agent of a certain age, gender, marital status, level of wealth, and an expected future income stream, votes for the option which maximises his expected remaining lifetime utility. In principle, we could derive optimal decision rules for all possible groups of individuals (across age, marital status, number of children, income opportunities, and preference parameters) and aggregate the preferences over voting options to get predictions of vote shares.\(^3\) In reality a number of difficulties arise: First, empirical data on individual characteristics are limited. Second, some of the determinants are either stochastic (such as income opportunities) or a combination of stochastic factors and choice (such as marital status). To derive optimal decision rules, the perceived probability distribution must be known.\(^4\) Third, simulation studies for realistic settings can be very complex, and are often sensitive to calibration parameters. As individuals are forward-looking, the forecasted rate of growth of the economy is crucial. Fourth, in evaluating the two voting options (yes and no), the median voter model suggests that only the utility ranking of the two options matter. In reality the utility differences between two options might be small for some individuals. In such circumstances, other factors such as ideological preferences might be more important.

Nevertheless one typical illustration of a simulated model is helpful for the interpretation of estimation outcomes. Figure 1 depicts the utility differences (measured as a fraction of remaining lifetime consumption) between the two options in the 1947 vote (AHV/AVS versus the status quo without pension system), as a function of age and marital status. In this setting, a married 50 year old man will be able to consume approximately seven percent more in every remaining period of his life, if the AHV/AVS is introduced.

The resulting profiles depend on the simulation parameters (in particular the forecasted rate of economic growth and the interest rate), but the general pattern is robust. First, as individuals get older, they increasingly favour the introduction of a public pension system over the status quo. Second, for younger individuals (approximately under age 40), utility differences are small. If intensities of preferences matter in democratic decision making, elderly voters will have a disproportionately large effect and are more like-

\(^2\) Note that age does not have to be a monotonous factor. An increase in retirement age, for example, will not affect the already retired individuals anymore, leaving them indifferent at least in theory.

\(^3\) In Butler (1999) a simulation model – based on a model with 15 (overlapping) generations – is developed for Switzerland, including elastic labour supply and a realistic model of government activities. There are, however, no differences in preferences across cantons, and households are treated as single entities.

\(^4\) This is particularly tricky for marital status in a setting where the marital status is crucial for the level of pension benefits: A single individual’s decisions will be different when he expects to marry with probability one, than when he plans to stay single forever.
ly to participate in a vote. Third, the structure of the planned pension system in 1947 favours married couples. The introduction of the program leads to higher utility gains for married men, and makes them indifferent between the two options at an earlier age.\(^5\)

Figure 1: Utility differences – as a fraction of remaining lifetime consumption – between the status quo in 1947 (no public pension system) and the planned AHV/AVS for one set of simulation parameters. Positive utility differences mean that the introduction of the AHV/AVS is preferred to the status quo.

2.2. The 1947 vote: Introduction of the AHV/AVS

The structure of the planned, and subsequently implemented, AHV/AVS system can be summarised by four aspects. First, pension benefits were financed by a proportional payroll tax. Second, benefits were dependent on past earnings. In contrast to the present situation, this tax-benefit linkage led to large differences in benefits even between beneficiaries with an equal contribution period. The system was therefore only mildly progressive. Third, pension benefits for married couples were 1.6 times the benefits of single retirees, regardless of whether the spouse had contributed or cared for children. As

\(^5\) The trajectories are drawn for individuals who plan to stay single, or married respectively, for the rest of their lives. The utility profile of a single man with a positive probability to marry lies in between the two depicted profiles.
the single earner family was still very much the norm, this feature amounted to a substantial redistribution from single individuals to married couples. Moreover, the system offered generous insurance for dependent survivors. Fourth, there was a large windfall gain for the transition generations, who benefited from the system without ever having contributed to it.

The second issue to keep in mind are (perceived) alternatives to the AHV/AVS system. Catholic cantons, for example, opposed the system, not necessarily because they preferred the status quo, but because they favoured an alternative form of social insurance, namely the support of families with children. Free market advocates (predominantly from French speaking cantons), on the other hand, opposed the interventionist nature of the program per se.

We can summarise the potential impacts of explanatory variables as follows:

- The vote share can be expected to increase in the age of the median voter (MEDIAN) and the ratio of elderly to middle-aged (OLDMID).
- The approving vote share can be expected to increase in the fraction of married voters.
- While the fraction of individuals under 20 (YOUTH) should not directly play a role, the (silent) option of a support program for families with children might induce voters to oppose the proposed pension system. Moreover, if individuals take the future utility of their children into account, they should oppose (support) a public pension system if it is expected to offer an internal rate of return below (above) the interest rate. In contrast to the present situation, the ranking of expected returns, however, was not clear cut in 1947.
- The insurance aspects of a PAYG are potentially more valuable for low-income families. The strong linkage between past earnings and the benefit level, however, should reduce a potentially negative impact of per capita income. We therefore expect INCOME to have only a small, but negative, effect on the number of approving votes.
- From an economic perspective, language, religion, ideology, or the participation should not play an important role in explaining the vote.

2.3. The 1995 vote: 10th revision of the AHV/AVS

The 10th AHV/AVS reform led to a number of important structural changes although the contribution rate and total expenditures remained basically unchanged. As a first and most important change, family benefits have been replaced by individual benefits. Second, individuals with responsibilities for children are entitled to child-care credits for a

6. Note that a proportional payroll tax in the magnitude of the initial contribution rate of the AHV/AVS was introduced during World War II to finance a compensation scheme for soldiers and their families (Erwerbsersatzordnung). It could therefore also be argued that voters were already used to this form of taxation, and therefore less reluctant to its continuation.
certain period. Third, the retirement age for women increases from 62 to 64 years over a period of approximately 10 years. Fourth, contributions during marriage (including child-care credits) are split between the spouses in case of divorce. These changes led to substantial improvements for divorced women, but reduced the entitlements of non-working spouses with few or no children.

The expected impact of explanatory variables can be summarised as follows:

- The number of children (YOUTH) should unambiguously increase the number of approving votes through the channel of child-care credits.
- The influence of the age-structure is not clear-cut. While elderly individuals are grandfathered (or more precisely grandmothered) and should therefore be indifferent, women and (to a lesser extent) married couples face a potential cut in benefits due to an increase in female retirement age.
- Once potential child-care credits have been taken into account, married couples face two potentially negative changes through an increase in female retirement age, and the transition to individual benefits. Unless married couples value the improvements in case of divorce, the overall impact of the fraction of voters married (PMAR3555) can be expected to be negative.
- The reform did not change the relative position of different income groups. INCOME should therefore be irrelevant.
- As before, neither language, nor religion, nor ideology should play an important role from an economic perspective. Nevertheless, the shift in focus from the family to the individual can be expected to have triggered some resistance in more conservative (Catholic?) regions.

3. DATA AND ESTIMATION STRATEGY

The stylised models of the theoretical literature focus predominantly on demographics. As we have seen in the previous section, there are a number of additional potentially important determinants of voting outcomes worth exploring. Moreover, preferences may differ across regions of the country. We have therefore included the following variables in a first exploratory analysis: Marital status across age-groups and gender, measures of economic performance (GDP/capita = INCOME, unemployment rate, wage rates (only 1995)), language, religion, political preferences (measured by the vote share of political parties in the closest parliament election), and a dummy for urban cantons.

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7. This feature was subsequently opposed by a voter initiative («10th reform without an increase in female retirement age»). In 1998 a 60% majority voted against this proposal, thus supporting the achievements of the 10th reform.
In this section, we focus on some important and interesting data problems in the first part and briefly explain the used estimation strategy in the second. Data sources and a description of the most important explanatory variables can be found in the appendix.

3.1. Data problems and choice of explanatory variables

The largest problem in the empirical analysis is the modelling of demographics. Many potential regressors of interest contain some demographic information, as can be seen in the correlation matrix of Table 1. Predominantly Catholic cantons, for example, have a different age structure than protestant ones. GDP per capita is also affected, as higher dependency ratios tend to depress this measure even if the income of similar individuals is the same across cantons. There are at least two ways to deal with the problem: The first is to choose those demographic variables which seem most important from a theoretical perspective, such as the age of the median voter and the fraction of retirees. The second approach is to use the whole age distribution and construct a parsimonious low-dimensional demographic measure by means of a principal component analysis. Both strategies have their merits and drawbacks. Using a selection of demographic summary statistics leads to more transparent results, but might fail to consider the most important demographic influences. Artificially constructed demographic variables, as derived by a principal component analysis, are hard to interpret, but ensure that socio-economic variables are freed from demographic information. We present estimation results for both approaches.

Due to the small number of observations and multicollinearity problems, a parsimonious model is called for. In a first exploratory stage of the analysis, we have tried to discard insignificant variables with a variety of model selection procedures, using the estimation strategies explained below. Admittedly there is no unambiguous choice of explanatory variables in such a setting. Fortunately, a number of outcomes turned out to be robust across model selection procedures and estimation methods.

The fraction of people under 20 (YOUTH), religion, and language, are almost always significant determinants of the two voting outcomes. FRENCH gives a better fit for the 1947 vote, and GERMAN for the 1995 vote. The Ticino has voted with predominantly German speaking cantons in 1947, but with French speaking cantons in 1995. While marital status is indeed important for understanding voting outcomes, gender is not. The best proxy for the distribution of marital status is the fraction of voters (between age 20 and age 55 for the 1947 vote, and age 35 to 55 for the 1995 vote), who are married. The most robust economic determinant is GDP per capita (INCOME). Unemployment is insignificant, once language and/or income are included in the regression. Political prefer-

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8. The distribution of marital status (with respect to age) of men and women is of course highly correlated. Nevertheless, there is enough variance in the data (mainly due to marriages with foreigners) to potentially disentangle marital status and gender.
ences, measured in vote shares of the largest political parties, are never significant if demographics, language and religion are accounted for. The same is true for an indicator of urban areas, irrespective of its definition. Most model selection procedures suggest that participation rates should be included in the 1947 regression, but not in the 1995 regression.

Table 1 contains pairwise correlation coefficients between the chosen explanatory variables. Note that some correlations have changed in the last 50 years. In particular, the fraction of prime age voters who are married (PMAR3555) was negatively correlated with KATH and YOUTH, but positively with INCOME, while in 1995 all three signs are reversed. Also keep in mind that the share of approving votes in 1947 was negatively correlated with KATH (reflecting the perception in the media), but not with any language variables.

Table 1: Pairwise correlations between dependent and explanatory variables. Below the diagonal are the correlation coefficients for the 1947 vote (introduction AHV/AVS, 25 observations), above the diagonal those for the 1995 vote (10th revision, 26 observations). P-values are given in italics, correlation coefficients that are significant at the 5% level are in bold type.

<table>
<thead>
<tr>
<th>1947/1995 vote (logit)</th>
<th>vote</th>
<th>PART</th>
<th>MEDIAN</th>
<th>OLDMID</th>
<th>YOUTH</th>
<th>KATH</th>
<th>FRENCH</th>
<th>GERMAN</th>
<th>INCOME</th>
<th>PMAR3555</th>
</tr>
</thead>
<tbody>
<tr>
<td>participation rate</td>
<td>0.149</td>
<td>0.479</td>
<td>0.107</td>
<td>0.603</td>
<td>-0.035</td>
<td>-0.281</td>
<td>-0.194</td>
<td>-0.092</td>
<td>0.191</td>
<td>0.256</td>
</tr>
<tr>
<td>age median voter</td>
<td>0.358</td>
<td>0.079</td>
<td>0.241</td>
<td>0.247</td>
<td>0.807</td>
<td>-0.703</td>
<td>-0.556</td>
<td>0.168</td>
<td>-0.261</td>
<td>0.006</td>
</tr>
<tr>
<td>ratio 60+/40-60</td>
<td>-0.028</td>
<td>0.896</td>
<td>0.134</td>
<td>0.524</td>
<td>0.784</td>
<td>-0.337</td>
<td>-0.356</td>
<td>0.168</td>
<td>-0.261</td>
<td>0.006</td>
</tr>
<tr>
<td>fraction under 20</td>
<td>-0.803</td>
<td>0.000</td>
<td>-0.076</td>
<td>0.720</td>
<td>-0.424</td>
<td>-0.567</td>
<td>0.656</td>
<td>-0.091</td>
<td>0.167</td>
<td>-0.449</td>
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<tr>
<td>fraction Catholic</td>
<td>-0.644</td>
<td>0.001</td>
<td>-0.549</td>
<td>-0.471</td>
<td>-0.104</td>
<td>0.747</td>
<td>0.000</td>
<td>-0.027</td>
<td>0.897</td>
<td>0.022</td>
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<tr>
<td>fraction French</td>
<td>-0.024</td>
<td>0.908</td>
<td>-0.367</td>
<td>-0.037</td>
<td>-0.026</td>
<td>-0.323</td>
<td>-0.135</td>
<td>-0.891</td>
<td>0.000</td>
<td>-0.082</td>
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<td>fraction German</td>
<td>-0.153</td>
<td>0.465</td>
<td>0.473</td>
<td>0.017</td>
<td>-0.029</td>
<td>-0.089</td>
<td>0.047</td>
<td>0.000</td>
<td>0.119</td>
<td>0.218</td>
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<tr>
<td>rel. GDP per capita</td>
<td>0.598</td>
<td>0.002</td>
<td>-0.009</td>
<td>0.964</td>
<td>0.054</td>
<td>-0.458</td>
<td>-0.708</td>
<td>0.055</td>
<td>0.000</td>
<td>-0.016</td>
</tr>
<tr>
<td>married 35–55 (PMAR3555)</td>
<td>0.797</td>
<td>0.000</td>
<td>0.394</td>
<td>0.051</td>
<td>0.221</td>
<td>-0.216</td>
<td>-0.791</td>
<td>0.141</td>
<td>-0.065</td>
<td>0.722</td>
</tr>
</tbody>
</table>

3.2. Estimation method

A voting outcome is an example of a grouping of binary responses (yes and no). What is observed is the proportion, $P_i$, of $n_i$ people (i.e. the number of voters participating in the vote) in canton $i$ voting «yes». The approving vote share is then assumed to depend on a
repressor vector $x_i$. The logistic model offers an easy procedure to deal with grouped data. If the approving vote share $P_i$ is modelled as

$$P_i = \frac{\exp(\beta'x_i)}{1 + \exp(\beta'x_i)},$$

the logit of $P_i$, $\Lambda_i$, is a linear function, $\Lambda_i = \ln(P_i/(1-P_i)) = \beta'x_i$. Weighted least squares regression produces the minimum chi-squared estimates of $\beta$. As the weights are functions of the unknown parameters, a two-step procedure must be applied. Ordinary least squares in a first step produces consistent, but inefficient estimates. In the second step, the weights

$$w_i = (n_i \Lambda_i (I - \Lambda_i))^{1/2}$$

can be used for weighted least squares.

Usually grouped data are obtained by observing the response of $n_i$ individuals, all of whom have the same regressor vector $x_i$. It follows immediately that applying standard analysis of grouped data is not without problems. Ideally, individuals should be grouped according to some common characteristics, an assumption which is clearly not satisfied for individuals living in different cantons. Fortunately qualitative results are relatively robust across estimation methods, but care should be taken when interpreting standard errors or significance levels.

As the cantons differ considerably in size, grouped logit estimates rely heavily on the few large cantons. Moreover, it is questionable whether approving proportions should indeed be considered as a single observation from a distribution of proportions. To give an idea of these effects, we also include the first step of our estimation procedure – an unweighted ordinary least squares estimate of the logit-transformed dependent variable – in Tables 2 and 3.

4. ESTIMATION RESULTS

4.1. The 1947 vote

Estimation results from an OLS and a two-stage grouped logit analysis (G-Logit) can be found in Table 2. Note that we have only included variables which were found to have some explanatory power in a preliminary model selection stage. To provide an impression of the fit of a parsimonious specification (regressions (3a) and (3b)), actual and predicted values for all cantons are depicted in Figure 2.

The conventional demographic statistics of the public choice literature, MEDIAN and OLDMID, do not seem to proxy the age distribution very well, as can be seen by a substantial difference in the goodness of fit between specifications (1) and (2). While the age of the median voter has an unexpected negative sign, a larger fraction of old people in-

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creases the number of yes-votes as expected. These findings can be interpreted in two ways. They could be an indication that intensities of preferences, as outlined in the previous section, do indeed matter. As Figure 1 shows, utility differences between the two options are usually much smaller around the age of the median voter than in old age. The second potential explanation is a non-linear relationship between the demographic proxies and the logit-transformed approving vote share.

As expected by the preferential treatment of couples, the fraction of married young and middle-aged voters (PMAR2055 gives a better fit than PMAR3555) has a positive sign and is highly significant. The coefficient on YOUNG is negative and highly significant, even after controlling for the whole age distribution as is done in specification (1). There are potentially two ways to explain this finding. The first is the presence of a silent alternative option of higher support for large families. The second is the possibility that voters have anticipated some draw-backs of the pay-as-you-go system, and have voted in their children’s interest.

GDP per capita (INCOME) has a negative sign and is significant if the demographic structure is controlled for by principal component variables. This could be an indication that insurance aspects are more valuable for low-income groups. Moreover, high-income earners face a lower implicit rate of return of the program and seem to oppose it to a larger extent. KATH has an unexpected positive sign and is significant in specification (1) despite the negative correlation of the fraction of Catholic voters with the approving vote share. INCOME and KATH, moreover, show that a careful identification of the demographic structure is crucial. Both variables presumably contain some demographic information in specification (2), which mask their true impact.

Despite the fact that the fraction of French speakers is uncorrected with the fraction of yes-votes, the coefficient of FRENCH is negative and highly significant. The importance of language is interesting from a historical perspective: Prior to the 1947 vote, it was expected that French speaking cantons would oppose the proposed pension system more than German speaking cantons. After the vote, the general consensus was that language did not matter (this is also reflected in a very low, insignificant correlation between the voting outcome and the fraction of French speakers). Our analysis, however, shows that language mattered nonetheless.

The participation rate has a (somewhat unexpected) negative sign. A possible explanation is that – in view of an already high average participation rate (80%) – a higher rate may indicate a higher participation of individuals facing small utility differences between the two options, introduction of a PAYG system or status quo.¹⁰ As can be shown numerically (and is illustrated by Figure 1), a majority of voters whose respective utility difference is below a certain value would have opposed the introduction of the system.

¹⁰ Note that voting was still compulsory in a number of cantons in 1947.
Figure 2 shows observed and forecasted vote shares for all cantons. On average, the prediction errors are relatively small. All specifications, however, fail to predict the low number of no-votes in Obwalden, and to a lesser extent in Nidwalden, but underestimate the fraction of approving votes in Appenzell Innerrhoden. Note that all three cantons are very small. An exclusion of any or all of these cantons did not substantially change the estimated coefficients or standard errors.

4.2. The 1995 vote

Estimation results from a two-stage grouped logit analysis can be found in Table 3. For regressions (6a) and (6b), actual and predicted values for all cantons are also depicted in Figure 3, to give an impression of the fit of the most parsimonious specification.

In contrast to the 1947 vote, the 1995 vote is not better explained by artificially constructed (principal component) demographic summary statistics. A single variable, MEDIAN, seems to capture most of the demographic variation. The higher the age of the median voter, the larger the opposition against the 10th reform, presumably due to the increase in female retirement age. The coefficient on YOUTH has the expected positive
Table 2: Estimation results for the 1947 vote (introduction AHV/AVS), dependent variable = logit (approving vote share). Standard errors are in parenthesis. One asterisk indicates significance at the 5% level, two asterisks indicate significance at the 1% level. The first two columns (regressions 1a and 1b) represent estimations in which the demographic structure has been approximated by three principal components.

<table>
<thead>
<tr>
<th>Regression</th>
<th>(1a)</th>
<th>(1b)</th>
<th>(2a)</th>
<th>(2b)</th>
<th>(3a)</th>
<th>(3b)</th>
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<tr>
<td></td>
<td>OLS</td>
<td>G-Logit</td>
<td>OLS</td>
<td>G-Logit</td>
<td>OLS</td>
<td>G-Logit</td>
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<td>MEDIAN</td>
<td>Principal comp. (3)</td>
<td>Principal comp. (3)</td>
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<td>-0.337</td>
<td>-0.162</td>
<td>-0.345</td>
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<td></td>
<td></td>
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<td>(0.125)</td>
<td>(0.147)</td>
<td>(0.119)</td>
<td>(0.148)</td>
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<td>OLD MID</td>
<td>Principal comp. (3)</td>
<td>Principal comp. (3)</td>
<td>1.209</td>
<td>4.559</td>
<td>3.307</td>
<td>5.093</td>
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<td></td>
<td></td>
<td></td>
<td>(2.402)</td>
<td>(2.144)</td>
<td>(1.994)</td>
<td>(2.549)</td>
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<td>YOUTH</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>-7.422</td>
<td>-7.602</td>
<td>-5.116</td>
<td>-6.519</td>
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<td></td>
<td>(1.343)</td>
<td>(1.096)</td>
<td>(1.589)</td>
<td>(1.734)</td>
<td>(1.509)</td>
<td>(1.460)</td>
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<td>KATH</td>
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<td></td>
<td>0.942</td>
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<td>0.550</td>
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<td>FRENCH</td>
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<td>(0.288)</td>
<td>(0.175)</td>
<td>(0.306)</td>
<td>(0.219)</td>
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<td>(0.208)</td>
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<td>-1.082</td>
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<td></td>
<td>(0.485)</td>
<td>(0.464)</td>
<td>(0.756)</td>
<td>(0.758)</td>
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<tr>
<td>PMAR2055</td>
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<tr>
<td></td>
<td>(2.284)</td>
<td>(2.075)</td>
<td>(3.107)</td>
<td>(2.889)</td>
<td>(2.545)</td>
<td>(2.369)</td>
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<td>-1.864</td>
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<td>-2.328</td>
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<td>(1.136)</td>
<td>(0.581)</td>
<td>(1.574)</td>
<td>(0.937)</td>
<td>(1.158)</td>
<td>(0.880)</td>
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<tr>
<td>adjusted $R^2$</td>
<td>0.889</td>
<td>0.929</td>
<td>0.781</td>
<td>0.814</td>
<td>0.772</td>
<td>0.807</td>
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Sign and is significant. A higher percentage of married prime age individuals (PMAR3555), on the other hand, lowers the number of yes-votes significantly. Once the number of children (as a proxy for child-care credits) is controlled for, the negative effects of the reform on an average middle-aged married couple seem to outweigh the positive ones. Marital status for other age groups can be shown to have no impact. INCOME and other measures of economic importance are also irrelevant.

Language is again very important. The higher the fraction of German speakers, the higher the approving vote share. Note that there has been an apparent shift in either preferences or other conditions in the last 50 years. While the regions with a French speaking majority were more sceptical to the introduction of a public pension system in 1947,
they were also more reluctant in reforming the structure of basically the same system 50 years later. Although participation rates varied considerably across cantons, they were never relevant.

While political parties can be shown to be unimportant, religion does matter. The larger the fraction of Catholic voters, the lower the number of approving votes. Apparently it was the change in structure that made Catholic cantons oppose the reform, which – among other issues – offers more insurance in case of divorce. Divorce rates, however, are still lower in predominantly Catholic regions. After having controlled for other factors, the importance of religion indicates that voting behaviour is probably not entirely free from ideology, though – surprisingly – not necessarily in the form of party membership.

Figure 3: Actual and predicted values for the 1995 vote (percent yes-votes), regressions (6a) and (6b). The regressors are MEDIAN, YOUTH, GERMAN, KATH, and PMAR3555.
Table 3: Estimation results for the 1995 vote (10th revision), dependent variable = logit(approving vote share). Standard errors are in parenthesis. One asterisk indicates significance at the 5% level, two asterisks indicate significance at the 1% level. The first two columns (regressions 4a and 4b) represent estimations in which the demographic structure has been approximated by four principal components.

<table>
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<tr>
<th>Regression</th>
<th>(4a)</th>
<th>(4b)</th>
<th>(5a)</th>
<th>(5b)</th>
<th>(6a)</th>
<th>(6b)</th>
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<td>Regressors</td>
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<td>G-Logit</td>
<td>OLS</td>
<td>G-Logit</td>
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<td>G-Logit</td>
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<td>MEDIAN</td>
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<td>Principal comp. (4)</td>
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<td>(0.054)</td>
<td>(0.058)</td>
<td>(0.025)</td>
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<tr>
<td>OLDMID</td>
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<td>Principal comp. (4)</td>
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<td>(0.635)</td>
<td>(0.660)</td>
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<td></td>
<td>(3.605)</td>
<td>(4.374)</td>
<td>(3.243)</td>
<td>(3.962)</td>
<td>(2.605)</td>
<td>(2.508)</td>
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<td>**</td>
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<tr>
<td>KATH</td>
<td>-0.911</td>
<td>-0.698</td>
<td>-0.761</td>
<td>-0.680</td>
<td>-0.739</td>
<td>-0.661</td>
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<td>(0.267)</td>
<td>(0.239)</td>
<td>(0.160)</td>
<td>(0.136)</td>
<td>(0.171)</td>
<td>(0.129)</td>
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<tr>
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<td>**</td>
<td>*</td>
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<tr>
<td>GERMAN</td>
<td>0.519</td>
<td>0.473</td>
<td>0.624</td>
<td>0.521</td>
<td>0.577</td>
<td>0.503</td>
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<td>(0.162)</td>
<td>(0.173)</td>
<td>(0.112)</td>
<td>(0.118)</td>
<td>(0.094)</td>
<td>(0.082)</td>
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<td></td>
<td>**</td>
<td>*</td>
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<tr>
<td>INCOME</td>
<td>0.233</td>
<td>0.198</td>
<td>0.258</td>
<td>0.147</td>
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<tr>
<td></td>
<td>(0.251)</td>
<td>(0.330)</td>
<td>(0.200)</td>
<td>(0.275)</td>
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<tr>
<td>PMAR3555</td>
<td>-5.888</td>
<td>-4.784</td>
<td>-7.132</td>
<td>-5.731</td>
<td>-6.718</td>
<td>-5.807</td>
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<td>(2.589)</td>
<td>(2.983)</td>
<td>(1.989)</td>
<td>(2.353)</td>
<td>(1.691)</td>
<td>(1.468)</td>
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<td>**</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>adjusted $R^2$</td>
<td>0.774</td>
<td>0.807</td>
<td>0.798</td>
<td>0.826</td>
<td>0.771</td>
<td>0.838</td>
</tr>
</tbody>
</table>

5. CONCLUSIONS

The public choice literature on social security focuses almost entirely on the demographic structure of the society, and consequently predicts a size of PAYG systems which is much larger than the one observed in reality. Although our analysis cannot directly explain this empirical puzzle, it proposes two potentially important avenues of future research aiming at its resolution: The first is a more careful model of individual utility which might include heterogeneity of preferences, as well as altruism and fairness arguments. Second, votes on social security issues should be analysed in a broader public policy context. A possible interpretation, especially of the 1947 vote, is that voters are also concerned with the implication of a social security reform on other aspects of public policy. They seem to take into account that an increase in the size of the public pension system may imply expenditure cuts in other programs.

Our estimations of the two voting outcomes show the importance of socio-economic variables, which are not typically considered by economic analysis. In particular, language turns out to be highly significant in all cases, even after controlling for measures of economic performance and demographics. The fraction of French speakers is thus not
a proxy for economic strength as might have been suspected. Moreover, differences in
voting behaviour (and therefore in preferences) between language regions are not a re-
cent phenomenon. Such differences – at least in the context of social security – have al-
ready been important 50 years ago, although they were masked by other characteristics,
to a higher degree at the time.

Once demographics, language and religion have been accounted for, political parties
are unimportant. Religion, which presumably does contain some ideological aspects, is
relevant, however. The example of religion shows that careful data analysis is crucial in
correctly identifying the important determinants of voting outcomes. Despite the high
and significantly negative correlation between the fraction of Catholic voters and ap-
proving vote shares in 1947, the former has a positive sign in the regression equations
after controlling for differences in demographics and language.

In general, the impact of demographics, marital status, and measures of economic per-
formance are as expected. Especially the unambiguous impact of the fraction of married
individuals in both votes is a clear indication that individuals indeed decide in accor-
dance with economic theory, at least to a certain extent. Gender differences are hard to
detect, and households seem to decide like a single entity. The strong impact of the frac-
tion of young people under 20 suggests that people put some weight on the utility of fu-
ture generations. However, it is difficult to disentangle this effect from other reasons
for the importance of minors.

A major problem in the analysis is the heterogeneity within cantons. Most estimation
procedures using grouped data usually assume that all individuals in a group have the
same regressors, an assumption clearly violated by the structure of our data. Two possi-
ble extensions seem worth exploring. The first is an analysis of more disaggregate data,
if possible on the community level. The second is a search for more sophisticated esti-
mation methods to deal with within-group heterogeneity.

Nevertheless, we believe that our results offer some interesting and important insights
into direct-democracy votes on social security. Well designed policy changes have to
take into account that preferences may differ across subgroups of the population. In the
context of public pension reforms in Switzerland, for example, language and religion
have played a much larger role than expected from economic reasoning. If a reform
should win an approving majority, it has to strike a balance between the different posi-
tions. Referenda in a democracy can be viewed as a kind of line-item-vetoes of the peo-
ples, and have therefore been treated as basically one-dimensional decisions in the litera-
ture. Our findings, however, seem to imply that voters might be aware of the
consequences of (social security) reforms on the available set of policy measures, or on
the policy options of their descendants.

12. This tentative finding is consistent with experimental evidence, as provided by van der Heijden, Nelis-

sen and Verbon (1997), and Eichenberger and Oberholzer-Gee (1998).
APPENDIX: DATA DESCRIPTION

All data are from the Bundesamt für Statistik. Population statistics, including information on language and religion, were taken from the closest census (1950 and 1990 respectively), but were adjusted for the earlier/later date of the vote. After an extensive model selection process, including other measures of economic performance, more demographic information (marital status), and information on political parties, the following variables were included in the final analysis:

- **MEDIAN**: Age of the median voter in years. Voters are male Swiss citizens above the age of 20 for the 1947 vote, and all Swiss citizens above the age of 18 for the 1995 vote.
- **OLDMID**: Ratio of elderly voters (above age 60) to middle-aged (40 to 60 years) voters. This measure summarises the distribution of voters beyond the median age (also used in Breyer and Craig (1997)).
- **YOUTH**: Fraction of the total population under 20 years.
- **KATH**: Fraction of voters who are Catholic.
- **FRENCH**: Fraction of voters with French (German = GERMAN) as their mother tongue.
- **INCOME**: GDP per capita given as a fraction of the Swiss GDP per capita.
- **PMAR3555**: Fraction of 35 to 55 year old voters who are married.
- **PART**: Participation rate in vote.

Moreover, the following demographic statistics were used to derive a low-dimensional demographic profile by means of a principal component analysis: The fractions of voters in all 5-year age-groups above the age of 20, and their corresponding squares. The three (four) first principal components accounted for more than 99% of the total variance in 1947 (1995).

REFERENCES


SUMMARY

This paper empirically analyses two important events in the history of the Swiss pay-as-you-go pension system (AHV/AVS): First, its introduction in 1947, and second, the substantial structural reforms of the 10th revision in 1995. Approving vote shares are estimated with a grouped logit model. Both voting outcomes can be relatively well explained by a combination of demographic factors, such as age and especially family structure, and socio-economic variables, such as language and religion.

ZUSAMMENFASSUNG


RESUME

L'article présente une analyse empirique de deux événements importants dans l’histoire de l’assurance vieillesse en Suisse (une assurance qui est basé sur le système de la répartition des dépenses). Ces événements sont, premièremen, son introduction en 1947 et, deuxièmemen, les réformes structurelles profondes de la 10e révision en 1995. Les résultats des deux plébiscites s’expliquent assez bien par une combinaison de variables démographiques, comme la structure par âge et les formes familiales, avec des variables telles que la langue et la religion.