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Abstract

We analyze the role of taxation in individual annuitization decisions in an environment that shows large differences in relative taxation between the one-off lump sum payment and the life-long annuity. For each individual whose retirement choice is recorded in an administrative dataset from a large Swiss pension fund we impute taxes for both options. We show that taxes can explain a significant part of the variation in annuity rates. Exploiting kinks in the tax schedule we also find evidence for tax optimization strategies by individuals. Our findings suggest that individuals react strongly to tax incentives when making retirement choices.

Keywords

Annuity Puzzle, Taxation, Occupational Pension.

JEL Classification

D81, D91, H24, J26.

1 Introduction

Understanding the determinants and consequences of individual retirement choices is paramount in an increasingly aging society. In many countries the choice between an annuity and a lump sum has become a major policy issue. Annuities are one of the best ways to insure against poverty risk in old age. For individuals it is a hard choice, though; the decision involves a large sum of money, it is largely irreversible and has long-lasting consequences for individuals. Through its feedback to social insurances (for example, via social and medical insurance), individual annuitization decisions also impact public expenditures and hence, society as a whole.

While the annuity price is an obvious factor in the cash-out decision at retirement, the estimation of its impact has proven difficult because of a shortage of exogenous variation in annuity prices. Brown (2001) and others have used variations in economic and regulatory environment, such as interest rates and conversion rates. Behavioral anomalies are another reason why it is difficult to trace out the impact of price variations. If framing and peer effects are strong, small changes in prices may be insufficient to trigger a change in pay-out behavior. Indeed, Chalmers and Reuter (2012), who study payout decisions in the Oregon Public Employees Retirement System, find no evidence that retirees respond to small changes in annuity prices.

Not surprisingly, people do respond to large, salient changes in an annuity's value. Taking advantage of a large policy change in Switzerland Bütler et al. (2013) demonstrate that an 8% reduction in the rate at which retirement capital is translated into a lifelong annuity - equivalent to a net present value loss of around US$ 18,500 for the average retiree – was accompanied by a decline in the annuitization rate by 16.8 percent.

In this paper we look at a hitherto neglected factor of an annuity's value: differential taxation of the lump sum and the annuity. Taxes are interesting as they can induce price variation, albeit in a much less transparent way than other price differences. Our analysis is based on the highly decentralized tax system in Switzerland in which there is not only sizeable variation in tax schedules between cantons and municipalities, but also differences in the tax treatment of retirement wealth depending on whether its drawn down as a lump sum or as an annuity.[1]

We study the impact of taxation on individual annuitization choices using administrative records from one large Swiss insurance company. The dataset includes 14,620 individual cash-out decisions made between the years 2007 and 2015. A tax imputation model shows substantial differences between taxation of the lump sum and taxation of the annuity. As all individuals face the same insurance contract and regulation our setting is ideal laboratory to analyze how individuals within a homogeneous region react to differential taxes and take advantage of them to optimize their after-tax wealth or income.

Our empirical estimates show that taxes are an important determinant of individual annuitization choices: an increase in the tax rate on the lump sum is associated with a significant increase in the choice to annuitize, on average, while an increase in the tax rate on the annuity leads to a significant decrease in the choice to annuitize. Not surprisingly wealthier individuals react more strongly to tax incentives and thus variations in annuity pricing.

The progressive nature of income (and one-off capital cash out taxation) in all (most) cantons leave another avenue of optimization than just choosing a polar option: a carefully chosen mix between the two options can reduce the tax burden for the retiree. We use jumps in the marginal tax rate on the lump sum to identify this effect. Using a regression discontinuity design we find evidence for tax optimization strategies by individuals: individuals sort into more favorable tax brackets by annuitizing part of their pension wealth and taking the rest as a lump sum. This tax optimizing behavior is only observed among the wealthy for whom such strategies pays off

[1]Switzerland provides an excellent setting to study the effects of differential taxation within a relatively homogeneous region. So far research has mainly concentrated on the effects of the decentralized tax system on income sorting, such as Brülhart and Parchet (2014), Schaltegger et al. (2011), Liebig and Sousa-Poza (2006), Schmidheiny (2006) and Feld (2000).

financially.

Our results suggest that individuals react to tax incentives with regards to retirement choices. This has important policy implications. On top of mandates and nudges a more preferential tax treatment of annuities relative to the taxation of lump sum payments could induce individuals to annuitize a larger share of their pension wealth. As a consequence, the prevalence of low incomes in old age as well as means-tested social assistance to those who run out of assets would be reduced.

Taxes have been shown to affect individual decisions around retirement. Charupat and Milevsky (2001) analyze tax treatments of life insurance and annuity products and conclude that there are tax arbitrage opportunities in the Canadian insurance market (but not in the US). Hagen (2015) calculates the value of an annuity both gross and net of taxes and finds that the present value of a 5-year payout (an option similar to cashing out one's pension wealth) could fall by more than 20% relative to the life annuity when taxes are accounted for. The negative tax effect on the present value of the fixed-term payout is particularly large for high-income individuals with large capital stocks. Most other research looks at the impact of taxes on retirement savings and labor supply. 401(k) pension plans in the US, for example, subsidize savings through an income tax deferral and through investment accrual at the pre-tax interest rate. Using data from the Health and Retirement Study (HRS) Cunningham and Engelhardt (2002), for example, demonstrate the 401(k) plan savings responds to tax deductibility of individual retirement account contributions. A number of papers find evidence for the distortionary nature of taxation in individual retirement decisions, e.g. Michel and Pestieau (2003), Pech (2004) and Brunner and Pech (2008).

The paper proceeds as follows: section 2 presents key features of the Swiss pension system and the Swiss tax scheme. Section 3 discusses the data and descriptive statistics and chapter 4 outlines the identification strategies. Section 5 presents the results. Section 6 summarizes and concludes.

2 Institutional Background

2.1 The Swiss Pension System

The first and the second pillar are the core of Switzerland's three pillar pension system and account for the bulk of retirement income. The first pillar is a pay-as-you-go universal system which aims to provide a subsistence level of income to all retirees. The benefits depend on the amount of income earned during one's work life as well as the number of years contributed to the work force. The minimum is CHF 1,175 per month and the maximum CHF 2,350 per month (as of 2015). The statutory retirement age is 65 for men and 64 for women.

The second pillar, which is the focus of our analysis, is a fully funded occupational pension scheme, mandatory for all employees whose annual income exceeds a pre-defined threshold (CHF 24,675 in 2015). Its goal is to maintain pre-retirement living standards. An employer can choose from different organizational structures for his occupational pension plan. These range from setting up a completely autonomous pension fund to outsourcing the scheme entirely to an insurance company. The latter is relatively common, particularly for small and medium sized companies. Almost all pension plans are based on defined contributions, but carry extensive guarantees.

The two main pillars system is complemented by voluntary, but tax favored private pension savings, as well as by means-tested supplemental benefits in case total income is not enough to cover basic needs. Means-tested benefits may create incentives to cash out second pillar pension wealth because they guarantee a minimum income at retirement and thus act as an implicit

insurance against financial consequences of longevity.[2]

At retirement workers withdraw the accumulated second pillar retirement capital as a monthly lifelong annuity, a lump sum, or a mix of the two options. Annuities are strictly proportional to accumulated retirement assets: second pillar pension wealth W is translated into a yearly nominal annuity A using the conversion rate γ, hence $A = \gamma W$. The conversion rate varies with retirement age and gender (see Appendix). The law stipulates a minimum conversion rate for the mandatory part, which is currently 6.8%.[3] The annuity also entails to benefits for dependent children and to survivor benefits under certain conditions.

The accumulation and decumulation phase of occupational pensions are organized by the same provider. While it is possible to cash out the accumulated balances to buy an annuity in the unregulated market, such a strategy would never be optimal as the conversion rates (γ) in unregulated markets are well below conversion rates in the highly regulated second pillar.

2.2 Taxing annuities and lump sums

Figure 1 provides an overview of the choices individuals face at retirement and their impact on taxation. If the annuity is chosen, the resulting annual income stream from pension wealth, A, is taxed like ordinary income, on top of any other income, in particular, income from the first pillar.

The lump sum, on the other hand, is subject to a special, one-off tax applied to the full amount of pension wealth cashed out, disregarding any income or any other form of wealth.[4] If annuity and lump sum are combined, taxes are applied to the amount withdrawn as either option separately.

[2] Bütler et al. (2017) demonstrate that means-tested benefits are indeed associated with a decrease in demand for annuities, especially for individuals at the lower end of the wealth distribution.

[3] The amount of insured income above the lower threshold (CHF 24,675 in 2015) and below the upper threshold (CHF 84,600 in 2015) is called the mandatory component, and income above the upper threshold is called the super-mandatory component. All pension providers are required by law to insure the mandatory share. They are free to offer insurance for the super-mandatory share, however most (including the pension fund providing this data) do so because the second pillar is considered an integral part in attracting well-educated workers in Switzerland's tight labor market.

[4] The only exception is third pillar pension wealth if the latter is cashed out at the same time. It is never optimal to withdraw money from the second and third pillar in the same year. This fact is actively advertised by banks or other third pillar providers when retirees plan to withdraw third pillar savings. Moreover, third pillar wealth is much lower than second pillar wealth for most retirees.

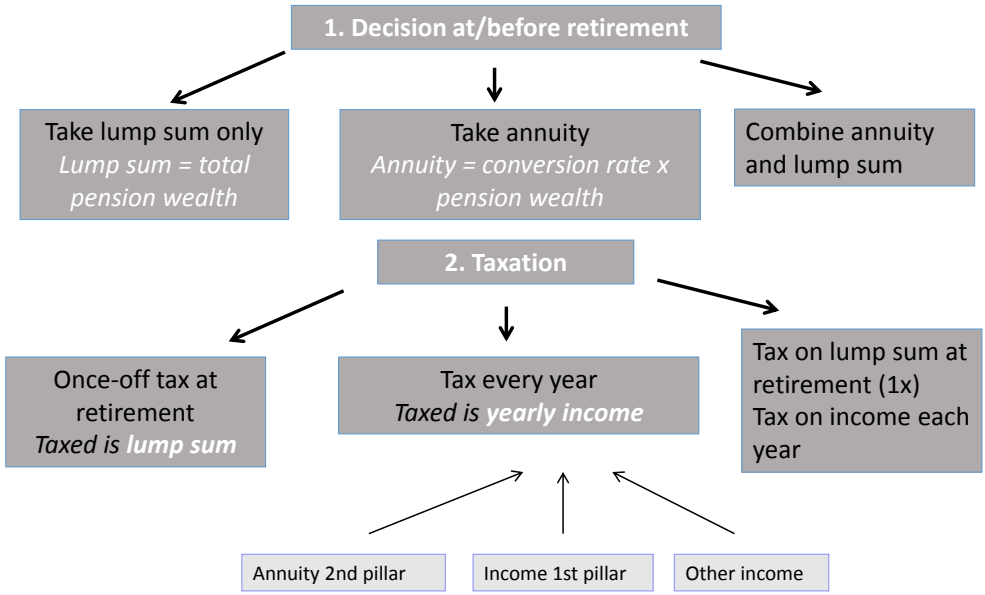

Abbildung 1: Taxation of second pillar pension wealth

Like ordinary income and wealth, annuities and lump sums are taxed at three levels in Switzerland: at the federal, at the cantonal and at the municipality level. For the majority of individuals, the federal tax constitutes less than 20% of their total tax, the remainder of the tax load goes to the municipality and to the canton in roughly equal shares.

To calculate taxes on annuities and lump sums, we use information on tax schedules from the tax administrations of all 26 Swiss cantons. To calculate the tax load, we first compute the base tax which is defined by the cantons and determines progressivity of the tax schedule (including deductions). The total canton and municipality tax load can then be derived by multiplying the base tax with the cantonal and municipality tax multipliers.[5] While there are large differences in tax progressivity across cantons, there are none between municipalities within each canton. The base tax differs according to marital status, but cantonal and municipal tax multipliers do not. As there is mandatory tax filing each year (no taxation at source), individuals are usually well aware of the tax loads in their own community.[6]

To impute the total tax liability for individuals, we calculate the base tax for both married and unmarried individuals with any amount of pension wealth and annuity income, and then apply the municipality and cantonal tax multipliers. Figures 2 and 3 illustrate substantial difference in taxes using our imputation model on a hypothetical dataset consisting of observations in each municipality in Switzerland with a moderate pension wealth of CHF 200,000.

[5]Most cantons provide the information for calculating the base tax online. Those cantons which do not provide the information online were contacted by email or telephone, after which the information was willingly provided.

[6]Switzerland has roughly 2,600 municipalities, with a decreasing tendency over time due to municipality mergers. For our analysis we keep track of all name changes and municipality mergers over time.

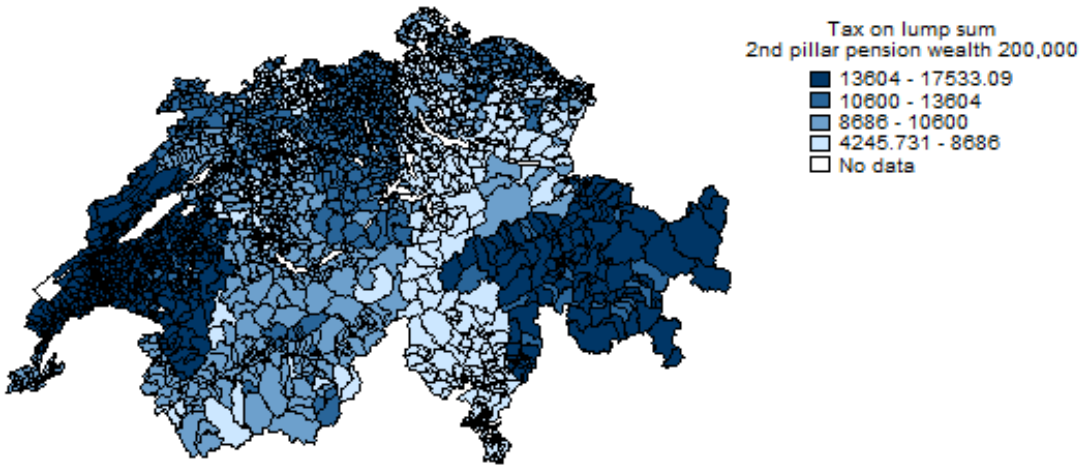

Abbildung 2: Tax load on lump sum of CHF 200,000 for married individuals

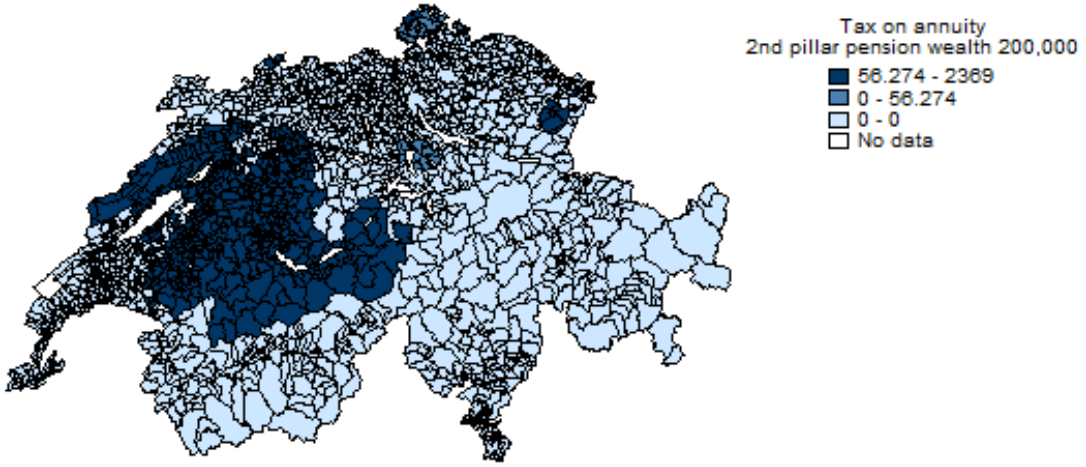

Abbildung 3: Tax load on annuity, pension wealth of CHF 200,000 converted to annual income of 13,600; married individuals

The total tax liability on the lump sum of CHF 200,000 ranges from about CHF 4,000 to over CHF 17,000, the tax liability on the annuity (corresponding to an annual income of about CHF 13,600) from CHF 0 to over CHF 2,000. While some municipalities have high (or low) taxes on both the annuity and the lump sum, others levy a high tax on the lump sum but only a moderate tax on the annuity, and vice versa. For different levels of pension wealth, relative tax loads of the annuitization choice may differ as is illustrated by Figures 5 and 4. The main driver of differences in taxation are differences between cantons. Differences between municipalities between cantons exist as well but are smaller and we find that they do not affect retirees.

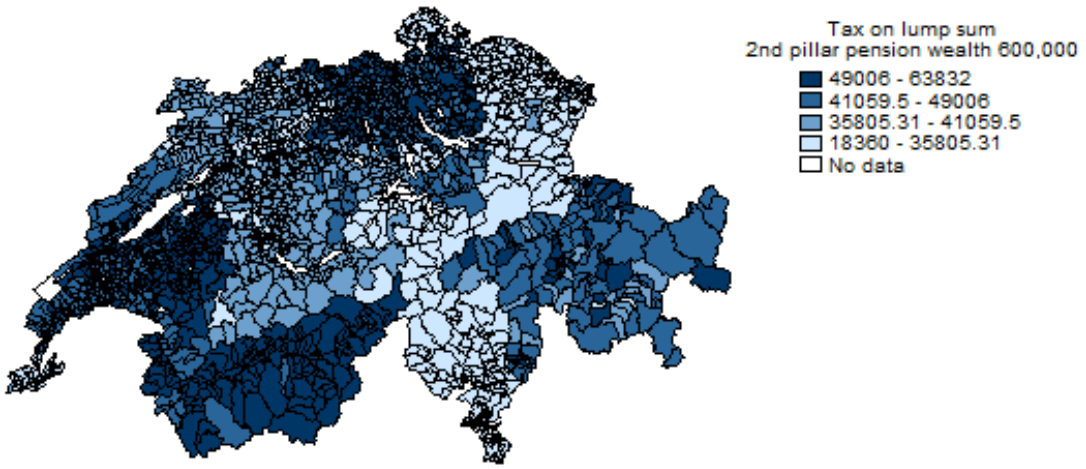

Abbildung 4: Tax load on lump sum of CHF 600,000 for married individuals

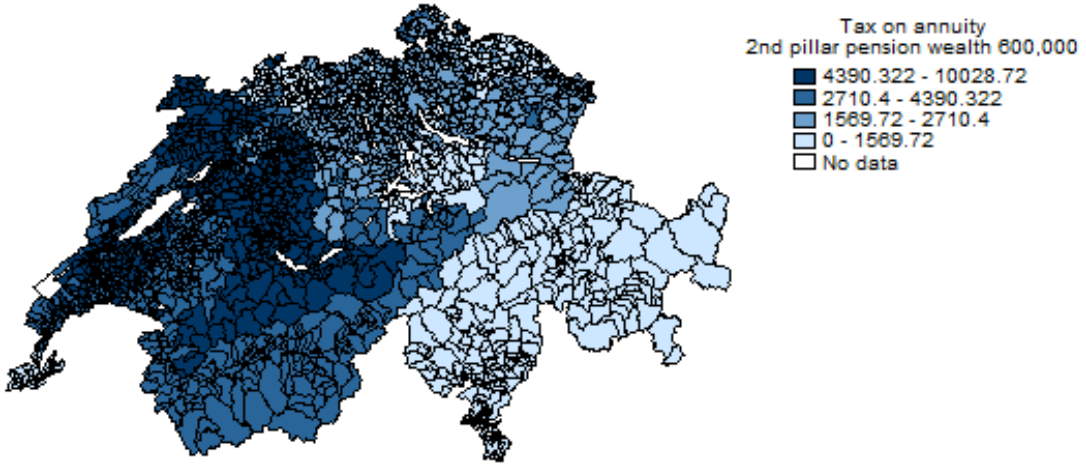

Abbildung 5: Tax load on annuity, pension wealth of CHF 600,000 converted to annual income of 40,800; married individuals

To allow for a direct comparison of the tax burdens for the two pay-out option we would have to compute the present values of tax loads on the remaining life time. However, this statistic would only change the parameter estimates on the tax for annuity, but not on other factors. Note that differences due to marital status and gender are already taken care of by covariates.

Taxes may change slightly over time as municipalities can adjust the municipality tax mul-

tiplier to increase or decrease their tax revenues. Cantonal taxes change in a more sluggish fashion since more parties and negotiations are involved. Five of the 26 cantons changed the base tax calculation for the lump sum during the time period under consideration (Bern, Uri, Glarus, Appenzell Ausserrhoden and Graubünden) however, these changes did not translate into large differences in tax liabilities.[7] Thus, while we take into account these changes in our tax calculation model, we do not exploit changes over time explicitly.

Several cantons introduced tax-related policy changes on a cantonal level in the time period under consideration, following one or more cantonal ballots, namely Baselland, Lucerne, Bern, Zug, Schaffhausen, Aargau and Solothurn. The nature of the changes varies, although most of them addressed families through the implementation of, e.g., deductions from income for children or decreases in tax rates for families with children. None of these changes were targeted at retirees.

In a second step, we apply our tax imputation model to the administrative insurance data to calculate tax loads and tax rates on the annuity and on the lump sum for all observations within that dataset. The model allows us to directly calculate the tax on the lump sum from gross pension wealth. To calculate annuity income, we apply applicable conversion rates to pension wealth to transform the latter into an annual income stream (see Appendix for an overview on applicable conversion rates). We also approximate income from the first pillar for each individual and add it to income from the second pillar. According to BSV (2014), both men and women receive on average 86% of the maximal first pillar income. This is because each year not contributed (the so-called 'tax gap') leads to a reduction of 1/44 in one's first pillar income. We thus assign 86% of the maximal first pillar income to all individuals in our dataset.[8]

[7] Exploratory difference-in-differences estimates show that individuals have not reacted to these changes in base tax calculation, potentially because these changes are dwarfed by the tax difference between the two pay-out options.

[8] The maximum first pillar income differs by year, which we take into account.

3 Data and Descriptive Statistics

We use administrative records from a large Swiss insurance company which provides pension plans to small- and medium-sized companies in the private sector. The latter constitute 99 percent of all companies in Switzerland and provide about two thirds of all places of employment in Switzerland (BFS, 2012).[9] The data contains information on retirement choice (taking the annuity or the lump sum, or a combination of the two), to create the outcome variable, Y:

$$Y = \frac{\text{Amount of pension wealth withdrawn as annuity}}{\text{Total pension wealth}} \tag{1}$$

It also contains the following individual characteristics: date of retirement (*date*), age at retirement (*age*), gender (*sex*), marital status (*married*), total second pillar pension wealth at time of retirement (*wealth*), income in the year before retirement (*income*), whether the individual receives a disability insurance (*disability*) and whether individuals have ever withdrawn some money from their second pillar to finance the purchase of a house (*WEF*, from the German 'Wohneigentumsförderung'). We further know in which sector (defined by so-called Noga codes) the individual worked prior to retirement (*noga*). We exclude individuals who receive full disability insurance because their choice to take the lump sum is severely restricted (see Section 2.1; descriptives statistics for the full sample are in the Appendix in Table 7). Table 1 provides summary statistics for the observations which are used for the analysis.

Our data is a fairly representative sample of the Swiss population and corresponds closely to other papers which have used data from Swiss pension funds: the average annuity rate is almost equivalent to the rate of 0.443 in Bütler et al. (2013). Average age at retirement is only slightly higher than in Bütler et al. (2013) and Bütler and Teppa (2007) where the average age is 63.9 years and 61.75 years, respectively. A lower share of women in this dataset corresponds roughly to the national average of second pillar recipients, which is 0.41 (BFS, 2013). The number of people entering retirement increases over time but is unrelated to specific retirement dates, although there seems to be a cyclical component (see Figure 13 in the Appendix). Average age at retirement remains stable over time (see Figure 11 in the Appendix).

[9]The formal definition of a small- or medium-sized company provided by the Swiss Federal Statistics Office is that it should not contain more than 249 employees.

Tabelle 1: Descriptive statistics

Variables	N	mean	s.d.	min	max
Covariates:					
Sex	12,186	0.36	0.48	0	1
Married	12,186	0.70	0.46	0	1
Age	12,186	64.33	1.63	58	70.97
Pension wealth	12,186	295,359	335,693	100	6,824,000
Income	12,186	77,660	58,175	0	1085000
WEF	12,186	7,749	46,608	0	1,500,000
Annuity after retirement*	6,003	20,079.41	22,285.71	0	289,200
Dependent variables and variables of interest:					
Annuity rate	12,186	0.45	0.48	0	1
Choice of combination	12,186	0.21	0.41	0	1
Fraction annuitized**	1,619	0.69	0.25	0.02	1
Tax on annuity	12,186	1,213	3,573	0	89,470
Tax on lump sum	12,186	20,294	37,072	0	638,382
Tax rate annuity	12,186	0.03	0.04	0	0.28
Tax rate lump sum	12,186	0.05	0.02	0	0.31
Ratio***	12,009	0.03	0.05	0	0.7
Average wealth by type of choice (annuity, lump sum, or combination):					
Lump sum	4,382	304,099	268,761	2,700	4,142,800
Annuity	6,177	241,697	344,936	100	6,823,800
Combination	1,627	476,487	399,115	4,500	4,257,300

**Annuity after retirement:* only for individuals who receive an annuity.
***Fraction annuitized:* only for individuals who annuitize part of their pension wealth.
****Ratio:* only for individuals with *tax on lump sum* > 0.

For every individual in the dataset we first calculate the (gross) present value of an annuity, i.e., the present value of an annual income stream of 1 after retirement, without taking into consideration taxation. The present value (PV) captures changes in the yield curve which represent investment opportunities if the lump sum is taken. We calculate the present value annuity factor at the statutory retirement age of 65 for a male beneficiary until the end of his life.[10] We use nominal yields on Swiss treasury bonds with maturities of 1, 2, 3, 4, 5, 6, 7, 8, 10, 20 and 30 years to calculate the expected nominal short rate in each future period. Life expectancy is calculated using data from mortality tables created by the Swiss Federal Statistics Office (BFS).[11]

Figure 6 shows the (average) tax rate on the lump sum across the wealth distribution. The average tax rates are defined as the percentage of post-retirement wealth spent on taxes. It shows that the tax rate on the lump sum is higher for Zürich than for other cantons and increasing at different rates across cantons. The clouds in Figure 6 can be explained by differences in taxes by marital status and date of retirement for individuals with the same amount of pension wealth: tax rates differ between married and single individuals and also (to a much lesser degree) over time.

[10]The age of 65 is chosen because it corresponds to the statutory retirement age for men, and we chose men rather than women because there are more men in the sample. Our present value annuity factor is biased downwards as individuals covered by the second pillar have, on average, a higher life expectancy than the overall population.

[11]We have also calculated the money's worth ratio (MWR), a measure of the value of an annuity compared to the cash-out option, both with and without taxes. The MWR has been used in a number of papers, e.g. Mitchell et al. (1999), Brown (2001), Finkelstein and Poterba (2004), Chalmers and Reuter (2012) and Hagen (2015). It is expressed as the ratio of the present value of an annuity to the value of the lump sum. The net MWR explicitly takes into account taxes, comparing the net-of-tax income stream after retirement to the net-of-tax lump sum.

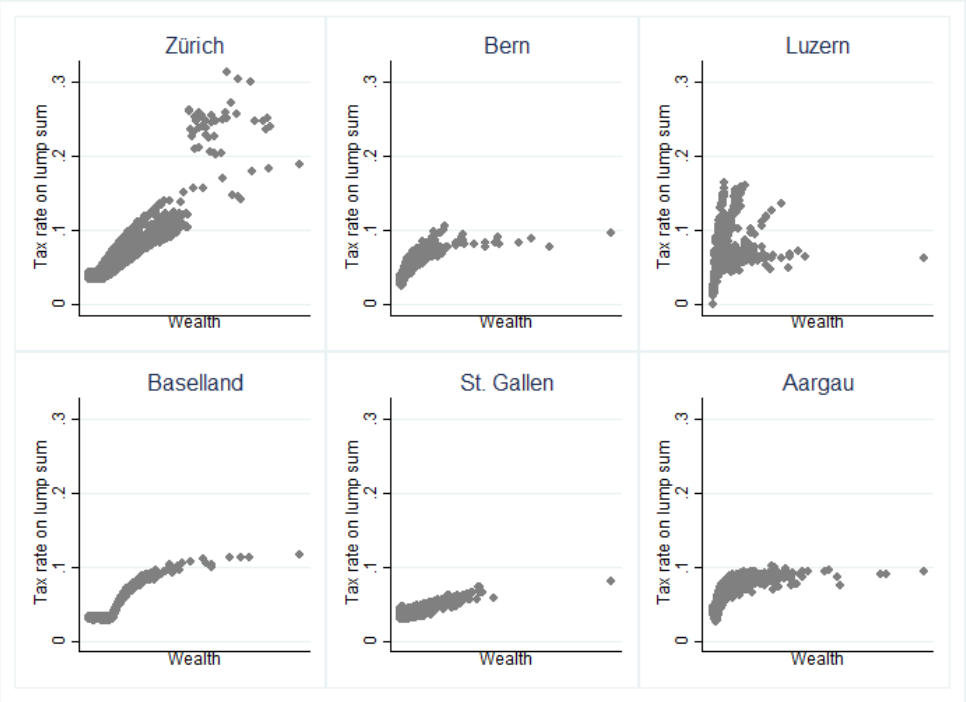

Abbildung 6: Tax rate on lump sum across wealth. Married and single individuals.

4 Regression Analysis

4.1 OLS Regressions

In a first step, we run OLS regressions of the annuity rate on 3 different tax measures: the (average) tax rate on the annuity, the (average) tax rate on the lump sum and the ratio of the tax on the annuity to the tax on the lump sum. We rely on truly exogenous variation in tax rate that does not affect second pillar savings (it might affect private savings, but not institutionalized savings.

Brülhart and Parchet (2014) study the effects of bequest taxes on the mobility of eldery, wealthy tax payers in Switzerland. They exploit a number of reforms in the taxation of bequests between the years 1973 and 2008 within a panel regression framework. The tax cuts did not have a statistically significant impact on migration of high-income retirees: the compositional changes are not large enough to translate into significant effects on the overall size of the tax base concerned. Yet, their findings suggest that if taxes were higher, they could potentially have an effect on migration patterns of wealthy retirees.

While Schmidheiny (2006) and Schaltegger et al. (2011) find evidence of income sorting within a canton as a reaction to tax differences between municipalities, Liebig and Sousa-Poza (2006) do not find large effects of income taxation on individual migration choices. Feld (2000) and Schmidheiny (2006) confirm a limited impact of taxation on within-country migration for the full population.

Thus, if you want to mimimize tax choosing the right option (annuity, lump sum, or mix of the two options) this is nearly free, while moving to another canton takes a huge financial and non-financial hit.

The OLS regressions can be written as follows:

$$Y_i = \beta_0 + \beta_1 * Z_i + \beta_2 * X_i + \eta_i \tag{2}$$

Y_i is the annuity rate defined in Section 3, Z_i refers to our tax variables and X_i are control variables. The tax rate on the annuity and the tax rate on the lump sum are included in the same regression because they represent a trade-off between the two choices.[12] The regressions on the tax ratio are run separately to avoid collinearity. We control for age, age squared, gender, marital status, the present value of the annuity and the sector in which the individual has worked prior to retirement as all these factors have been shown to affect annuity choices (for the relationship between age, gender, marital status and an annuity's value see, e.g., Bütler and Teppa (2007), and for the relationship between work sector and annuity choice see Bütler and Ramsden (2015)).

We further control for pension wealth as the tax rate is a function of accumulated pension wealth, and wealth squared to capture non-linearities in wealth with regards to annuity demand. Time dummies are included in most regressions: including time fixed effects controls for differences in the annuity rate over the years, which is important as we observe an increase in the annuity rate over time (see Bütler and Ramsden, 2015, for a discussion). We do not include canton dummies (which control for all unobservable time-invariant canton-specific factors affecting the annuity rate) as doing so eliminates an important source of variation in relative tax loads of the two drawdown options.[13]

The distribution of the outcome variable has two mass points at at zero and one as a large fraction of individuals in the sample chooses either only the lump sum or only the annuity. The resulting loss in efficiency can be taken care of by computing heteroskedasticity-robust standard errors. Results of a Breusch-Pagan test for heteroskedasticity support the use of heteroskedasticity-robust standard errors.

In all estimations we assume that, after controlling for covariates, taxes on the annuity and on the lump sum are exogenous: at the time of retirement, the individual is faced with a given tax on the annuity and lump sum. There is a concern that individuals change residence prior to retirement to take advantage of favorable tax conditions *after* making a choice between the annuity and the lump sum. If this was the case, our results would suffer from endogeneity bias. Based on research by Brülhart and Parchet (2014) is can be assumed that the willingness to migrate is low among the elderly, in particular for lower wealth individuals: Brülhart and Parchet (2014) found that cuts in bequest taxes had almost no impact on migration patterns of elderly taxpayers nor on the tax base represented by these individuals in terms of federal income taxes.

Nevertheless, we use several strategies to address potential endogeneity issues such as selection effects into low-tax municipalities: we exclude high-wealth individuals from the dataset as those are the ones which are likely to migrate to take advantage of lower taxes. This is primarily important for the regressions on the lump sum tax rate: since the tax on the annuity is the same as the tax on income, people who move for income tax reasons would have done so long before retirement. Moreover, excluding wealthy retirees circumvents the problem of a potentially different annuity demand for the very rich. We also control for income from last year of employment and withdrawal of pension wealth to finance owner-occupied housing (WEF): income before retirement might be an important determinant of residence, which in turn influences tax rates. Withdrawing pension wealth prior to retirement to finance purchase of a house might directly affect the tax rate that individuals face at retirement. It reduces the amount of pension wealth in the second pillar, while owning a house makes moving more costly. In some specifications we additionally control for cantonal debt per capita which proxies for tax expectations: individuals that live in a canton with high debt might expect tax rates to increase in the future, consequently choosing the lump sum over the annuity. We do not include this variable in all regressions as it is not available for 2014 and 2015, thus leading to a loss in observations.

[12] Running separate regressions for the two variable leads to almost identical results.

[13] Including canton fixed effects leads to very similar results, hence variation within a canton seems to be enough to drive the effects that we observe when not adding canton fixed effects.

4.2 Regression Discontinuity Design

Individuals may also choose a combination of annuity and lump sum to optimize taxation. For a number individuals a combination between an annuity and a lump sum reduces the tax burden due to the progressivity of both taxes. The relative gain over a polar option might be ample if the individual faces a large jump in the marginal tax rate on the lump sum. In this case individuals can optimally choose the right combination of annuity and lump sum to be in a more favorable tax bracket.

A recent paper by Schmidheiny and Slotwinski (2015) investigates behavioral responses of foreigners around the threshold where the special tax regime which only applies to foreigners, the so-called source tax, changes to the ordinary tax regime which applies to all individuals in Switzerland. They find that foreigners from high-tax municipalities push their income just below the threshold of CHF 120,000 where the tax regime changes, while foreigners from low-tax municipalities shift their income above the threshold. This paper thus provides evidence for strategic bunching of individuals around the tax threshold.

We exploit the fact that tax schemes of the lump sum create kinks in the marginal tax rate as a function of wealth, illustrated by Figure 7 for 6 cantons:

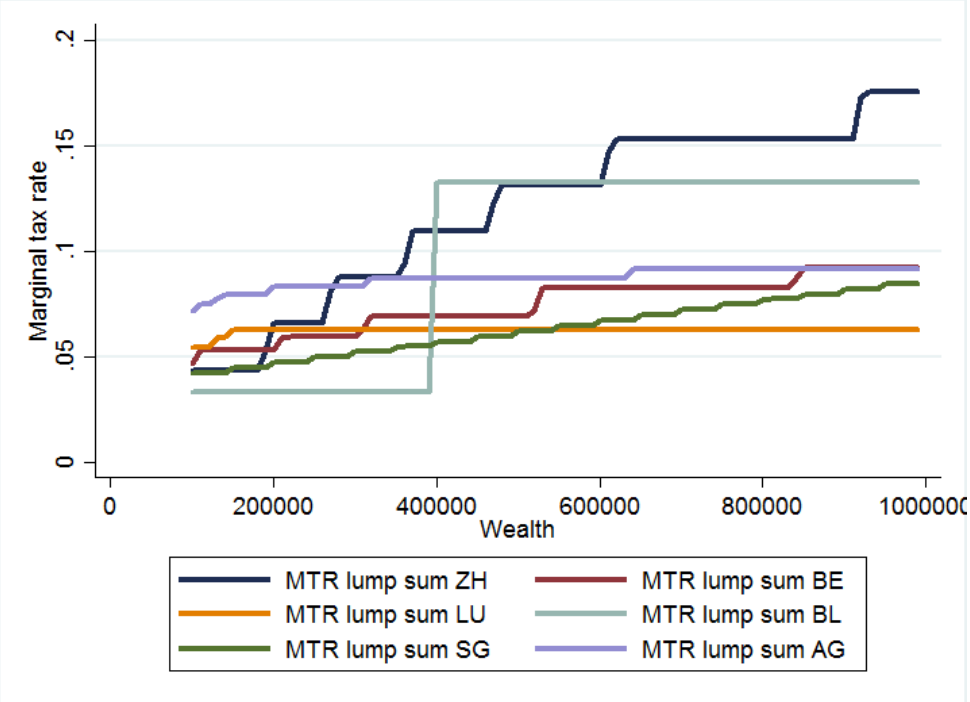

Abbildung 7: Marginal tax rate of lump sum across wealth.

Figure 7 shows that tax schedules differ a lot between the cantons. For example, while the canton of St. Gallen has a lot of small jumps in the marginal tax rate, the canton of Baselland has one large jump in the marginal tax rate at a pension wealth of 400,000. Individuals with a pension wealth just above CHF 400,000 might thus be better off annuitizing part of their pension wealth and taking the rest as a lump sum. We have calculated two examples: individuals with a pension wealth of CHF 410,000 pay around CHF 900 more in tax than individuals with a pension wealth of 400,000 (the exact amount depends on the municipality of residence), and individuals with a pension wealth of CHF 500,000 may pay up to CHF 10,000 more in tax, depending on the municipality of residence.

To gain insight into whether individuals strategically try to place themselves in a lower tax bracket we investigate the likelihood for choosing a combination of annuity and lump sum. This

is a binary indicator which equals 1 if an individual annuitizes part of his or her pension wealth, but not all of it, and zero otherwise. Hence, it excludes individuals who choose the full annuity. Graphical evidence is shown for three cantons: Aargau (married individuals), Baselland (married and single as the tax bracket is the same for both) and Bern (married individuals). Figures 8, 9 and 10 show that at the high tax thresholds in the cantons of Aargau and Bern and at the only tax threshold in the canton of Baselland, the likelihood for choosing a combination is higher for individuals just above the threshold where the marginal tax rate increases. This suggests that high wealth individuals with wealth just above these thresholds annuitize part of their pension wealth (but not all of it) more often, on average.[14]

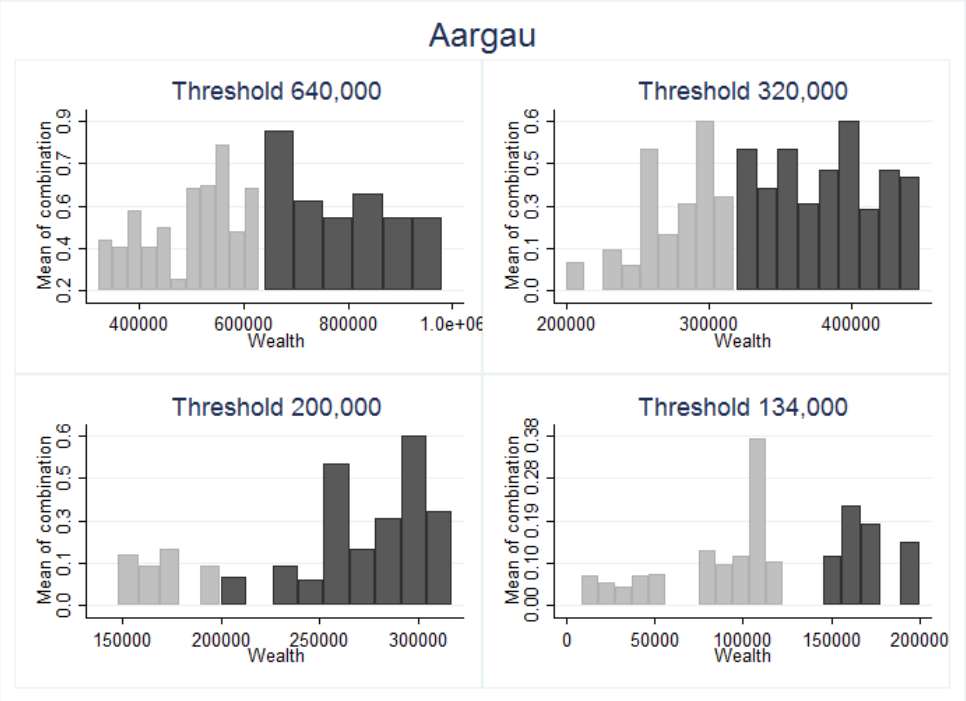

Abbildung 8: Mean of 'mixed option' across wealth, canton of Aargau, married individuals.

[14]Figures exclude individuals who choose a full annuity; gaps are due to insufficient observations.

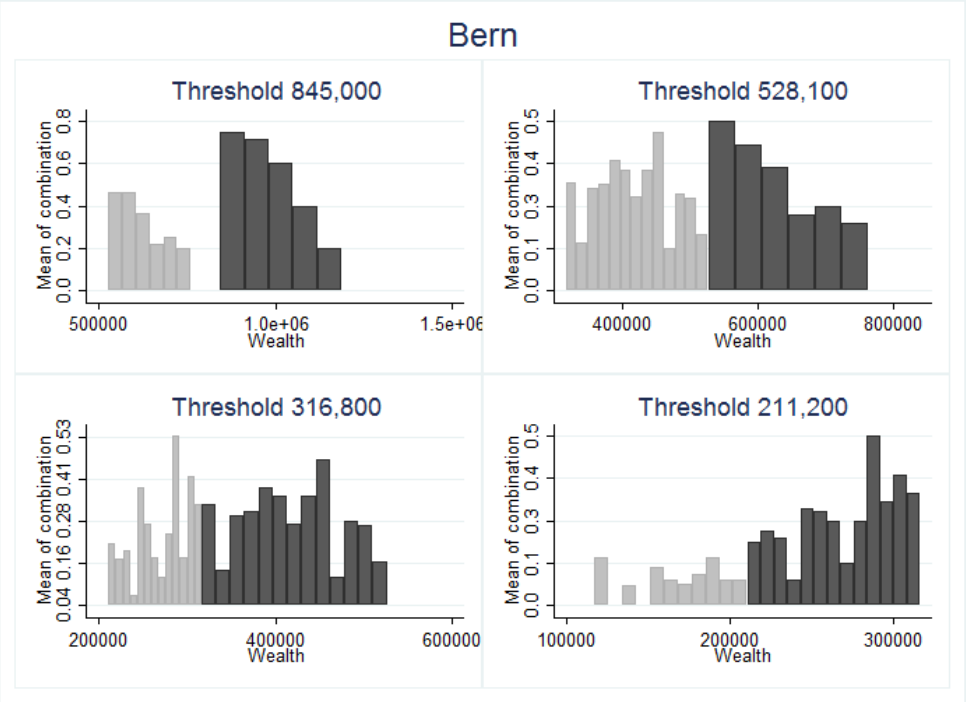

Abbildung 9: Mean of 'mixed option' across wealth, canton of Bern, married individuals.

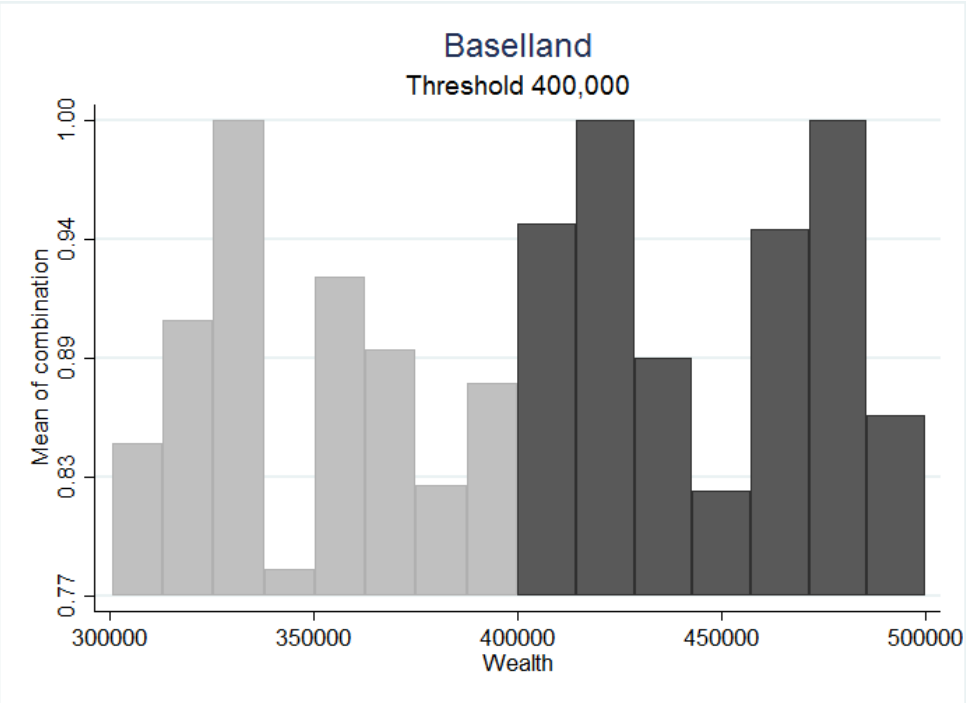

Abbildung 10: Mean of 'mixed option' across wealth, canton of Baselland, married and single individuals.

To test whether individuals optimize taxation by taking a combination of annuity and lump sum, we implement a regression discontinuity design exploiting the kinks in the marginal tax rate schedule. In this RDD setting, treatment is a deterministic function of wealth and is defined as:

$$T_i = \begin{cases} 1 & \text{if } w_i \geq w_0 \\ 0 & \text{if } w_i < w_0 \end{cases} \tag{3}$$

where T_i denotes treatment, w_i denotes wealth and w_0 the wealth thresholds. The treatment effect is estimated using a flexible parametric model within a narrow bandwidth (in terms of wealth), hence the regression formulation is:

$$Y_i = \alpha_0 + \alpha_1 T_i + \alpha_2 W_i + \alpha_3 W_i T_i + \epsilon_i \tag{4}$$

The parameter α_1 measures the average causal effect of the tax threshold on choosing the combination of annuity and lump sum at the assignment threshold W_0. We include interaction variables $W_i T_i$ between the assignment variable and the treatment dummy to control for the fact that the treatment may impact not only the intercept, but also the slope of the regression line.

Covariates are included as a robustness check. We do not include higher-order polynomials which would be justified when using observations very far away from the cut-off for which different treatment effects are expected. Within a reasonably narrow wealth range, there is no reason to expect non-linearity between mean counterfactual outcomes and the rating variable (see Jacob et al. (2012) for a discussion). Nevertheless, we perform a series of robustness checks including polynomial terms along with covariates and interaction terms. A summary of these robustness checks for the two highest tax thresholds for the canton of Bern can be found in the Appendix in Tables 16 and 17.

To provide unbiased impact estimates, the cut-point must be determined independently of the rating variable, i.e. the accumulated pension wealth must be exogenous. Individuals in Swiss pension funds have no option to manipulate their pension wealth. The latter is accumulated over the whole work life; it depends on individual decisions with regards to one's occupation (e.g. working part-time or full-time, or being employed or self-employed), the amount earned, marriage and divorce decisions, and above all the regulatory environment at the pension fund chosen by the employer. That individuals are able to sort into their most favourable tax bracket is thus highly unlikely. Graphical evidence for no sorting around thresholds for the cantons of Aargau, Baselland and Bern is given in the Appendix in Figures 14, 15 and 16.

We perform this RDD for 6 different cantons with a large enough number of observations.[15]

5 Results

5.1 Results from OLS Regressions

Tables 2 and 3 show OLS regressions of the annuity rate on the different tax indicators (tax rate on lump sum, tax rate on annuity and ratio of tax on annuity to tax on lump sum). We first run a regression of the annuity rate on the tax rate on the lump sum and the tax rate on the

[15]These are the cantons of Aargau, Baselland, Baselstadt, Bern, Fribourg and Zürich. We cannot estimate effects for the other 19 cantons for the following reasons: (i) there are not enough observations per canton (SZ, OW, SH, AR, AI, VD, NE, GE, JU), (ii) there are too many thresholds i.e. jumps in the marginal tax rate and consequently not enough observations in each tax bracket (SG, ZG, TI, LU, SO), (iii) the cantons have a flat tax rate or very complex tax system i.e. there are no jumps in the marginal tax rate (UR, NW, GL, GR, TG, VS). While it seems attractive at first to pool together all observations to redefine wealth (of each individual) in terms of distance to nearest threshold, this approach turns out to be unfeasible: (i) there is large heterogeneity across cantons, thus tax incentives differ hugely even for otherwise identical individuals; (ii) cantons with narrow thresholds and low-wealth households would be over-represented in this RDD due to the bandwidth selection. However those are precisely the observations where we would not expect to see an effect anyway. Table 9 in the Appendix gives an overview on number of observations in the sample and compares them to population statistics from the Swiss statistics office BFS.

annuity plus a set of control variables, defined above: wealth, wealth squared, income prior to retirement, withdrawal of pension wealth prior to retirement, the present value of an annuity, age, age squared, gender, marital status and sector in which an individual has worked prior to retirement (column (I) in Tables 2 and 3). We then include year dummies (column (II)) and debt per capita, our proxy for tax expectations (column (III)). Columns (IV) to (VI) in Tables 2 and 3 are specified in the same way but the richest 5% of the sample (in terms of pension wealth) are excluded to test for selection effects and differences in annuitization behaviour among the rich (see Section 4.1).

Table 2 summarizes the OLS regressions of the annuity rate on the lump sum tax rate and the annuity tax rate. The coefficient on *tax rate LS* in columns I to III is highly significant and implies that if the tax rate on the lump sum increases by 1 percentage point, the annuity rate increases by 0.85 to 0.99 percentage points, depending on the specification. This is a sizeable effect. Results become insignificant when we exclude the richest 5% of the sample (columns (IV) to (VI)). Not surprisingly the effect is driven by wealthier individuals, as explained in section 4.1.

Coefficients on *tax rate annuity* are negative and highly significant across all specifications for the full sample (columns (I) to (III) in Table 2) and when excluding 5% of the richest individuals in our sample (columns (IV) to (VI)). The coefficients imply that an increase in the tax rate on the annuity by 1 percentage point leads to a 0.6 percentage point decrease in the annuity rate, on average. The OLS regressions on *ratio* (Table 3) provide very similar results: the coefficients are negative and significant for the full sample and when excluding the richest 5% of the sample. The coefficient on *ratio* implies that a higher tax on the annuity - compared to the tax on the lump sum - is associated with a lower propensity to annuitize, on average.

Tabelle 2: OLS regression of annuity rate on tax rate on lump sum and tax rate on annuity

	Full sample			Excluding richest 5%		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Tax rate lump sum	0.99***	0.85***	0.99***	0.36	0.43	0.37
	(0.22)	(0.25)	(0.22)	(0.24)	(0.27)	(0.24)
Tax rate annuity	-0.69***	-0.65***	-0.71***	-0.61***	-0.60***	-0.63***
	(0.15)	(0.17)	(0.15)	(0.15)	(0.18)	(0.15)
Wealth	0.05***	0.05***	0.05***	0.22***	0.21***	0.22***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Wealth squared	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income	-0.04***	-0.05***	-0.04***	-0.06***	-0.06***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Sex	0.01	0.00	0.01	0.07***	0.06***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Married	-0.05***	-0.05***	-0.05***	-0.03***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age	0.74***	0.64***	0.76***	0.72***	0.64***	0.74***
	(0.09)	(0.11)	(0.09)	(0.10)	(0.12)	(0.10)
Age sq.	-0.01***	-0.01***	-0.01***	-0.01***	-0.00***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
PV	0.03***	0.01**	-0.01	0.03***	0.01*	-0.01
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)
WEF	-0.07***	-0.07***	-0.07***	-0.08***	-0.08***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Debt PC		0.33*			0.26	
		(0.18)			(0.17)	
Constant	-23.91***	-20.52***	-23.98***	-23.69***	-20.71***	-23.75***
	(2.93)	(3.52)	(2.93)	(3.14)	(3.81)	(3.13)
Noga dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	No	No	Yes
Observations	12,186	8,814	12,186	11,573	8,389	11,573
R-squared	0.060	0.064	0.065	0.119	0.116	0.122

Tabelle 3: OLS regression of annuity rate on the ratio of tax on annuity to tax on lump sum

	Full sample			Excluding richest 5%		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Ratio	-0.26**	-0.27**	-0.21	-0.55***	-0.56***	-0.53***
	(0.12)	(0.12)	(0.14)	(0.12)	(0.12)	(0.14)
Wealth	0.05***	0.05***	0.05***	0.23***	0.23***	0.22***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Wealth squared	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income	-0.05***	-0.05***	-0.05***	-0.07***	-0.07***	-0.07***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Sex	0.01	0.01	0.00	0.07***	0.07***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Married	-0.05***	-0.05***	-0.05***	-0.03***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age	0.75***	0.77***	0.66***	0.73***	0.75***	0.65***
	(0.09)	(0.09)	(0.11)	(0.10)	(0.10)	(0.12)
Age sq.	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
PV	0.03***	-0.01	0.01**	0.03***	-0.01	0.01*
	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)
WEF	-0.06***	-0.06***	-0.06***	-0.08***	-0.07***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Debt CP			0.35**			0.24
			(0.17)			(0.17)
Constant	-24.18***	-24.23***	-21.11***	-23.75***	-23.82***	-21.11***
	(2.94)	(2.94)	(3.53)	(3.16)	(3.15)	(3.84)
Noga dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	No	Yes	No
Observations	12,009	12,009	8,650	11,396	11,396	8,225
R-squared	0.056	0.060	0.060	0.116	0.120	0.113

As a robustness check we re-estimate the regressions on the three different tax indicators with a tobit estimation. OLS regressions have a disadvantage for our data as the distribution of the outcome variable has two mass points at zero and one due to a large fraction of individuals choosing a polar option: the full lump sum or the full annuity. As a consequence estimates from the OLS regression will be downward-biased for the slope coefficient and upward-biased for the intercept. The doubly censored Tobit model estimates both the likelihood and the intensity of annuitization by means of maximum likelihood methods (Wooldridge, 2013). Tables 10 and 11 in the Appendix summarise results from the tobit regressions on the different tax indicators, showing that the results do not change qualitatively.[16]

We also estimate a linear probability model and a probit model for the effect of the tax rate on choosing either the full annuity or the full lump sum, hence we exclude the mixed option. This gives an idea how the tax rates affect the two polar options alone. This does not qualitatively change the results (see tables 12 and 13 in the Appendix).

5.2 Results from Regression Discontinuity Design

Results for the RD estimations for the cantons of Aargau, Bern and Baselland - cantons with a large enough number of observations in our sample - are summarized in Tables 4, 5 and 6. Treatment effects for the canton of Aargau are positive and significant for the two highest tax thresholds (thresholds 640,000 and 320,000) and insignificant for all other thresholds. The same holds true for the canton of Bern where treatment effects are positive and significant at thresholds 845,000 and 526,000 and insignificant thereafter. In the canton of Baselland, the treatment effect is positive and significant at the only tax threshold of 400,000. For the latter, specifications with different bandwidths (in terms of wealth) ranging from 200,000 to 350,000 are shown, revealing that the results are robust to a number of bandwidth choices. Bandwidths for all cantons are selected on an ad-hoc basis and tested with the cross-validation procedure, a means of calculating the optimal bandwidth (see Jacob et al., 2012, for an overview). Bandwidths from the cross-validation procedure are very similar to the bandwidths selected ad-hoc.

All in all, results from the regression discontinuity estimation provide evidence that individuals at the higher end of the wealth distribution choose a combination of annuity and lump sum to optimize taxation, whereas individuals with moderate or average wealth do not strategically place themselves in a lower tax bracket by choosing a combination of annuity and lump sum. This makes sense for two reasons: (i) generally, the thresholds where there are jumps in the marginal tax rate are much closer together for lower wealth levels, thus positioning oneself in a lower tax bracket is often not worthwhile for individuals with low pension wealth; (ii) high-wealth individuals can gain much more financially from annuitizing part of their pension wealth than low-wealth individuals.

Since the outcome variable is binary, the treatment effects for, e.g., Bern imply that being above the cut-off increases the probability of choosing the mixed option by over 40%. Effects are smaller for the canton of Baselland, where the treatment effect implies an increase in the probability of choosing the mixed option by about 20%.[17]

Additional results for the cantons of Baselstadt and Fribourg for the high marginal tax rate thresholds are in the Appendix in Tables 14 and 15. Again all estimations include wealth and an interaction term and bandwidths are chosen ad-hoc and tested with the cross-validation procedure. Results for the lower tax thresholds are not shown because they are not significant, confirming the findings in the other cantons. Treatment effects for high tax thresholds on the other hand are positive and significant, providing additional evidence that individuals at the

[16]The coefficients from this model cannot be directly interpreted: tobit regressions require computation of partial effects to make them comparable to OLS coefficients (Wooldridge, 2013).

[17]Treatment effects for the canton of Aargau lack a clear economic interpretation as they are larger than 1, a common problem associated with linear probability models.

higher end of the wealth distribution choose a combination of annuity and lump sum to optimize taxation. Results from the RD estimation for the canton of Zürich are never significant, a potential explanation is that jumps in the lump sum schedule are small compared to jumps in the annuity schedule.

Tabelle 4: RDD treatment effects for canton Aargau, married. Outcome variable is choice of combination

Threshold	640,000		320,000		200,000		134,000		...
Bandwidth	320,000	270,000	120,000	110,000	90,000	80,000	26,000	21,000	...
T_i	1.002**	1.228**	0.936**	1.123**	-1.026	-1.792*	-1.679	0.191	...
	-0.45	-0.517	-0.465	(0.679)	(1.001)	-0.535	-1.465	-2.213	...
Wealth	8.11e-07*	1.04e-06*	4.24e-06***	-5.21e-07	-3.59e-06	4.81e-06**	-1.45E-05	7.79E-07	...
	-4.85E-07	-6.10E-07	-1.59E-06	(3.40e-06)	(5.19e-06)	-1.86E-06	-1.17E-05	-1.75E-05	...
Wealth*T_i	-1.45e-06**	-1.81e-06**	-3.42e-06**	4.73e-06	8.67e-06	-4.07e-06**	1.41E-05	-1.09E-06	...
	-6.53E-07	-7.78E-07	-1.66E-06	(3.66e-06)	(5.42e-06)	-1.91E-06	-1.20E-05	-1.79E-05	...
Const.	0.113	-0.0053	-0.823**	0.213	0.769	-0.981**	1.867	-0.0177	...
	-0.22	-0.293	-0.415	(0.580)	(0.918)	-0.491	-1.379	(2.131)	...
Obs.	190	158	233	139	120	225	68	54	...
R-sq.	0.03	0.038	0.082	0.094	0.105	0.073	0.026	0.004	...
Cov.	No	No	No	No	No	No	No	No	...

Tabelle 5: RDD treatment effects for canton Bern, married. Outcome variable is choice of combination

Threshold	845,000		526,000		316,000		...
Bandwidth	265,000	225,000	146,000	116,000	76,000	56,000	
T_i	0.562***	0.778***	0.354**	0.409**	-0.131	-0.189*	...
	(0.171)	(0.239)	(0.163)	(0.189)	(0.0935)	(0.112)	...
Const.	0.826***	1.195***	1.123***	1.362**	-0.0175	-0.348	...
	(0.203)	(0.424)	(0.347)	(0.535)	(0.196)	(0.359)	...
Obs.	86	66	163	124	295	207	...
R-sq.	0.116	0.160	0.032	0.037	0.010	0.017	...
Wealth	Yes	Yes	Yes	Yes	Yes	Yes	...
Wealth*T_i	Yes	Yes	Yes	Yes	Yes	Yes	...
Cov.	No	No	No	No	No	No	...

Tabelle 6: RDD treatment effects for canton Baselland, married and single. Outcome variable is choice of combination

Threshold		400,000		
Bandwidths	350,000	300,000	250,000	200,000
T_i	0.224***	0.176***	0.150**	0.149**
	(0.0470)	(0.0518)	(0.0583)	(0.0640)
Const.	0.136***	0.153***	0.184***	0.200***
	(0.0228)	(0.0259)	(0.0304)	(0.0348)
Obs.	365	305	254	213
R-squared	0.059	0.037	0.025	0.025
Wealth	Yes	Yes	Yes	Yes
Wealth*T_i	Yes	Yes	Yes	Yes
Cov.	No	No	No	No

6 Conclusion

Research on annuitization decisions has strongly focused on behavioral aspects of the choice between a lump sum and a lifelong income stream. This is not surprising given that truly exogenous variations in annuity prices are hard to find. In this paper we exploit large differences between the taxation of the annuity and the lump sum induced by the place of residence of individuals within the same pension sponsor.

We find that taxation matters in individual decisions to cash out pension wealth: the lower the relative tax burden on the annuity (compared to the lump sum), the higher the annuity rate. The effects are sizable - increasing the tax rate on the lump sum by 1 percentage point increases the annuity rate by almost 1 percentage point, on average. On the other hand, increasing the tax rate on the annuity by 1 percentage point decreases the annuity rate by about 0.6 to 0.7 percentage points, on average. The results are robust to different specifications.

The freedom to allocate pension wealth between an annuity and a lump sum opens up the possibility to minimize the tax burden by annuitizing an optimal fraction of pension wealth. We exploit kinks in the tax schedule for the lump sum within a regression discontinuity framework to investigate whether individuals try to optimize taxation by annuitizing part of their pension wealth and taking the rest as a lump sum. Our results provide clear evidence for sorting effects, i.e., tax optimization strategies: individuals with wealth just above the threshold where the marginal tax rate on the lump sum increases choose a combination of annuity and lump sum to end up in the lower marginal tax rate bracket. These tax optimization strategies are implemented only by relatively wealthy individuals for whom such behavior pays off financially.

In contrast to the annuity factor which is a clear indicator of relative prices, tax burdens on withdrawal options are not very salient. They depend not only on the amount of accumulated pension wealth, but also on the individual's place of residence and, in case of the annuity, on other income. Nonetheless, our results demonstrate that individuals react to tax incentives with regards to retirement choices. This has important implications for policy. If policy makers try to reduce poverty at advanced ages, taxes might be an alternative or a supplementary measure to mandates and nudges. In particular, a more preferential tax treatment of annuities relative to the one of lump sum payments could induce more individuals to annuitize a share of their pension wealth, thereby reducing the danger that they outlive their assets in old age and need social assistance.

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Appendix A Tables

Tabelle 7: Descriptive statistics for the full sample, including individuals who receive full disability insurance

Variables	N	mean	s.d.	min	max
Sex	14,620	0.343	0.475	0	1
Married	14,620	0.694	0.461	0	1
Age at retirement	14,620	64.32	1.578	58.00	70.97
Pension Wealth	14,620	279,214	315,341	0	6,824,000
Income	14,620	65,681	59,970	0	1,085,000
Disability	14,620	13.82	32.58	0	100
PV	14,620	15.98	1.317	13.27	18.16
Outcome variable:					
Annuity rate	14,620	0.516	0.481	0	1.000

Tabelle 8: Minimum applicable conversion rates, 2007 - 2015

Year	Men (age 65)	Women (age 64)
2007	7.10%	7.15%
2008	7.05%	7.10%
2009	7.05%	7.00%
2010	7.00%	6.95%
2011	6.95%	6.90%
2012	6.90%	6.85%
2013	6.85%	6.80%
2014	6.80%	6.80%
2015	6.80%	6.80%

Tabelle 9: Number of observations per canton in dataset and in Switzerland

	Sample:		*Population statistics:*	
Canton	Number of obs.	Share	Number of obs.	Share
ZH	2,376	0.195	226,831	0.168
BE	1,740	0.143	187,588	0.139
LU	710	0.058	61,255	0.045
UR	35	0.003	6,415	0.005
SZ	464	0.038	22,663	0.017
OW	51	0.004	5,597	0.004
NW	78	0.006	6,836	0.005
GL	37	0.003	6,960	0.005
ZG	311	0.026	17,335	0.013
FR	282	0.023	39,918	0.03
SO	453	0.037	45,866	0.034
BS	314	0.026	38,679	0.029
BL	815	0.067	54,245	0.04
SH	101	0.008	15,121	0.011
AR	109	0.009	9,627	0.007
AI	66	0.005	2,679	0.002
SG	734	0.06	78,639	0.058
GR	456	0.037	35,077	0.026
AG	1,189	0.098	96,646	0.071
TG	488	0.04	39,287	0.029
TI	326	0.027	69,804	0.052
VD	314	0.026	113,529	0.084
VS	242	0.02	54,557	0.04
NE	139	0.011	31,338	0.023
GE	269	0.022	73,230	0.054
JU	87	0.007	13,037	0.01
TOTAL	12,186	1	1,352,759	1

Tabelle 10: Tobit regression of annuity rate on tax rate of lump sum and tax rate on annuity

	Full sample			Excluding richest 5%		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Tax rate LS	5.84***	5.88***	4.92***	2.56	2.61	3.01
	(1.57)	(1.57)	(1.85)	(1.93)	(1.93)	(2.31)
Tax rate annuity	-5.36***	-5.53***	-5.38***	-4.90***	-5.07***	-5.13***
	(1.03)	(1.03)	(1.27)	(1.13)	(1.13)	(1.40)
Wealth	0.47***	0.47***	0.48***	1.77***	1.77***	1.78***
	(0.03)	(0.03)	(0.04)	(0.08)	(0.08)	(0.09)
Wealth sq.	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income	-0.36***	-0.36***	-0.36***	-0.47***	-0.48***	-0.47***
	(0.08)	(0.08)	(0.09)	(0.10)	(0.10)	(0.13)
Sex	0.17**	0.17**	0.12	0.55***	0.55***	0.51***
	(0.08)	(0.08)	(0.10)	(0.09)	(0.09)	(0.11)
Married	-0.38***	-0.38***	-0.40***	-0.21***	-0.22***	-0.24**
	(0.07)	(0.07)	(0.09)	(0.08)	(0.08)	(0.09)
Age	5.31***	5.48***	5.02***	5.81***	5.98***	5.76***
	(0.71)	(0.71)	(0.90)	(0.80)	(0.80)	(1.03)
Age sq.	-0.04***	-0.04***	-0.04***	-0.04***	-0.05***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PV	0.21***	-0.13	-0.16	0.19***	-0.10	-0.12
	(0.03)	(0.11)	(0.12)	(0.03)	(0.11)	(0.13)
WEF	-0.59***	-0.59***	-0.70***	-0.65***	-0.65***	-0.81***
	(0.09)	(0.09)	(0.12)	(0.12)	(0.12)	(0.16)
Debt PC			2.30*			2.15
			(1.35)			(1.47)
Constant	-174.54***	-175.20***	-160.37***	-193.34***	-194.31***	-187.73***
	(22.73)	(22.76)	(28.65)	(25.56)	(25.59)	(32.97)
Noga dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	No	No	Yes
Observations	12,186	12,186	8,814	11,573	11,573	8,389
Pseudo R2	0.0350	0.0373	0.0415	0.0640	0.0660	0.0678

Tabelle 11: Tobit regression of annuity rate on the ratio of tax on annuity to tax on lump sum

	Full sample			Excluding richest 5%		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Ratio	-2.71***	-2.81***	-2.42**	-4.35***	-4.47***	-4.46***
	(0.85)	(0.85)	(1.02)	(0.95)	(0.95)	(1.16)
Wealth	0.46***	0.47***	0.46***	1.77***	1.77***	1.78***
	(0.03)	(0.03)	(0.03)	(0.08)	(0.08)	(0.09)
Wealth squared	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income	-0.36***	-0.37***	-0.37***	-0.48***	-0.49***	-0.49***
	(0.08)	(0.08)	(0.09)	(0.10)	(0.10)	(0.13)
Sex	0.16*	0.16*	0.11	0.53***	0.53***	0.49***
	(0.08)	(0.08)	(0.10)	(0.09)	(0.09)	(0.11)
Married	-0.37***	-0.37***	-0.38***	-0.23***	-0.23***	-0.25***
	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.09)
Age at retirement	5.32***	5.49***	5.09***	5.80***	5.96***	5.83***
	(0.71)	(0.71)	(0.89)	(0.80)	(0.80)	(1.03)
Age squared	-0.04***	-0.04***	-0.04***	-0.04***	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PV	0.21***	-0.13	-0.15	0.18***	-0.10	-0.11
	(0.03)	(0.11)	(0.12)	(0.03)	(0.11)	(0.13)
WEF	-0.57***	-0.57***	-0.68***	-0.64***	-0.64***	-0.79***
	(0.09)	(0.09)	(0.12)	(0.12)	(0.12)	(0.16)
Debt PC			2.62**			2.13
			(1.30)			(1.40)
Constant	-174.54***	-175.10***	-162.37***	-192.55***	-193.48***	-189.73***
	(22.68)	(22.71)	(28.59)	(25.50)	(25.53)	(32.92)
Noga dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	No	Yes	No
Observations	12,009	12,009	8,650	11,396	11,396	8,225
Pseudo R2	0.0327	0.0348	0.0391	0.0621	0.0641	0.0655

Tabelle 12: Effect of taxation on choosing a polar option: linear probability model for binary outcome annuity or lump sum on the tax rate on annuity and tax rate on lump sum

	Full sample			Excluding richest 5%		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Tax rate LS	1.09***	0.90***	1.09***	0.29	0.31	0.29
	(0.26)	(0.29)	(0.26)	(0.27)	(0.31)	(0.27)
Tax rate annuity	-0.84***	-0.81***	-0.86***	-0.73***	-0.71***	-0.75***
	(0.17)	(0.20)	(0.17)	(0.17)	(0.20)	(0.17)
Wealth	0.05***	0.05***	0.05***	0.23***	0.21***	0.22***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Wealth sq.	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income	-0.05***	-0.04***	-0.05***	-0.07***	-0.06***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Sex	0.02	0.01	0.02	0.07***	0.06***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Married	-0.05***	-0.05***	-0.05***	-0.03***	-0.03**	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age	0.76***	0.65***	0.78***	0.76***	0.67***	0.78***
	(0.10)	(0.12)	(0.10)	(0.10)	(0.12)	(0.10)
Age sq.	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
PV	0.03***	0.01*	-0.02	0.03***	0.01	-0.01
	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.02)
WEF	-0.07***	-0.07***	-0.07***	-0.08***	-0.08***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Debt PC		0.34*			0.24	
		(0.19)			(0.18)	
Constant	-24.40***	-20.78***	-24.41***	-24.71***	-21.75***	-24.76***
	(3.12)	(3.76)	(3.12)	(3.30)	(3.98)	(3.29)
Noga dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	No	No	Yes
Observations	10,032	7,690	10,032	9,638	7,407	9,638
R-squared	0.060	0.062	0.064	0.114	0.110	0.118

Tabelle 13: Effect of taxation on choosing a polar option: probit model for binary outcome annuity or lump sum on the tax rate on annuity and tax rate on lump sum

	Full sample			Excluding richest 5%		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Tax rate LS	1.48**	1.58**	1.52**	0.91	0.99	0.94
	(0.70)	(0.80)	(0.70)	(0.77)	(0.88)	(0.77)
Tax rate annuity	-2.49***	-2.43***	-2.58***	-2.01***	-1.93***	-2.06***
	(0.46)	(0.53)	(0.46)	(0.46)	(0.54)	(0.46)
Wealth	0.25***	0.25***	0.25***	0.64***	0.62***	0.64***
	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Wealth sq.	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income	-0.15***	-0.15***	-0.16***	-0.18***	-0.17***	-0.18***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)
Sex	0.11***	0.08**	0.11***	0.20***	0.18***	0.20***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)
Married	-0.12***	-0.14***	-0.12***	-0.08**	-0.08**	-0.08***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Age	2.03***	1.98***	2.11***	2.17***	1.97***	2.24***
	(0.30)	(0.36)	(0.30)	(0.32)	(0.40)	(0.32)
Age sq.	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
PV	0.07***	0.02	-0.04	0.07***	0.02	-0.03
	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)	(0.05)
WEF	-0.24***	-0.29***	-0.24***	-0.27***	-0.32***	-0.27***
	(0.04)	(0.05)	(0.04)	(0.05)	(0.06)	(0.05)
Debt PC		0.75			0.69	
		(0.51)			(0.52)	
Constant	-66.93***	-64.69***	-67.93***	-72.31***	-65.36***	-73.05***
	(9.47)	(11.65)	(9.52)	(10.25)	(12.65)	(10.30)
Noga dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Observations	10,027	7,686	10,027	9,633	7,403	9,633
Pseudo R-squared	0.0566	0.0653	0.0601	0.0899	0.0917	0.0932

Tabelle 14: RDD treatment effects for the canton of Fribourg, married individuals. Outcome variable is choice of combination

Thresholds	190,000				130,000	
Bandwidths	60,000		50,000		50,000	
T_i	0.272**	0.605	0.410**	5.120**	-0.0753	0.828
	(0.133)	(1.242)	(0.192)	(2.249)	(0.185)	(0.812)
Constant	0.117	-47.75	0.218	-59.75*	-0.214	16.60
	(0.121)	(29.80)	(0.210)	(31.08)	(0.276)	(87.89)
Observations	113	113	74	74	38	38
R-squared	0.045	0.116	0.069	0.233	0.046	0.242
Wealth	Yes	Yes	Yes	Yes	Yes	Yes
Wealth*T_i	No	Yes	No	Yes	No	Yes
Cov.	No	Yes	No	Yes	No	Yes

Tabelle 15: RDD treatment effects for the canton of Baselstadt, married individuals. Outcome variable is choice of combination

Thresholds	100,000		50,000	
Bandwidths	50,000		25,000	
T_i	0.344**	0.163	5.284**	5.019*
	(0.143)	(0.575)	(1.991)	(2.480)
Constant	0.00354	-54.01***	-5.284**	-12.97
	(0.130)	(20.38)	(1.975)	(29.92)
Observations	126	126	91	91
R-squared	0.045	0.141	0.398	0.421
Wealth	Yes	Yes	Yes	Yes
Wealth*T_i	No	Yes	Yes	Yes
Cov.	No	Yes	No	Yes

Tabelle 16: Robustness Checks (I): RDD treatment effects for canton Bern, married individuals, threshold 845,000. Outcome variable is choice of combination

Bandwidths:		319,000			265,000			225,000			145,000	
T_i	0.200*	0.355**	0.317**	0.567***	0.910***	0.951***	0.775***	0.877***	0.930***	0.931*	0.843**	0.863*
	(0.112)	(0.153)	(0.152)	(0.164)	(0.244)	(0.237)	(0.234)	(0.277)	(0.278)	(0.452)	(0.391)	(0.418)
Const.	-63.47**	0.627***	-62.53**	-71.75***	2.391***	-74.99***	-56.56*	2.367	-60.65**	-23.49	19.14*	35.48
	(25.01)	(0.176)	(24.99)	(25.97)	(0.842)	(25.40)	(28.97)	(1.838)	(29.22)	(91.22)	(9.265)	(88.45)
Wealth	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wealth*T_i	No	No	No	No	No	No	No	No	No	No	No	No
Wealth squ.	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Cov.	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Obs.	109	109	109	87	87	87	67	67	67	26	26	26
R-squ.	0.116	0.056	0.127	0.214	0.156	0.260	0.227	0.170	0.240	0.336	0.410	0.465

Tabelle 17: Robustness Checks (II): RDD treatment effects for canton Bern, married individuals, threshold 526,000. Outcome variable is choice of combination

Bandwidths		210,000			146,000			116,000			76,000	
T_i	1.371***	0.249*	0.261**	0.431***	0.398**	0.432***	0.495***	0.454**	0.495***	0.655***	0.665***	0.651***
	(0.513)	(0.127)	(0.126)	(0.156)	(0.159)	(0.157)	(0.182)	(0.183)	(0.183)	(0.228)	(0.225)	(0.229)
Const.	-39.65**	-0.529	-42.48**	-46.92**	1.358	-46.84**	-38.56	1.593	-39.23	-31.07	5.544	-31.55
	(18.97)	(0.462)	(19.05)	(21.55)	(1.236)	(21.64)	(24.69)	(2.292)	(24.95)	(35.82)	(6.834)	(36.03)
Wealth	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T_i*Wealth	Yes	No	No	No	No	No	No	No	No	No	No	No
Weatlth squ.	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Cov.	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Obs.	258	258	258	166	166	166	126	126	126	72	72	72
R-squ.	0.091	0.036	0.093	0.111	0.041	0.111	0.125	0.048	0.126	0.188	0.116	0.191

Appendix B Figures

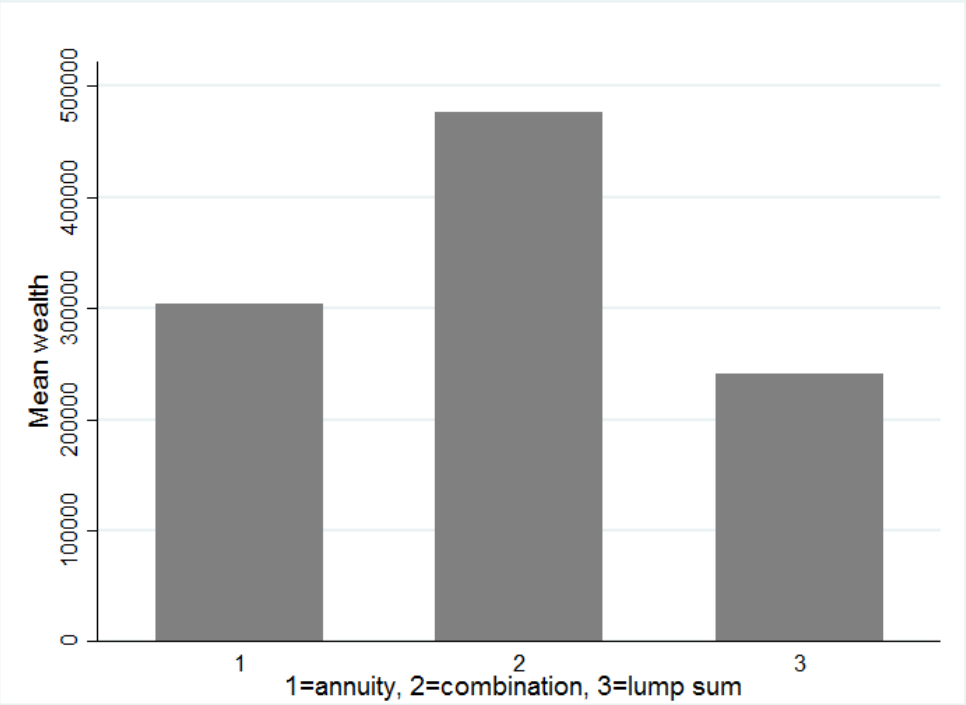

Abbildung 11: Average age at retirement across years, 2007-2015; full sample excluding individuals that receive disability insurance.

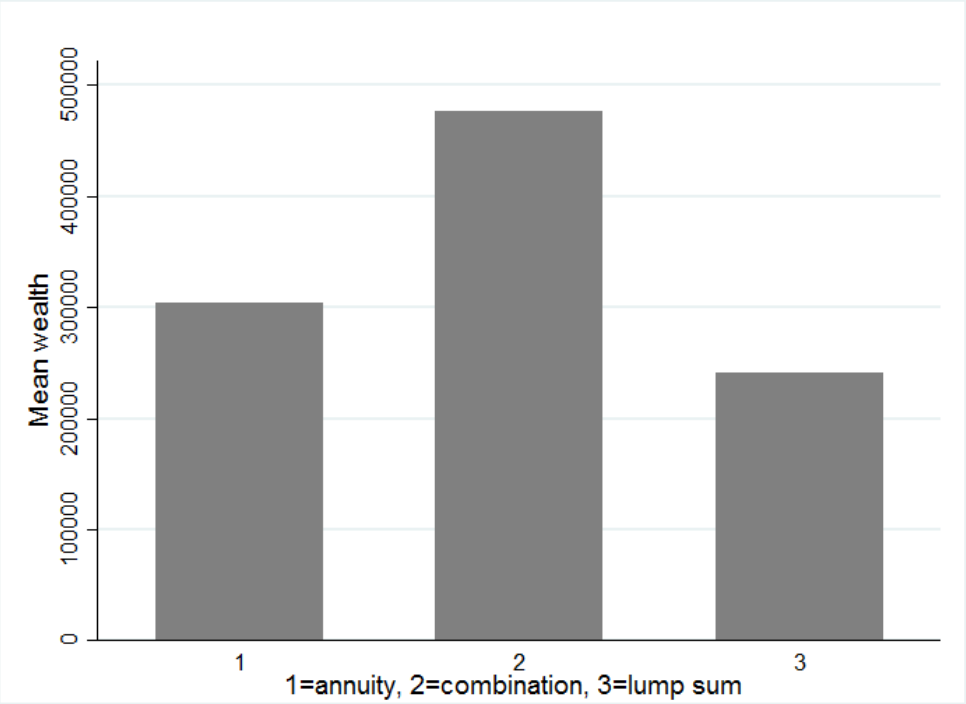

Abbildung 12: Average wealth across choice (full annuity, combination annuity and lump sum, full lump sum); full sample excluding individuals that receive disability insurance.

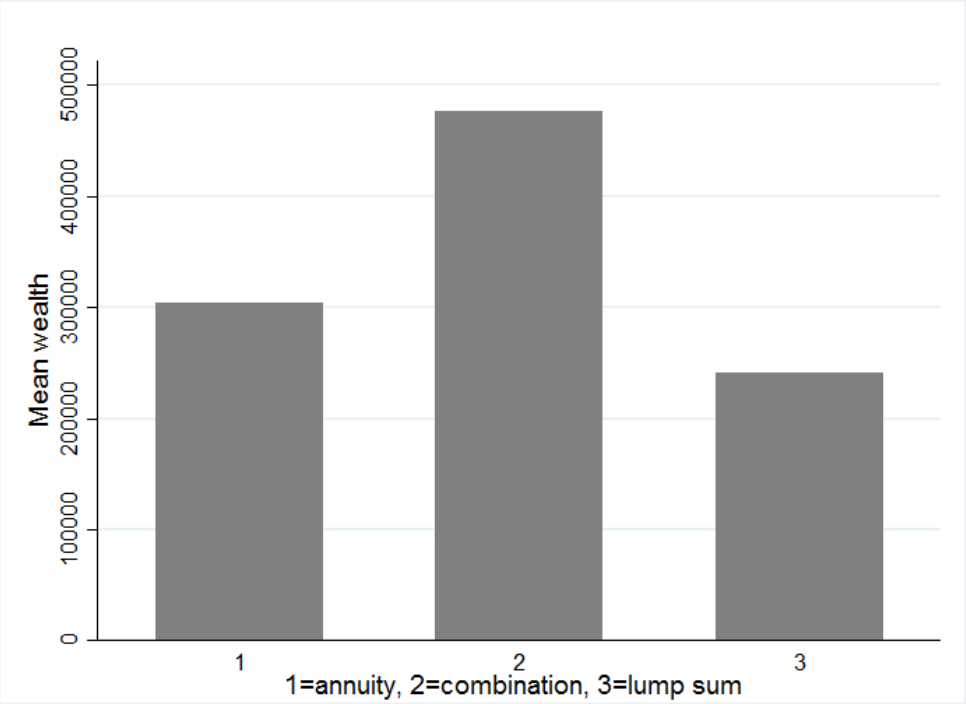

Abbildung 13: Histogram of number of people entering retirement, 2007-2015; full sample.

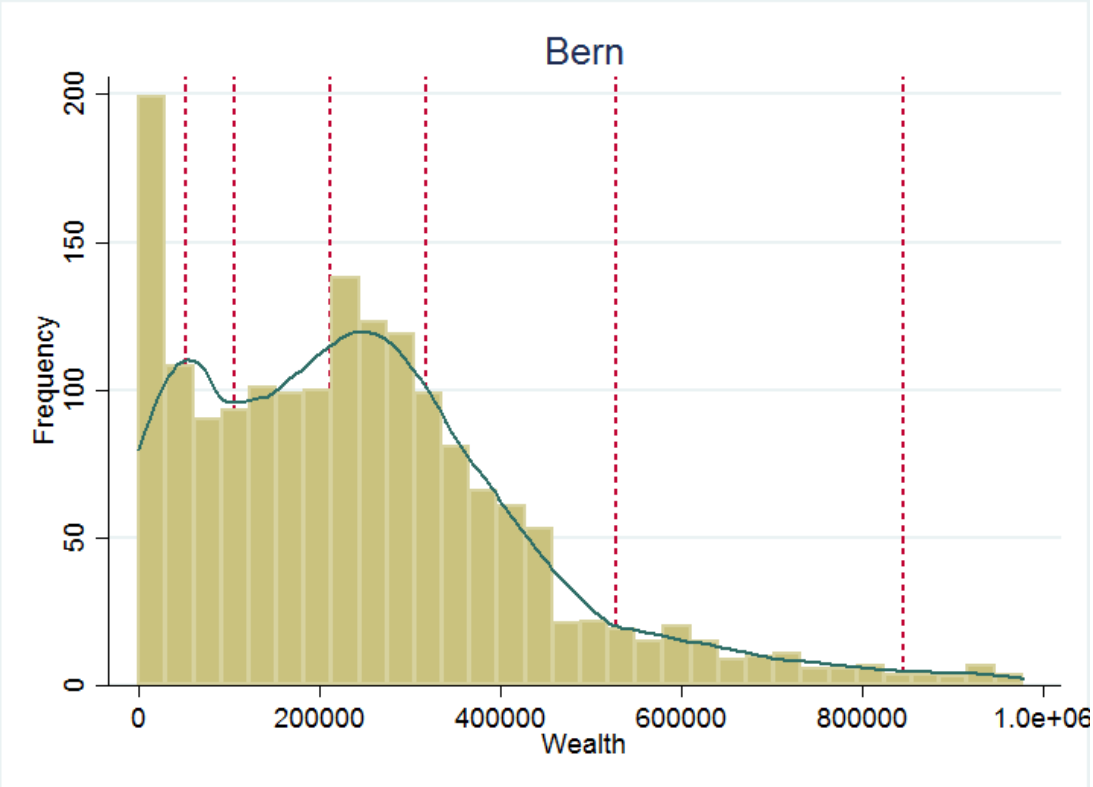

Abbildung 14: Wealth frequency density and wealth kernel density for wealth 0 to 1,000,000, married individuals, canton Bern. Red dotted lines indicate tax thresholds where marginal tax rates increase.

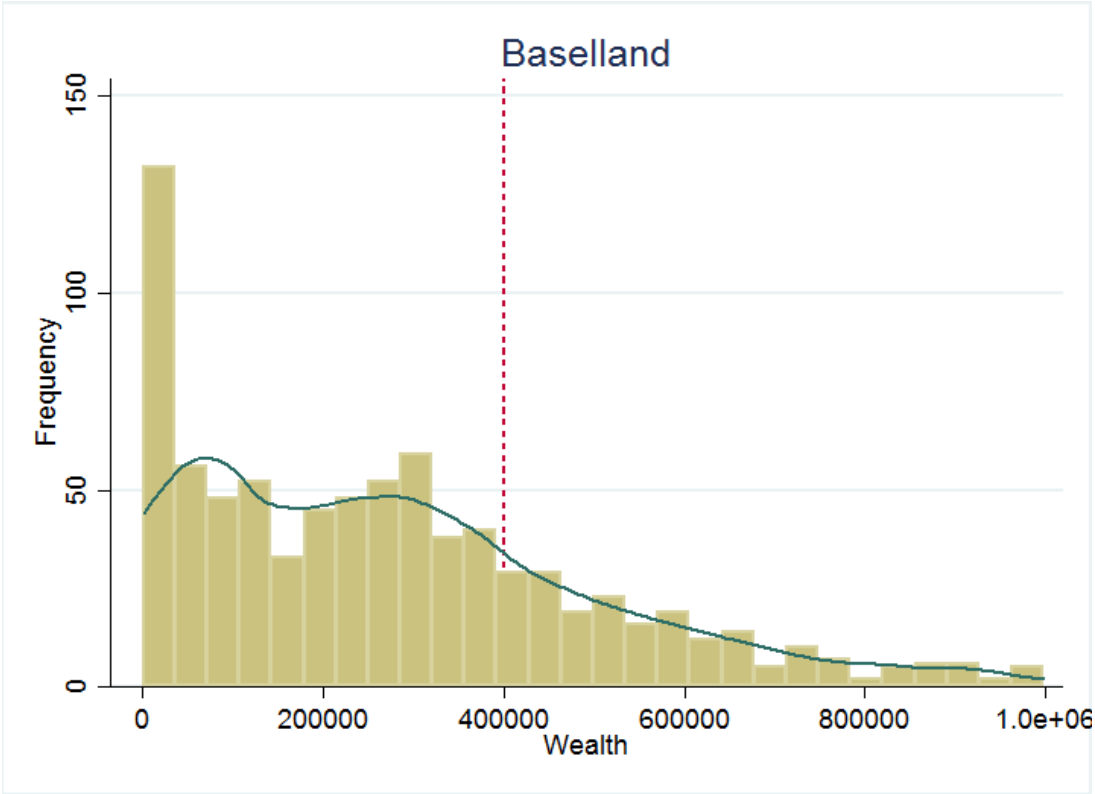

Abbildung 15: Wealth frequency density and wealth kernel density for wealth 0 to 1,000,000, married and single individuals, canton Baselland. Red dotted line indicates tax threshold where marginal tax rates increases.

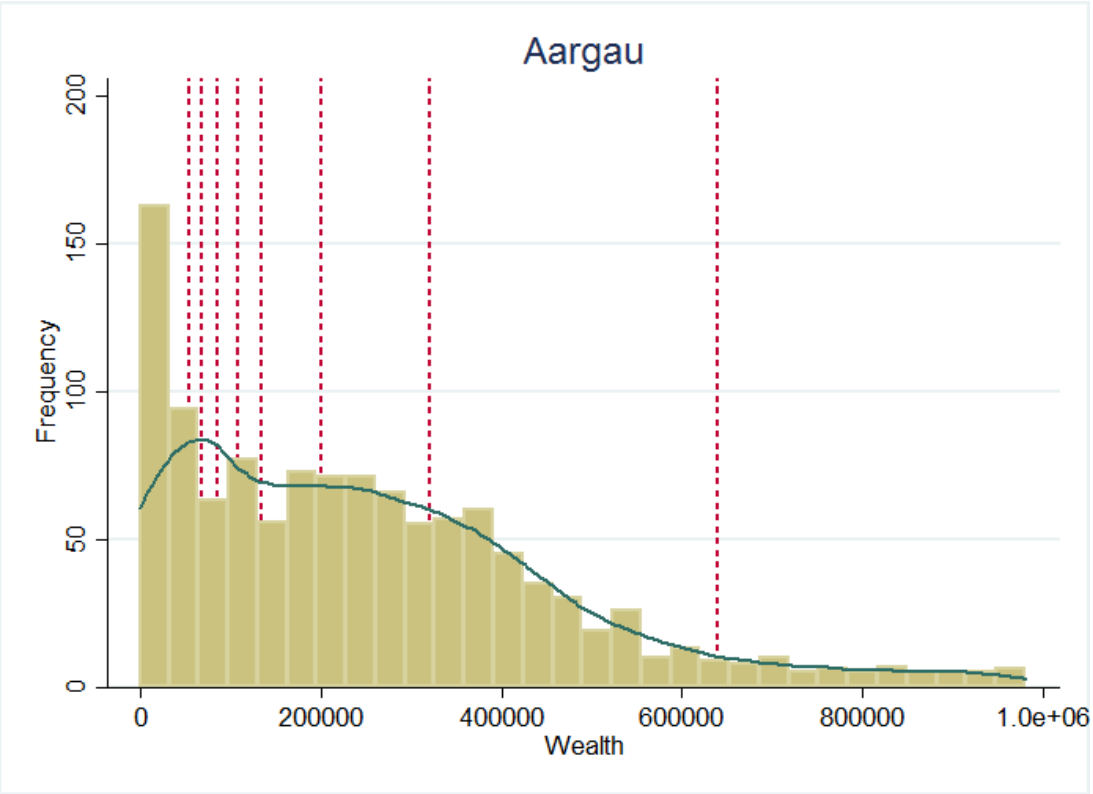

Abbildung 16: Wealth frequency density and wealth kernel density for wealth 0 to 1,000,000, married individuals, canton Aargau. Red dotted lines indicate tax thresholds where marginal tax rates increase.