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Annuity puzzle: Evidence from a Swiss pension fund

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Abstract

We analyze individual annuitization decisions at retirement in an environment with mandatory participation in a funded pension pillar and low average annuity price. Using administrative data from a large Swiss insurance company over the period 2011–2015, we document that, even in this favorable environment, only 42.7% of the retirees fully annuitize, against 45% taking full lump sum. We show that individual annuitization decisions strongly respond to financial incentives, measured by the Money Worth Ratio, and to the tax rates on annuity and lump-sum payments. Lump-sum payments are more common among French- and Italian-speaking individuals. Using Survey of Health, Ageing and Retirement in Europe data, we show that French- and Italian-speaking Swiss are more likely to leave inheritance—thus suggesting that preferences for bequests may affect annuitization decisions. Finally, we provide evidence of asymmetric information, using the unused observable test, to show that individuals living in high mortality municipalities are less likely to annuitize and more likely to cash out their pension wealth.

KEYWORDS
annuity demand, culture, mortality risk, passive adverse selection

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1 | INTRODUCTION

Economists have long theorized (Yaari, 1965) that older individuals are better off annuitizing their pension wealth rather than withdrawing lump sums at retirement. In fact, annuities provide insurance against longevity risk, thus preserving people from the risk of outliving their assets. Yet, the empirical evidence shows otherwise and several explanations have been put forward to account for behavior, the so-called "annuity puzzle." Adverse selection is pervasive in most annuity markets (Finkelstein & Poterba, 2002, 2004), in which fees are often high, thereby making annuities expensive financial products. The presence of additional welfare programs, such as public pensions, or the incentives built in the fiscal system may also reduce the demand for annuities. But individuals' characteristics, such as preferences for bequest or personalized long-term care (LTC), risk, and loss aversion, may play a role too.

In this paper, we analyze the annuitization decision at retirement in a specific environment, which does not suffer from many of these shortcomings. We consider the Swiss second pension pillar, in which individuals enrolled in company pension plans have to decide, upon retirement, whether to annuitize their accumulated pension wealth, to receive the lump-sum amount or to opt for a combination of these two options. Since enrolling into the second pension pillar is mandatory for Swiss workers with labor income above a minimum threshold, there is no adverse selection in participating to this pension program. Moreover, the coefficients used to convert the individual pension wealth into an annuity are administratively fixed at a very favorable level, so that the average price of an annuity is conveniently low. However, there could be adverse selection in the annuitization decision, based on unobserved individual characteristics.

In this favorable institutional setting, we exploit administrative data from a large Swiss insurance company (II pillar) over the period 2011–2015. We use this data set to test some specific hypotheses on the determinants of the annuity puzzle drawn from the literature, which we formulate in Section 5. First, we investigate the role played by individual characteristics, such as gender and pension wealth. Second, we evaluate the responsiveness of annuitization choices to financial and fiscal incentives. We construct a measure for the value of an annuity to an individual, that is, the Money Worth Ratio (MWR), using the insurance company information on the individuals' retirement age, pension wealth, annuity, or lump-sum payments, and the average mortality tables. Moreover, we calculate the overall average tax rates applied to each individual in the two cases of full annuitization and of complete lump-sum withdrawn. These tax rates vary according to individual characteristics, such as the amount of pension income, whether in the form of regular annuity payments or lump-sum payments, but also according to location defined at the canton and municipal levels. Third, we test whether family culture affects annuitization decisions, possibly by shaping preferences and attitudes towards bequest. In particular, we consider the language of the financial statement sent by the insurance company to the enrolled individuals and partition our sample into Latin—namely, French- and Italian-speaking individuals—and others, mostly German (or English) speaking. Finally, we examine the existence of asymmetric information in the Swiss annuity market, with the "unused observables" test. We investigate whether information available to the individual, such as the average mortality risk of their municipality of residence, is correlated with their annuity demand.

Our data documents that even though the most favorable choice would be to annuitize, only 42.7% of the retirees choose fully annuitization, against 45% who withdraw all their pension wealth as a lump sum. Moreover, our analysis shows that individuals respond to financial incentives, as proxied by MWRs and by taxes on annuity and on lump-sum payments. This is also true when we use mortality data at the municipal level to control for differences in expected longevity. Individual

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characteristics matter too. Annuitization rates are higher for women than for men, but lower for French- and Italian-speaking individuals, who display a strong preference for lump-sum payments, than for German speaking. Using the Survey of Health, Ageing and Retirement in Europe (SHARE) database, we show that French- and Italian-speaking Swiss are more likely to leave an inheritance than German-speaking Swiss. These findings provide supporting evidence to the idea that individual preferences for bequest may affect annuitization decisions.

Finally, we find evidence of adverse selection in annuitization choices, according to the "unused observable test" introduced by Finkelstein and Poterba (2014). In fact, we find that some observable individual characteristics that are not used for the pricing of the annuity are correlated with the annuity demand. This is the case of the mortality rate at the municipal level, with individuals from high-mortality municipalities being less likely to annuitize—both fully and partially.

The paper is structured as follows. Section 2 reviews the related literature, and Section 3 describes the Swiss institutional framework. Section 4 presents the methodology. Section 5 discusses our hypotheses, empirical strategy, and results. Finally, Section 6 concludes.

2 | LITERATURE

Since Yaari (1965), the theoretical literature (Brown & Poterba, 1999; Davidoff et al., 2005) has suggested that, in the absence of distortions or bequest motives, individuals should fully annuitize their pension wealth upon retirement. In fact, annuities allow one to insure against the longevity risk, by guaranteeing a stream of income so long as an individual is alive. However, the empirical literature has provided large evidence that most individuals do not fully annuitize and some even prefer complete withdrawal (Benartzi et al., 2011).

Incomplete annuitization of pension wealth may be related to the lack of flexibility (or perceived lack of flexibility) that annuities have vis-à-vis other forms of savings, which can easily be used to respond to unexpected shocks. Important reasons could be the presence of health-related risks, leading to unforeseen future out-of-pocket expenses, which call for precautionary savings, especially in cases when good quality public services are not available, or the desire to leave bequests (Peijnenburg et al., 2017; Sinclair & Smetters, 2004; Turra & Mitchell, 2007). Bequest motives induce retirees to prefer lower annuitization rates to have control over their private wealth and disposable funds to transfer to their offspring (Ameriks et al., 2011; Bommier & Le Grand, 2014; Friedman & Warshawsky, 1990). Moreover these two drivers may interact: bequest motives might decrease the demand for annuities by reducing the opportunity cost of precautionary savings and encouraging rich people to self-insure their late-life risks (Lockwood, 2018).[1] These cases are good examples of how other determinants could tilt the balance in favor of enhanced flexibility achieved through lump-sum payments. However, according to several theoretical models, bequests and other quests for flexibility cannot explain the prevailing underannuitization observed on the data. The alternative explanation is that annuity contracts are unfairly priced as a result of adverse selection (Lockwood, 2012). Finally, the existence of generous public pension benefits, which constitute a real (i.e., inflation-indexed) annuity, may also provide a disincentive for individuals to annuitize the additional pension wealth accumulated through the second pillar (Dushi & Webb, 2004).

[1]The cost of a cut in the consumption due to precautionary savings is higher for those people without bequest motives, who would like to consume all of their wealth, than for those who value the prospect of leaving inheritance to their heirs.

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The empirical literature has long recognized, with mixed evidence, the role of individual characteristics in explaining differences in annuity decisions. Hurd and Panis (2006) find that annuitization is more common among male, older, well-educated and richer individuals, while workers with short expected longevity are more likely to take a lump sum, while Agnew et al. (2008) suggest that women are more likely to annuitize, even after controlling for different degrees of risk aversion and financial literacy. If, on the one hand, wealth, financial literacy and education are shown to be important drivers of the take-up of annuity contracts (Cappelletti et al., 2013; Inkmann et al., 2011), especially for the participation of individuals to voluntary annuity markets, on the other hand the existence of other sources of old-age income has a negative effect on participation in the market and on the demand for annuities (Chalmers & Reuter, 2012; Inkmann et al., 2011). Differences in the subjective discount factor and nonaccurate perception of the mortality risk also affect annuity decisions (Horneff et al., 2023; O'Dea & Sturrock, 2021; Warner & Pleeter, 2001). To account for differences in mortality risk, marital status, risk aversion, and social security benefits, Brown (2001) uses a life-cycle model of consumption to construct a utility-based measure of annuity valuation, that is, an equivalent wealth measure, which is shown to be positively associated to the annuitization rate. To capture in one summary measure individual characteristics, Brown (2001) uses the same approach on Swiss administrative data, and Bütler and Teppa (2007) find similar results, with an important twist: low accumulation of retirement assets is strongly associated with taking up the lump-sum option. In a different setup, Chalmers and Reuter (2012) show that individuals only weakly respond to exogenous variation in life annuity pricing, while they strongly respond to individual characteristics, such as health conditions, so that in their data, financial incentives do not seem to play a role.

Preference in terms of attitudes to risk and the discounting of utility over time obviously may play a role: some models are based on the assumption that individuals are loss-averse, and thus perceive an annuity as a gamble, in which an early departure represents a loss of a large part of their pension wealth or that preferences characterized by early resolution of uncertainty lead to lower demand for annuities when the value of life is high (Benartzi et al., 2011; Hu & Scott, 2007; Munnell et al., 2022; Pashchenko & Porapakkarm, 2022). Also, individuals characterized by ambiguity aversion towards uncertain survival probabilities tend to annuitize less (d'Albis et al., 2019). Overall, several behavioral aspects have been advocated in the literature: mental accounting, framing or distrust (Agnew et al., 2008; Goedde-Menke et al., 2014). In some cases individuals facing the trade-off between a lump sum and an annuity may overweight the relevance of an immediate large lump sum versus a long sequence of smaller sums (Benartzi et al., 2011) or they might overreact to recent events, such as realizations of stock returns, especially at older ages (Previtero, 2014).[2]

Another stream of the literature has stressed the interaction between the timing of annuity payments and the market structure, suggesting that annuities may have low values for consumers, due to the loading factors which could be generated by adverse selection prevailing in such markets (Brugiavini, 1993; Friedman & Warshawsky, 1990). Indeed, the empirical literature provides ample evidence of adverse selection even in more developed annuity markets, such as the UK (Finkelstein & Poterba, 2002, 2004), Chile (Illanes & Padi, 2021), and Sweden (Hagen, 2015). Finkelstein and Poterba (2002, 2004) use the positive ex post correlation test (Chiappori & Salanie, 2000) to establish the existence of adverse selection both within and across annuity products in the UK. They show that annuitants tend to live longer than the average UK

[2]Li et al. (2021) also study the theoretical implications of misperceptions about the default risk of annuity providers on annuity demand and show that even a modest perceived risk can negatively affect annuitization.

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population and that long-lived individuals self-select into annuity products with a longer guaranteed period and a steeper payment profile. As a result, the value of the annuities is lower for those products that are preferred by long-lived individuals. Finkelstein and Poterba (2002) draw an interesting distinction between "active" and "passive" selection. In "active selection," people exploit private information on their expected mortality, for instance, from parents' mortality or from their own health, to take decisions. In "passive selection," the demand for annuities is correlated with observable socioeconomic factors, which, in turn, are correlated with life expectancy, but are not directly related to individual's choices. Finkelstein and Poterba (2014) develop an alternative "unused observable" test to analyze the asymmetric use of information in annuity markets. By using a data set of annuity contracts over the period 1980–1998 from a UK life insurer, they show that the socioeconomic characteristics of the annuitant's ward that are correlated with the annuitant's mortality risk matter for annuitization decisions, conditional on the age and gender of the individual, which are the only two variables used by insurers in annuity pricing. These characteristics predict the choice of annuity contract in terms of initial annual annuity payment, the tilt of the annuity payment stream over time, and the length of the annuity guarantee period.

Besides individual's preferences and characteristics of the annuity markets directly related to the market price, other features of the contract or of the environment could be relevant, for example, the presence of large administrative costs (Mitchell et al., 1999) or distortive fiscal incentives (Bütler & Ramsden, 2024). Welfare programs may also reduce the appeal of annuities when means-tested income support, health, or LTC programs are available to older people (Bütler et al., 2017; Laitner et al., 2018; Reichling & Smetters, 2015).

A wide literature has analyzed "cultural factors" as determinants of portfolio and insurance decisions, among other economic decisions (for a survey, see Alesina & Giuliano, 2015). Several authors refer to "family cultural factors," that is, they consider that habits and traditions, are passed on from parents to children (Guiso et al., 2006). These "cultural traits" are part of the wider class of individuals' characteristics, but should be related to the social imprinting that individuals carry with them, and not just to the individual-specific preferences, which in turn affect several domains of economic decision making. The strength of family ties has been shown to influence individuals' living arrangements across Europe (Giuliano, 2007) and employment decisions (Algan & Cahuc, 2007, 2009). Also, the design of economic institutions may depend on the predominant family culture. Alesina and Giuliano (2015) argue that strong family ties induce individuals to be less mobile and thus to prefer a more regulated labor market, while countries with weak family ties are associated with more flexible labor markets since workers are less reluctant to provide geographic mobility. Galasso and Profeta (2018) suggest that the design of the pension system, in particular its degree of generosity, depends on the pre-existing family organization, as proxied by the inheritance rules. Finally, Eugster et al. (2011) and Gentili et al. (2017) analyze the role of culture, respectively, in the demand for social insurance and in LTC arrangements. They focus on Switzerland and exploit the within-state variation in cultural groups. Their results suggest that residents of French-, Italian-, and Romansh-speaking municipalities develop a higher demand for social insurance, use home-based care services more intensely and enter nursing homes at older ages and in worse condition than their German-speaking neighbors.

Our paper contributes to the literature on the annuity puzzle in several ways. First, unlike most of the literature that focuses on voluntary annuity markets, we consider the Swiss annuity market in which participation is compulsory for most employees. Hence, we can analyze the existence and the determinants of the annuity choices in an environment with no self-selection in the pool of individuals accessing the market. Second, we are able to study the decision to annuitize and its

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determinants in a market in which annuity prices—being administratively determined—are significantly lower than in other countries. Hence, one important dimension of the annuity puzzle—the high price of the annuities—should be absent. Third, we analyze the role of culture in explaining the annuity puzzle and link cultural traits to the preferences for bequests. Our results also contribute to a wider literature on the role of culture on economic decisions, by providing first evidence on the effect of family culture on the annuitization choice. This is a novel result, as family ties are found to affect several economic decisions (Alesina & Giuliano, 2015), but we are not aware of any existing evidence on their role in the annuity market. Finally, we document the existence of unused observable information in the Swiss annuity market, due to governmental regulations. In fact, we find large inequalities in mortality across municipalities in Switzerland and show how these differences predict individual's annuity decisions at retirement.

3 | THE SWISS PENSION SYSTEM

The Swiss pension system is based on two pillars. The first pillar consists of the public basic old-age social security provision, which is mandatory for all employees, self-employed, and unemployed individuals over the age of 20. This unfunded system is financed by payroll taxes (PAYG), which amount to 9.8% of the individual's labor market income and provides inflation-indexed pension benefits upon retirement. The normal retirement age is currently 65 for men and 64 for women. The second pillar consists of funded company pension plans. Participation is compulsory for all the employees whose income exceeds a minimum threshold of 21,330 CHF/year (in 2019), however, other employees, whose income is below the threshold, and self-employed persons may choose to join the plan. Overall, approximately 96% of working men and 83% of working women are covered (Bütler, 2016). The contribution rate, which is equally shared between employers and employees, changes with the age of the insured worker and amounts on average to 17% of the labor income. For this second pillar, the minimum age to be entitled to a benefit varies across pension plans. Many plans allow early retirement, by offering an option for early withdrawal from employment with actuarially fair reductions. In Switzerland, pension funds are structured as not-for-profit organizations, their administrative costs are covered by a specific contribution rate paid by employers and employees. In fact, the overall contribution rate of the second pillar is composed of three elements: the actual contribution to the pension fund, the contribution to the administrative costs of the pension fund, and the contribution to a disability insurance scheme. In our calculation of the MWR, which we describe below, we consider the cumulated pension wealth that is associated with the first component, that is, the actual contribution to the pension funds.[3]

First pillar pension benefits can only be collected as real annuities. Instead, the second pillar of occupational pension wealth can be withdrawn either as a monthly (nominal) annuity, as a lump-sum payment, or as a combination of the two components. The annuity is calculated using a conversion rate, which varies according to the gender and age of the recipient. The minimum conversion rate is decided by law. Since 2004 it has gradually been reduced from 7.2 to 6.8 (for men and women who have reached the normal state retirement age). The minimum conversion rate applies only on the mandatory part of the occupational pension savings, which refers to the portion of the annual salary between 24,885 and 85,320 CHF. Pension funds may decide to use a lower

[3]Not considering the contribution to the administrative costs may increase the value of the MWR, however this is not expected to correlate with any of the relevant variables as these are large pension funds applying similar costs.

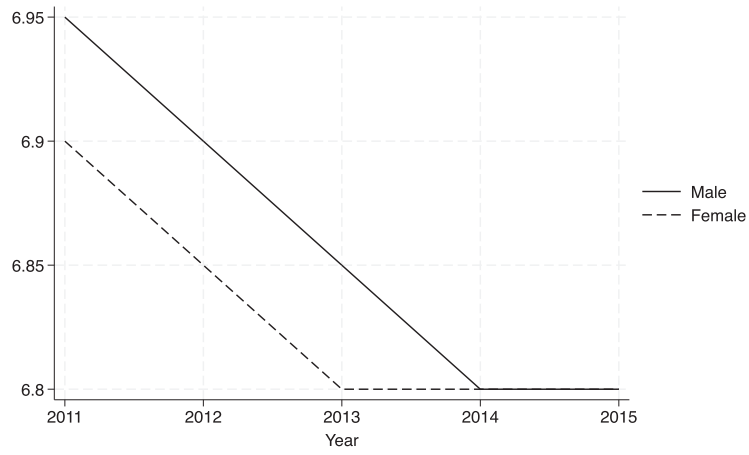

FIGURE 1 Conversion rates over time by gender. The graph shows the conversion rates applied by the pension fund to translate the pension wealth (mandatory component) into annuities, for women age 64 and men age 65.

conversion rate for the overmandatory part. Figure 1 shows the evolution of the minimum conversion rate by gender over the time span of our analysis.

Both annuities and lump-sum payments are subject to income taxes. Three layers of taxation apply: national, cantonal, and municipal levels. Annuities are simply added to other sources of labor income, such as first-pillar pensions, to determine the tax base, on which the national, cantonal and municipal tax rates are applied every year. Lump-sum payments are instead subject to a one-time special tax, which is kept separate from other sources of labor income. Also in this case, three tax rates are applied to the taxable lump-sum payment to determine the total special tax on the lump-sum payment.

The Swiss welfare system includes other programs that can be of relevance to individuals making their financial decisions at retirement. Older people, disabled individuals and survivors, who are unable to cover basic costs of living with benefits from the two pension pillars and from other sources of income, are eligible for means-tested benefits from a supplementary benefit scheme, which secures a monthly income of 3000 CHF for singles and 4500 CHF for couples (Bütler et al., 2015). This income level is coupled with guaranteed health insurance, provided by the canton, covering health expenses. Cantons are also in charge of providing LTC services, through medical nursing homes, and nursing departments of old-age and disability home.[4] According to the federal law on LTC provision, about 65% of the cost of health care provided by nursing homes or by home-based health care services is covered by compulsory health insurance. Individuals are responsible for up to 20% of the costs, with a ceiling of approximately 8000 CHF/year, while the remaining part of the bill is covered by cantons and municipalities. The nonmedical costs of LTC, such as residential costs and help at home for activities of daily living or instrumental activities of daily living, are financed through individuals' out-of-pocket expenditures, which may vary according to their income or wealth, or covered by supplementary LTC insurance. Individuals with insufficient resources to cover these basic costs may receive additional transfers from the Swiss old age and survivors insurance scheme pillar of the social security administration and from the canton.

[4]While German-speaking regions have so far relied more heavily on nursing homes, French- and Italian-speaking areas have developed more home care services (Gentili et al., 2017).

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4 | DATA AND DESCRIPTIVE EVIDENCE

4.1 | Data

In our analysis, we use administrative data from a large Swiss insurance company on almost 13,000 contracts for the period 2011–2015. The data set contains information on the financial choice at retirement (annuity only, lump-sum payment only, or a combination of the two options) and related amounts, on the date of retirement, age at retirement, gender, postal code, and language used in the financial statements sent by the company for almost 13,000 individuals. For each individual, we can estimate the total pension wealth from the lump-sum amount or from the annuity (or from the combination). In the case of an annuity, we use the conversion rates that are applied to convert the pension wealth into annuities.[5] We then construct three outcome variables: (i) Annuity is a dummy variable equal to 1 if the individual chooses to annuitize fully and 0 otherwise, (ii) Annuity Rate is the share of the individual's pension wealth obtained as an annuity, and (iii) Capital is a dummy variable equal to 1 if the individual chooses to collect all the pension wealth as a lump-sum payment and 0 otherwise.

We use the postal code of the individual's place of residence to construct individuals' specific tax rates on the annuity and on the lump sum since these tax rates vary by municipalities and cantons. We collect information on tax schemes from the tax administrations at the national level, for the 26 Swiss cantons and for around 1700 municipalities in the sample. For each individual, depending on his/her municipality of residence and income level, we calculate the tax rate that would be applied in the two polar options of full annuitization and of full withdrawal with the lump sum. In the case of fully annuitization, we calculate the taxable income by summing the annuity and an estimate of the first pillar pension, since the tax rate applied to the annuity depends on this overall taxable income.[6] The tax rate varies by cantons (and municipalities) and determines the progressivity of the tax schedule. Using the federal and canton tax rates and the municipal multiplier to the canton taxes, which determines the municipal taxes, we can calculate the overall average tax rate imposed every year on the annuity. In the case of full lump-sum withdrawal, special federal, cantonal, and municipal taxes are levied on a one-time basis. We apply the respective tax rates, which again vary at canton and municipal levels, to obtain the overall average tax rate on the lump-sum payment.

In the calculation of the tax rates, we assume individuals to be married and to be jointly taxed, with their incomes being combined to determine the relevant tax bracket.[7] Unfortunately, our data contain neither information on whether an individual is actually married, nor on the income of the spouse[8]; hence, we consider different possible scenarios. In the baseline scenario we do not assign any income to the spouse, so that the insured person is the only earner in the

[5]We have information on the conversion rates used for both the mandatory part and the overmandatory part of the pension wealth.

[6]In line with Butler and Ruesch (2008), we assume that the first pillar pension is equal to 32/17, 52/46, or 122/40 of the benefit payment of the annuity, respectively, if the annuity is less than 52,000 CHF, between 52,000 and 122,000 CHF, and larger than 122,000 CHF.

[7]Among people retiring at the Normal Retirement Age, the marriage rate is 70%.

[8]Married (or in a registered partnership) women are entitled to a widow's first pillar pension equal to 80% of their spouse's old-age pension. Men are entitled to receive a widower's pension if they care after children from the marriage aged 18 or younger. Rules for occupational pension funds vary across funds. However, the general rule is that a surviving spouse (male or female) of an insured person is entitled to a second pillar pension, if they have dependent children or are at least 45 years old and the marriage lasted at least 5 years.

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family.[9] But we do provide some sensitivity analysis by exploring three alternative cases: in the first scenario, we assume that the wife of a man who is in our sample is not employed; thus, the couple has no additional pension, while the husband of a woman included in our sample has a pension income that is 25% higher than that of the wife. In the second scenario, the wife of a man in our sample is still assumed to have no pension, while the husband of a woman is assumed to have a pension that is twice as large as the wife's. In the third scenario, we assume the gender pension gap between husband and wife to be 25%, irrespective of the gender of the individual we observe.[10]

We also collect age and gender-specific mortality data for the Swiss population as a whole and at the municipal level. Data at the national level come from the mortality tables provided by the Swiss Federal Statistical Office. To construct municipal-specific mortality rates, we use vital statistics death data and census population data. We attribute the mortality rates to the different individuals, according to their gender and age, and, for the data at the municipal level, also according to their postal code. We then use these data also to calculate the individual value of the annuity (see Section 4.2).

Finally, we collect the following municipal variables from the Swiss Federal Statistical Office: mortality rates for the age group 60–79, average taxable income, share of individuals with upper-secondary education, and share of foreigners.

4.2 | The MWR

To analyze whether people are responsive to financial incentives, and, particularly to the price of the annuity, we calculate the MWR. This is equal to the expected present discounted value of all annuity payments divided by the initial premium:

$$\mathrm{MWR}_{i,x,s} = \frac{A_i}{\mathrm{PW}_i} \sum_{t=j}^{w} \frac{{}_jp_{x,s}}{(1+r)^{(j-t)}}, \tag{1}$$

where A_i is the annual annuity payment received by individual i, w is the ultimate age in the mortality table, ${}_jp_{x,s}$ is the probability that an individual aged x of sex s is still alive at time j, r is the interest rate used to discount future payments, and PW_i is the accumulated pension wealth of individual i. The price of an annuity is typically defined as the complement to one of the MWR. For each individual, the accumulated pension wealth can be estimated from insurance company data by considering the lump-sum payments and/or the annuity payments, to which the conversion coefficients are applied. The surviving probabilities come from the national-level mortality tables provided by the Swiss Federal Statistical. They differ by gender. Finally, we assume a nominal interest rate of 4% to discount future payments, which corresponds to the technical interest rate for a minimum conversion rate of 6.8.[11]

[9]In 2011, among married individuals, the share of employed women is 58%, while the share of employed men is 72% (Federal Statistics Office). More than half of employed women work part-time.

[10]These assumptions are consistent with the employment rate among Swiss married women in the period of analysis being about 65%, with having more than 70% of part-time jobs among employed Swiss women, and with a gender pension gap among married individuals of 50%.

[11]We control that our results are robust to using alternative discounting rates. Specifically, we replicate our analysis using the interest rate of a 10-year government bond plus a constant spread of 0.03, 0.02, or 0.04. See Section 5.1.

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A novelty of our paper is that we also construct an alternative measure of the individuals' MWRs, which captures the differences in life expectancy by municipality and gender. To smooth out these more granular mortality data and provide a complete set of mortality probabilities at different ages, we adopt the following Gompertz function:

$$\mu_{x,m,s} = \alpha e^{b_{x,s}}, \tag{2}$$

where μ is the rate of mortality at age x in the municipality m for sex s, α denotes the level of mortality at initial age, and b the increase in mortality over age x for sex s. To estimate the parameters of the Gompertz curve, we use the method of least squared and estimate the following model:

$$\log(m_{x,m}) = \alpha + \beta_{am} + n_m, \tag{3}$$

where $m_{x,m}$ is age- and municipality-specific mortality rates, am is equal to $\frac{\text{age} + \text{age}(n+1)}{2}$, and n_m are municipal fixed-effects. We estimate the model separately for women and men.

The complements of the predicted values of our dependent variable in the model represent age- and gender-specific municipal survival probabilities ($h_{x,m,s}$). Specifically,

$$h_{x,m,s} = 1 - e^{\log(\hat{m}_{x,m})}. \tag{4}$$

These probabilities are used to compute our alternative measure of individuals' MWRs, which reflects mortality differences across municipalities, as follows:

$$\text{MWR}_{i,x,s,mun} = \frac{A_i}{\text{PW}_i} \sum_{t=j}^{w} \frac{{}_j hx, m, s}{(1+r)^{(j-t)}}, \tag{5}$$

where ${}_j h_{xms}$ is the probability that an individual aged x of sex s living in the municipality m, is still alive at time j. All the other variables are defined as before. Hence, this alternative measure of MWRs varies according to the individuals' municipality of residence, age at retirement, sex, annual annuity payment, and pension wealth. Figure 2 shows the observed mortality rates and the modeled Gompertz hazard function. Although these estimates are useful to the extent that we can incorporate them into the annuity valuation methodologies, it is interesting to note that the fit is good, at least until very old ages, such as 95 or 96.

4.3 | Descriptive evidence

Table 1 provides summary statistics for our variables of interest. The average retirement age is 64.14 years and the average pension wealth amounts to 280,000 CHF. Second pillar recipients are mostly male 63%. Most of the financial statements are in German (77%), with a lower percentage in French (14%) and in Italian (8%).[12] Individuals' financial decisions at retirement were very polarized: 43% decided to fully annuitize their pension wealth and 45% to cash in the entire amount as a lump sum. Only 13% of the beneficiaries used a combination of both instruments.

[12]The Federal Statistical Office reports that in 2017 the share of the German-, French-, and Italian-speaking groups in the Swiss population were, respectively, 65%, 18%, and 10%.

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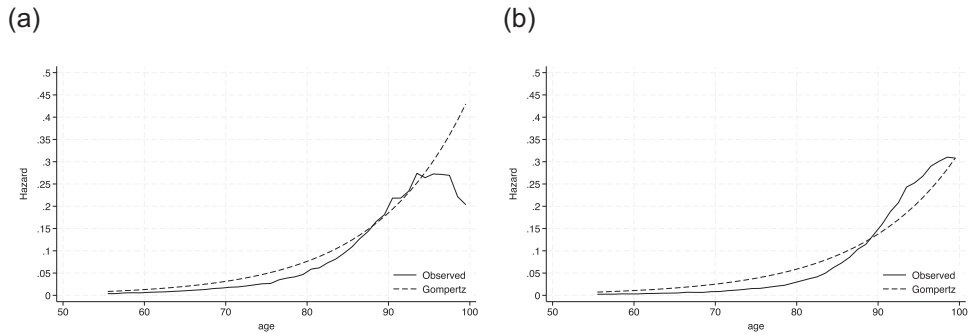

FIGURE 2 Age-specific mortality and Gompertz fit. (a) Switzerland men 2011–2015 and (b) Switzerland women 2011–2015. The graphs show the average observed mortality rates and the modeled Gompertz hazard rates in Switzerland for the 55–100 age group for men and women, respectively. The average is computed using municipal mortality rates and respective Gompertz estimates for the 2011–2015 time interval.

TABLE 1 Descriptive statistics.

Variable	Mean	SD	*N*
Female	0.366	0.482	12,320
German	0.775	0.417	12,320
English	0.007	0.087	12,320
French	0.144	0.351	12,320
Italian	0.077	0.417	12,320
Retirement age	64.138	1.742	12,320
Tax rate on capital	0.055	0.025	12,320
Tax rate on annuity	0.059	0.059	12,320
Pension wealth	2.873	2.740	12,320
Annuity	0.427	0.495	12,320
Share annuity	0.504	0.476	12,320
Capital	0.450	0.50	12,320
Death rate 60–79	0.013	0.007	12,320
MWR	1.206	0.060	12,320
MWR mun	1.235	0.077	12,320
Average income (municipal)	77,103	33,797	12,320
Share foreigners (municipal)	0.229	0.103	12,320
Share with upper-secondary education (municipal)	0.481	0.064	12,320

Note: Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Share annuity = (amount of pension wealth withdrawn as annuity/total pension wealth); Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF.

Abbreviation: MWR, Money Worth Ratio.

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Figure 3 displays the share of individuals, who fully annuitize, as a function of their pension wealth. Full annuitization is uncommon among individuals in the lowest decile of pension wealth, while ranging between 40% and 50% for individuals located in higher deciles of the pension-wealth distribution. As we argued, this pattern may depend on several factors, but in this particular case the existence of means-tested supplementary benefits provides an incentive for people with low pension wealth to opt for a full lump-sum payment, to avoid receiving even small annuities that may jeopardize their eligibility to social insurance scheme (Bütler et al., 2017). A further relevant route is that pension wealth levels may be negatively correlated with subjective discount rates and mortality rates, thereby leading low-wealth individuals to prefer the lump-sum option (Bütler et al., 2017; Frederick et al., 2002; Loewenstein, 1987).

Table 1 also reports summary statistics for the municipal mortality rate of the 60–79 age group and for individuals' MWRs. The average mortality risk is 1.3%.

FIGURE 3 Full annuitization by pension wealth deciles. The graph shows the share of individuals who fully annuitize their pension wealth in each decile of pension wealth. Data: Our sample 2011–2015.

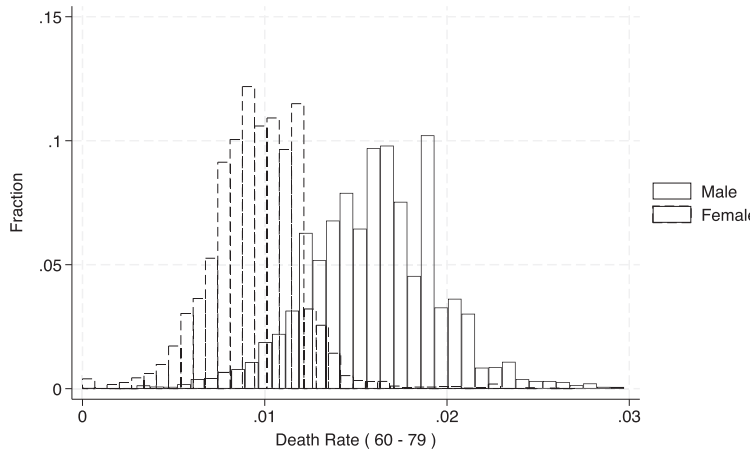

FIGURE 4 Municipal death rates (60–79) by gender. The graph shows the distribution of the female and male municipality mortality risk for the 60–79 age group, in our sample. Individuals are linked to the corresponding mortality risk using their municipality of residence and gender. Years: 2011–2015.

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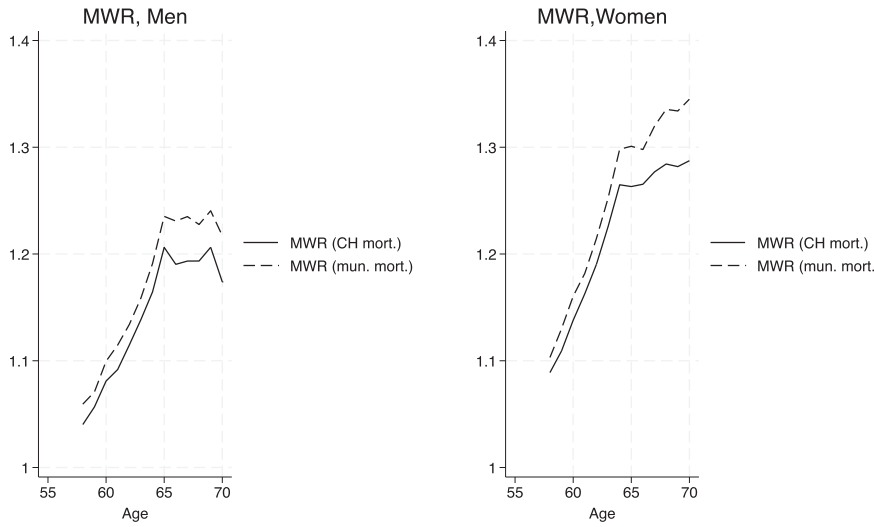

FIGURE 5 Individual Money Worth Ratios (MWRs) by age and gender. The graphs show the average MWR in our sample by age and gender of the individual. In the right figure, the MWRs vary according to the age, gender, year, and individual pension wealth of the individual. In the left figure, the MWRs also differ by municipality of residence of the individual. Years: 2011–2015.

Figure 4 plots the distribution of mortality risk for the 60–79 age group in the different municipalities for men and women. Large differences emerge, particularly for men. Municipalities at the 90th percentile of the distribution are characterized by a male mortality risk of 0.020, while the death rate decreases to 0.011 for those at the 10th percentile. The female mortality risk appears instead to be more compressed: the difference between these two percentiles is equal to 0.06.

The average MWR is well above one: 1.20–1.23 (Table 1). This large average MWR reveals that annuities are offered at a very favorable price in Switzerland. This depends on insurance companies being legally bind to use a given conversion rate of 6.8 (or more) for the mandatory part of the second pillar. This is recognized to be extremely convenient for retirees, particularly in a time of very low-interest rates (James & Vittas, 2001; Rusconi, 2008). Figure 5 displays the values of our two measures of MWR by retirement age for women (right panel) and men (left panel). For both measures, the MWR is 0.1 percentage points higher for women than for men and is increasing with retirement age until the mid-60s and then flattens out. For both sexes, the MWR calculated using the alternative measure of municipal life expectancy is larger than the MWR using the average life expectancy in Switzerland.

5 | HYPOTHESES AND EMPIRICAL ANALYSIS

The literature reviewed in Section 2 allows us to formulate specific hypotheses regarding the determinants of the annuity puzzle and the presence of adverse selection in annuitization decisions, which can be tested in the Swiss market. Specifically, we formulate and test four hypotheses in the context of the Swiss pension system. Some of these hypotheses have already been addressed in the literature. However, as previously discussed, the Swiss pension system displays interesting features, such as mandatory participation in the second (funded) pillar, which reduces the effects of adverse

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selection, and administrative regulations that allow for favourable pricing of the annuity, hence making the annuity choice appealing in a uniform way.

The first hypothesis regards the relationship between individual characteristics and annuity demand. We test whether women and richer individuals have stronger preferences for annuities, as observed in Anglo-Saxon countries.

Our second hypothesis concerns the responsiveness of annuitization choices to financial and fiscal incentives. We test whether, at the margin, the annuitization decision depends on the level of taxation, on the conversion rate used to translate the accumulated pension wealth into annuities, and on the individual value of the annuity (i.e., MWRs of the Annuity).

Our third hypothesis pertains to the role of cultural factors. To study the role of culture on annuitization choices we exploit the language (French, Italian, German, or English) of the statement sent to the individuals enrolled in the pension plan. We hypothesize that individuals with stronger family ties, proxied by the French or Italian language of their financial statement, are more likely to prefer the full lump-sum option or lower annuitization rates.

The last hypothesis relates to the existence of passive adverse selection as in Finkelstein and Poterba (2014), the idea is that the mortality rates prevailing in the municipality of residence of the individual, which cannot be used by the pension funds to set the annuity price, predict the annuitization choice.

We consider three possible dimensions of the annuitization choices: (i) the discrete choice to annuitize, (ii) the annuity rate in relation to the overall pension income, and (iii) the discrete variable capturing the presence of annuity wealth. To test the first two hypotheses, for each of our three dependent variables (Annuity, Annuity Rate, and Capital), we run three ordinary least square regressions. Our first specification is the following:

$$Y_{ist} = \beta_0 + \beta_1 \text{Female}_i + \beta_2 \text{ConversionRate}_i + \beta_3 X_i + \rho_s + \text{year}_t + \varepsilon_{ist}, \quad (6)$$

where Y_{ist} indicates the type of annuitization choice made by an individual i living in the canton s in the year t, Female_i is a dummy for women, ConversionRate_i indicates the conversion rate applied to convert the pension wealth into annuities,[13] and X_i is a set of individual characteristics that may influence the annuitization choice, including a battery of "pension wealth variables," which are the level of pension wealth and its square (to allow for nonlinearities) and their interactions with the female dummy.[14] We include the average tax rates that would be applied in the two extreme cases: full annuitization versus lump-sum withdrawal. Finally, ρ_s and year_t represent, respectively, canton and year fixed-effects, which control for differences in institutional arrangements and time-varying factors. Standard errors are clustered at the municipal level.

In a second specification, we replace Female_i and ConversionRate_i with MWR_i, which is the Money Worth Ratio for the individual i, calculated using gender- and age-specific mortality rates, as described in Section 4.2. It should be stressed once again that MWR is a synthetic utility-based

[13]The conversion rate varies according to the age and gender of the individual and to the year of retirement. Hence, we prefer not to include age dummies in our specifications. However, we do control that our results are robust enough to include a full set of age-time gender dummies.

[14]The interactions between the pension wealth variables and the female dummy capture the differential response to the level of pension wealth depending on the gender of the owner of the wealth, which may arise from different family arrangements or different overall family wealth. For instance, if a woman owns the pension wealth, her spouse may own an even larger pension wealth, whereas if a man owns the pension wealth, his spouse may own a lower pension wealth or no wealth at all. Hence, the pension wealth may be used differently, depending on who the owner is.

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measure of the insurance properties of the asset, which by construction varies itself with age and gender. For this reason when we use the "updated version" of MWR, we drop these variables from the regression to avoid correlations due to generated variables or even multicollinearity.

$$Y_{ist} = \beta_0 + \beta_1 \text{MWR}_i + \beta_2 X_i + \rho_s + \text{year}_t + \varepsilon_{ist}. \quad (7)$$

The third specification relates to the role of the cultural background: we augment the model by adding the language of the financial statement among the regressors. Specifically, we include Latin_i, which is a dummy variable for those who speak a Latin language (French, Italian, and Romansh).

Then, we investigate the presence of adverse selection in the annuitization choice, the basic model is one of the second specification above (Equation 7), where we include the municipal mortality rate for the age group 60–79 (MortalityRate_m) and a vector of other socioeconomic characteristics of the municipality itself, M_m, such as average income, share of foreigner and share of people with at least upper-secondary level of education:

$$Y_{imst} = \beta_0 + \beta_1 \text{MortalityRate}_m + \beta_2 \text{MWR}_i + \beta_3 M_m + \beta_4 X_i + \rho_s + \text{year}_t + \varepsilon_{imst}. \quad (8)$$

Finally, we replicate Equation (7) using our alternative measure of the MWR, which is constructed using mortality rates by age and gender that vary at the municipal level.

We also run a battery of robustness checks. For the two dichotomous dependent variables (Annuity and Capital), we replicate our analyses using a probit model rather than a linear probability model. We use alternative formulations (and values) of the interest rates in the calculation of the MWRs, as discussed in Section 4.2. Regarding the income of the spouse, which affects the calculation of the tax rates applied in the case of fully annuitization or complete withdrawal, we use three alternative scenarios, as described in Section 4.1.

5.1 | Results: The annuitization choice

Table 2 presents the results of the tests of the first two hypotheses regarding the role of individual characteristics and the financial incentives for annuitization decisions. Columns (1), (3), and (5) report the estimates of each factor that may affect financial incentives for our three variables of interest: Annuity, Share of Annuity and Capital (Equation 6). As expected, higher conversion rates, which increase the value of the annuity, increase their uptake and reduce the choice of lump-sum payments. The fiscal treatment of the annuity plays an important role, in line with the results in Bütler and Ramsden (2024). Higher average tax rates on the annuity reduce full annuitization and decrease the annuity rate, while higher tax rates on the lump-sum option encourage annuitization and reduce the probability of complete withdrawal. Individuals' accumulated pension wealth also matters for financial decisions at retirement. As also suggested by Figure 3, lower wealth is associated with a preference for a lump sum, with women being more responsive than men to changes in pension wealth. To assess any gender difference in the annuitization decision, Figure A1 plots the predicted values of the probability of fully annuitization over pension wealth by gender, obtained from the estimates of Equation (6). For low and medium levels of pension wealth, which are more likely for women than for men, women annuitize more than men. Only for high pension wealth, which is less likely for women, the opposite

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TABLE 2 The role of financial incentives.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
MWR		1.869***		2.137***		−2.225***
		(0.100)		(0.099)		(0.099)
Female	−0.012	−0.067***	−0.011	−0.074***	0.004	0.069***
	(0.018)	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)
Conversion rate	0.123***		0.150***		−0.160***	
	(0.011)		(0.011)		(0.011)	
Tax rate on annuity	−0.912***	−1.063***	−0.481**	−0.616***	0.273	0.399*
	(0.276)	(0.260)	(0.245)	(0.228)	(0.246)	(0.231)
Tax rate on lump sum	1.126***	0.819**	1.500***	1.139***	−1.866***	−1.486***
	(0.401)	(0.389)	(0.404)	(0.383)	(0.417)	(0.396)
Pension wealth	0.070***	0.112***	0.084***	0.130***	−0.091***	−0.139***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth * Female	0.066***	0.055***	0.065***	0.051***	−0.060***	−0.046***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth2	−0.004***	−0.006***	−0.005***	−0.006***	0.005***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Pension wealth2 * Female	−0.005***	−0.004***	−0.004***	−0.003***	0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.054	0.069	0.095	0.115	0.114	0.133
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Share annuity = (amount of pension wealth withdrawn as annuity/total pension wealth); Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

happens.[15] This gender difference may be due to the more favorable treatment that women receive on the annuity, given their higher longevity and even a larger conversion rate.

Columns (2), (4), and (6) present the results when financial incentives are mostly captured by the MWR, calculated using the average mortality rate (Equation 7). A higher MWR, corresponding to a lower price of an annuity, increases the probability of full or partial annuitization, and reduces the

[15]The average pension wealth for men is 352,000, while it is 118,000 for women.

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uptake of lump-sum payments. An increase of 0.06 points (corresponding to one standard deviation) of the MWR increases the probability of full annuitization of about 0.11 points, corresponding to an increase of 26% (or 0.22 SD), and decreases the probability of complete lump-sum withdrawal of 0.082 percentage points, corresponding to a decrease of 29% (or 0.16 SD). The effect on the annuity rate is instead of 0.13 points, corresponding to a 25% increase (or 0.27 SD). Also in this alternative specification, the tax treatment of the annuity and the accumulated pension wealth affect the annuity decision as expected.

But a generalization of our model allows us also to consider the effect of cultural traits: in Table 3, we report the results of the specification, in which we include the language of the financial

TABLE 3 The role of culture.

	(1)	(2)	(3)
Variables	**Annuity only**	**Share annuity**	**Capital only**
Latin	−0.052**	−0.034*	0.031
	(0.021)	(0.020)	(0.021)
MWR	1.868***	2.137***	−2.224***
	(0.100)	(0.099)	(0.099)
Female	−0.068***	−0.075***	0.069***
	(0.017)	(0.016)	(0.017)
Tax rate on annuity	−1.077***	−0.625***	0.407*
	(0.260)	(0.228)	(0.231)
Tax rate on lump sum	0.818**	1.138***	−1.485***
	(0.389)	(0.383)	(0.396)
Pension wealth	0.111***	0.130***	−0.138***
	(0.010)	(0.010)	(0.010)
Pension wealth * Female	0.055***	0.051***	−0.046***
	(0.011)	(0.010)	(0.010)
Pension wealth2	−0.006***	−0.006***	0.006***
	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.004***	−0.003***	0.003***
	(0.001)	(0.001)	(0.001)
Observations	12,320	12,320	12,320
R^2	0.070	0.115	0.134
Canton FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Share annuity = (amount of pension wealth withdrawn as annuity/total pension wealth); Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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statement. An interesting correlation emerges between the annuitization decision and the language of the financial statement. After controlling for the geographical location of the beneficiary, the coefficient on the Latin variable—that captures financial statements in French or in Italian—is negative and highly significant in Columns (1) and (2), while is positive (albeit not significant) in Column (3). Being a French- or an Italian-speaking person decreases the probability of choosing an annuity by 0.05 points, corresponding to 11% (or 0.10 SD). A similar result is found for the annuity rate. This suggests that cultural elements may play a role in shaping financial decisions at retirement. We will return to this aspect in Section 5.3.

The results in Tables 2 and 3 are robust to using a probit model (Tables A1 and A2), to applying the three alternative discounting rates for the calculation of the MWR, as discussed in Section 4.2 (Tables A3 and A4 report the results obtained using a constant spread of 0.03 plus the interest rate of a 10-year government bond, while the results obtained using the constant spread of 0.02 and 0.04 are available upon request), and to having three different assumptions regarding the pension income of the spouse (Tables A5–A10).[16] Hence, overall, our results support the idea that individuals react to financial incentives, if one can control for some confounding factors such as self-selection into the annuity market or even the differential effect of cultural traits.[17]

5.2 | Results: The role of the municipality

In Table 4, we test the hypothesis of the existence of asymmetric use of information in the Swiss annuity market by investigating whether differences in mortality risk at the municipal level contribute to explain annuitization choices. Columns (1), (3), and (5) report the estimates of the regression at Equation (8), which includes the mortality rate for the age group 60–79 in the municipality of residence of the individual (DeathRate_m), while Columns (2), (4), and (6) refer to the case in which MWR and municipal mortality rate are replaced by our second measure of the individual's MWR, which is calculated using the municipal mortality rate. Our findings show that fiscal treatment, pension wealth, and MWR remain crucial determinants of the financial decision at retirement. Yet, the mortality rate at the municipal level matters too. One standard deviation increase in the mortality rate (0.007 points) decreases the probability of full annuitization of 0.0090 points, corresponding to a 2.1% reduction (or 0.018 SD), and increases the probability of complete lump-sum withdrawal of 0.011 points, corresponding to a 2.4% increase (or 0.022 SD). Moreover, the inclusion of local mortality rates decreases the annuity rate by 0.010 points, corresponding to a 2.2% increase (or 0.02 SD).

The importance of the municipal mortality risk in the annuitization choices is confirmed in columns (2), (4), and (6), in which our second measure of the MWR that uses municipal-specific

[16]Table A11 shows the results of the specification regarding the Latin variable and the annuitization choices without the inclusion of any controls. The coefficient of the Latin variable remains negative (positive) in Columns (1) and (2) (3) and statistically significant in Columns (2) (3).

[17]As discussed in Footnote 13, we also control that our results are robust to including age dummies and (age × females) dummies. The results, which are available upon request, show that the inclusion of these dummies increases the coefficient of the MWR significantly (3.555). This might be due to potential multicollinearity between t, the MWR, and the age × female dummies. On the contrary, as expected, the coefficient of the conversion rate, which varies by gender, age, and year, becomes closer to 0 and loses significance, as there is no remaining variation to explore. Regarding the Latin dummy, the coefficient remains similar in magnitude, but no longer significant in Column (2).

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TABLE 4 The role of the municipal death rate.

Variables	(1) Annuity only	(2) Annuity only	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Death rate (60–79)	−1.299*		−1.551**		1.577**	
	(0.693)		(0.665)		(0.691)	
MWR	1.863***		2.134***		−2.224***	
	(0.100)		(0.099)		(0.099)	
MWR (mun)		1.032***		1.158***		−1.197***
		(0.079)		(0.081)		(0.082)
Female	−0.074***	−0.043**	−0.081***	−0.046***	0.076***	0.039**
	(0.018)	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)
Tax rate on annuity	−1.091***	−0.805***	−0.670***	−0.312	0.461**	0.079
	(0.256)	(0.264)	(0.225)	(0.233)	(0.228)	(0.235)
Tax rate on lump sum	0.699*	1.089***	0.936**	1.445***	−1.258***	−1.804***
	(0.398)	(0.391)	(0.391)	(0.389)	(0.405)	(0.402)
Pension wealth	0.115***	0.086***	0.136***	0.100***	−0.145***	−0.107***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Pension wealth * Female	0.054***	0.059***	0.050***	0.056***	−0.045***	−0.051***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth2	−0.006***	−0.005***	−0.006***	−0.005***	0.007***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Pension wealth2 * Female	−0.004***	−0.004***	−0.003***	−0.004***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.071	0.061	0.117	0.103	0.136	0.121
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	No	Yes	No	Yes	No

Note: Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Share annuity = (amount of pension wealth withdrawn as annuity/total pension wealth); Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Municipal controls include share of foreigners, municipal income, and share of individuals with upper-secondary education. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

mortality rates enters as a regressor. The MWR is highly significant: positive in the first two columns, and negative in the last one. Specifically, one standard deviation increase in the MWR (0.077 points) increases the probability of fully annuitization of 0.079 points, corresponding to an 18% increase (or 0.16 SD), and reduces the probability of complete lump-sum withdrawal of 0.092

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points, corresponding to a 20% drop (or 0.18 SD). Moreover, it increases the annuity rate by 0.089 points, corresponding to an 18% increase (or 0.19 SD).

Table A12 shows similar results using a probit model for the two dichotomous variables. Table A13 shows the robustness of the results to using an alternative discounting rate in constructing the MWR variables, Tables A14–A16 to using different assumptions for the pension income of the spouse, and Table A17 to including no controls.[18]

These findings are useful in two respects: they provide an estimate of the differential effects, mediated through the MWR, of differences in mortality, and they confirm that information about mortality rates at the municipal level, which is not used in the pricing of the annuity, despite being publicly available, has a large effect on financial decisions. This result is in line with the literature pointing to the existence of passive adverse selection (Finkelstein & Poterba, 2014).

5.3 | Culture and individual preferences

Our previous findings show that economic and fiscal incentives are crucial in financial decisions at retirement, but we have argued that other aspects of the annuity contract or of the contract holder turn out to be empirically relevant. In particular we show that French- and Italian-speaking individuals seem to have stronger preferences for lump-sum payments if compared with German-speaking individuals. Our data provides us with the unique opportunity to explore the potential channels through which cultural traits could matter. A similar argument motivates the paper by Gentili et al. (2017), who find systematic differences in entering nursing homes and relying more on home-based care, for older people living in regions speaking a Latin language versus the German regions in Switzerland. Illanes and Padi (2021) create a proxy for bequest motives in their Chilean sample by measuring the fraction of multigenerational households in the different municipalities. They find that, on average this proxy enhances the lump-sum option decision. We propose direct evidence on the role of cultural traits that are related to risk attitudes and to bequests motives. First, we analyze differences in the degree of risk aversion, which could lead to different financial choices at retirement. Second, we consider differences in family ties and in within-family arrangements on economic decisions such as leaving bequest or providing personalized care to the elderly.

To investigate these differences, we use the SHARE, a multidisciplinary and cross-national panel database containing individual information on health, retirement, socioeconomic status, and social and family networks for approximately 85,000 individuals aged 50 years or more in 19 European countries, including Switzerland (Börsch-Supan et al., 2013). We use the several waves (2004, 2007, 2011, 2013, 2015, and 2017) of SHARE for Switzerland. The survey includes information on gender and on the language spoken by the individual, which allows us to distinguish Swiss residents speaking a Latin language (Italian, French, and Romansh) from German-speaking residents. We exploit questions in the SHARE on risk aversion, purchase of insurance, probability of leaving an inheritance, and gift giving.

[18]Specifically, Table A13 shows the results obtained using a constant spread of 0.03 plus the interest rate of a 10-year government bond as a discounting rate. The results obtained using a constant spread of 0.02 or 0.04 plus the interest rate of a 10-year government bond are available upon request.

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We measure risk aversion using the following question, which offers a menu of answers: *When people invest their savings they can choose between assets that give low return with little risk to lose money, for instance, a bank account or a safe bond, or assets with a high return but also a higher risk of losing money, for instance, stocks and shares. Which of the statements on the card comes closest to the amount of financial risk that you are willing to take when you save or make investments? (a) Take substantial financial risks expecting to earn substantial returns. (b) Take above-average financial risks expecting to earn above-average returns. (c) Take average financial risks expecting to earn average returns. (d) Not willing to take any financial risks.* We construct a dummy variable for a risk aversion attitude that takes a value of 1 if individuals answered (*c*) or (*d*) to the previous question and 0 otherwise. Regarding the purchase of insurance, individuals are asked *"Do you currently own any life insurance policies?"* We construct a dummy variable equal to 1 for those who own a life insurance and 0 otherwise.

To elicit individuals' attitudes towards the chances of leaving an inheritance, we use the question *"What are the chances that you will leave any inheritance?"*[19] We then construct three dummy variables, which take value 1 if the individual states that the probability of leaving inheritance is, respectively, equal or larger than 50%, equal or larger than 70% or equal to 100%, and 0 otherwise.[20] Finally, to measure the gift-giving behavior, we exploit the following question: "Now please think about the last 12 months. Not counting any shared housing or shared food, have you given any financial or material gift or support to any person inside or outside this household amounting to 400 CHF or more?" We construct a dummy variable taking value 1 for a Yes answer and 0 otherwise. Table 5 provides summary statistics.[21] Using these variables we estimate the following probit model:

$$\text{Prob}(Y_{irt} = 1) = F(\beta_0 + \beta_1 X_i + \beta_2 \text{Latin}_i + \text{region}_r + \text{wave}_t + \varepsilon_{ist}), \tag{9}$$

Y_{ist} represents our variable of interests, namely, Risk Aversion, purchase of Life Insurance, the different self-assessed probabilities of leaving an inheritance and the gift-giving dummy. X_i is a set of individual control variables, such as gender, age, marital status, and education. Latin_i is a dummy for Latin-speaking individuals, that is, Italian, French, and Romansh, which represents our variables of interest. Finally, we include wave and macroregion fixed-effects and indicate them with wave_t and region_r, respectively.[22]

Table 6 reports the marginal effects from our probit regression estimates. Latin-speaking individuals are less risk-averse than German-speaking respondents (Column 1), which is in line with their financial choice at retirement. Moreover, Latin-speaking respondents expect to leave inheritance more than German-speaking Swiss. In fact, they are 16% more likely to respond that they will most certainly (with 75% probability) leave an inheritance (Column 4) and 19%

[19]Note that in the survey individuals are asked about their intentions to leave bequests and not about actual bequests. This allows us to claim that we are measuring the effect that preferences for bequests have on annuitization choices rather than the influence that liquidity constraints, due to previous annuitization choices, have on actual bequests. However, we are aware that the relationship can be bidirectional. Therefore, we also check the robustness of our results by excluding retirees (namely, those who have already taken their annuitization choices). Results are available upon request.

[20]We choose to use these dummy variables, rather than a continuous variable with the reported probability, due to the presence of mass points in the distribution of these reported probabilities.

[21]Our sample consisting of six waves of SHARE, yet not all questions are asked in each wave. In particular, the question on the probability of leaving inheritance was only asked in the 2004 and 2007 waves.

[22]The information on the canton is missing. The macroregions, which are defined at the NUTS 2 level, are Lake Geneva Region, Espace Mitterland, Northwestern Switzerland, Zurich, Eastern Switzerland, Central Switzerland, and Ticino.

TABLE 5 Descriptive statistics (SHARE).

Variable	Mean	SD	*N*
Latin	0.2719	0.4450	13,380
Age	66.9437	10.2822	13,380
Married	0.6957	0.4601	13,380
Female	0.5478	0.4977	13,380
Education	0.9158	1.1391	13,380
RiskAversion	0.9702326	0.1699527	10,918
LifeInsurance	0.1814848	0.3854437	7907
PrInheritance	30.6823	38.1274	661
GivenGift	0.3118	0.4633	11,003

Note: SHARE data (Waves: 1, 2, 4, 5, 6, and 7).

Abbreviation: SHARE, Survey of Health, Ageing and Retirement in Europe.

TABLE 6 SHARE, probit.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**RiskAver**	**LifeIns**	**PrLeavInh > 50**	**PrLeavInh > 75**	**PrLeavInh = 100**	**GivenGift**
Latin	−0.013**	0.023	0.101	0.162**	0.187**	0.043**
	(0.006)	(0.015)	(0.084)	(0.080)	(0.074)	(0.018)
Observations	10,845	7,907	582	582	582	10,942
Pseudo-R^2	0.0808	0.147	0.0423	0.0325	0.0315	0.0376
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes
Macroreg FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Individuals controls include age, civil status, gender, and education. Robust standard errors are in parentheses.

Abbreviations: FE, fixed effects; SHARE, Survey of Health, Ageing and Retirement in Europe.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

more likely to respond that they will leave an inheritance for sure (Column 5). Finally, Latin are 4.3% more likely to have engaged in gift-giving behavior in the last 12 months. Taken together, these findings point to systematic differences in risk aversion and in within-family inheritance behavior across language groups in Switzerland. These different preferences may help explain the observed differences in annuitization choices at retirement.

6 | CONCLUDING REMARKS AND POLICY CONSIDERATIONS

In this paper, we focus on the Swiss pension system, in which participation in a funded second pillar is mandatory and average annuity prices are favorable, making the annuity choice fairly appealing vis-à-vis a lump-sum payment, and test-specific hypotheses regarding the

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determinants of the annuitization choices. Thanks to the richness of our data we also test for the presence of "passive adverse selection" in annuitization decisions. We provide three main insights on the annuitization choice. First, we show that individuals strongly react to economic and fiscal incentives when making their annuitization decisions upon retirement: This is a nontrivial finding as several lines of investigation found little response of investors to financial incentives in this domain. By exploiting differences in the conversion rate used to convert the accumulated pension wealth into annuities (due to age, gender, and year of retirement), we show that individuals are more likely to opt for the annuity if the MWR of the annuity is high. Fiscal differences across municipalities in the taxation of pension benefits taken as an annuity or as a lump-sum transfer are also relevant. These findings are in line with what was found by Bütler and Ramsden (2024). Second, we provide novel evidence of the effect of family culture on the annuitization decision and present a possible explanation of the role of cultural traits. We find that the lump-sum option is more popular among French- and Italian-speaking individuals, if compared with German-speaking citizens. By making use of complementary information drawn from the SHARE data (Swiss sample), we can motivate this behavior with a stronger preference for leaving bequest. Finally, we provide evidence of passive adverse selection: individuals who reside in municipalities with higher average mortality risk are more likely to cash out their pension savings.

Overall, our findings confirm that individual's choices emerge as a mixture of responses to financially relevant incentives, individual preferences, and social norms. It is worth stressing that in our work we can rule out the problem of self-selection, that affects many empirical applications in this area of research. A set of policy considerations emerges from our empirical results. Clearly, our findings are rooted in the Swiss pension system that mandates participation to pension funds (for part of the working population) thus reaching a coverage rate of around 85%. Hence, while our empirical analysis does not suffer from adverse selection problems, there exits little room to increase participation in pension funds. However, our results may be valuable in other respects, such as the choice between an annuity or a lump sum when it comes to cashing the benefits. Our finding that the choice of retirees depends on the financial characteristics of the annuity contract and in general on the pension-funds market suggests that the government can encourage the annuitization option, especially through taxation but also allowing for favorable pricing. Furthermore, we find that the MWR, which provides a money-metric of the insurance value to people of the annuity contract, affects the annuitization decision. In other words, people do value the annuity and having more valuable annuities leads to prefer the annuity option. Analogously, in municipalities featuring higher survival probability, the rates of annuitization are higher. While this suggests the existence of "passive adverse selection," it also shows that people do make rational choices in protecting their old-age income. One interesting and novel message that emerges from our work is that Latin-language speakers retirees, who typically have a preference for leaving bequests and exhibit a quest for flexibility, are more likely to choose a lump-sum option. This finding prompts two considerations: it might be important to offer annuity contracts that allow for more flexible arrangements, and, at the same time, financial literacy is needed to favor the necessary knowledge and information about longevity risks.

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APPENDIX A

See Figure A1.

FIGURE A1 Fully annuitization and pension wealth by gender, predicted values. The graph shows the predicted values of the probability of fully annuitization over pension wealth by gender obtained from Equation (6). Pension wealth is expressed in 10,000 CHF.

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See Tables A1–A17.

TABLE A1 The role of financial incentives, robustness check I: Probit.

Variables	(1) Annuity only	(2) Annuity only	(3) Capital only	(4) Capital only
Conversion rate	0.133***		−0.173***	
	(0.012)		(0.013)	
MWR		2.136***		−2.497***
		(0.127)		(0.126)
Female	−0.010	−0.068***	0.009	0.078***
	(0.020)	(0.020)	(0.019)	(0.019)
Pension wealth	0.076***	0.126***	−0.095***	−0.152***
	(0.012)	(0.010)	(0.011)	(0.010)
Pension wealth * Female	0.066***	0.055***	−0.068***	−0.053***
	(0.014)	(0.013)	(0.012)	(0.011)
Pension wealth2	−0.005***	−0.006***	0.005***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
Pension wealth2 * Female	−0.005***	−0.004***	0.005***	0.003***
	(0.002)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−1.017***	−1.108***	0.280	0.398*
	(0.296)	(0.229)	(0.280)	(0.221)
Tax rate on lump sum	1.235***	0.588	−2.012***	−1.350***
	(0.429)	(0.385)	(0.489)	(0.378)
Observations	12,320	12,320	12,320	12,320
Pseudo-R^2	0.0406	0.0456	0.0870	0.0956
Canton FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Note: Probit estimates, marginal effects. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A2 The role of culture, robustness check I: Probit.

	(1) Annuity only	(2) Capital only
Latin	−0.058***	0.038*
	(0.022)	(0.023)
MWR	2.141***	−2.505***
	(0.125)	(0.125)
Female	−0.071***	0.081***
	(0.020)	(0.019)
Pension wealth	0.127***	−0.152***
	(0.012)	(0.012)
Pension wealth * Female	0.052***	−0.052***
	(0.013)	(0.011)
Pension wealth2	−0.006***	0.007***
	(0.001)	(0.001)
Pension wealth2 * Female	−0.003**	0.003***
	(0.001)	(0.001)
Tax rate on annuity	−1.233***	0.483*
	(0.282)	(0.269)
Tax rate on lump sum	0.888**	−1.619***
	(0.420)	(0.464)
Observations	12,320	12,320
Pseudo-R^2	0.0541	0.103
Year FE	Yes	Yes
Canton FE	Yes	Yes

Note: Probit estimates, marginal effects. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A3 The role of financial incentives, robustness check II: Different discounting rates.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Conversion rate	0.123***		0.150***		−0.160***	
	(0.011)		(0.011)		(0.011)	
MWR		1.880***		2.139***		−2.220***
		(0.099)		(0.098)		(0.097)
Female	−0.012	−0.076***	−0.011	−0.084***	0.004	0.079***
	(0.018)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
Pension wealth	0.070***	0.113***	0.084***	0.132***	−0.091***	−0.140***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth * Female	0.066***	0.054***	0.065***	0.051***	−0.060***	−0.045***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth2	−0.004***	−0.006***	−0.005***	−0.006***	0.005***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Pension wealth2 * Female	−0.005***	−0.004***	−0.004***	−0.003***	0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.912***	−1.047***	−0.481**	−0.593***	0.273	0.373
	(0.276)	(0.260)	(0.245)	(0.228)	(0.246)	(0.231)
Tax rate on lump sum	1.126***	0.778**	1.500***	1.093***	−1.866***	−1.439***
	(0.401)	(0.389)	(0.404)	(0.383)	(0.417)	(0.396)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.054	0.070	0.095	0.116	0.114	0.134
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Year	Yes	Year	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. The discounting rate used for the calculation of the MWR is equal to the interest rate of the long-term government bond (10 years) for Switzerland varying by the year of retirement plus a constant spread of 0.03. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A4 The role of culture, robustness check II: Different discounting rates.

Variables	(1) Only annuity	(2) Share annuity	(3) Capital only
Latin	−0.052**	−0.035*	0.031
	(0.021)	(0.020)	(0.021)
MWR	1.880***	2.138***	−2.220***
	(0.099)	(0.098)	(0.097)
Female	−0.077***	−0.084***	0.079***
	(0.018)	(0.017)	(0.017)
Pension wealth	0.113***	0.132***	−0.140***
	(0.010)	(0.010)	(0.010)
Pension wealth * Female	0.054***	0.051***	−0.045***
	(0.011)	(0.010)	(0.010)
Pension wealth2	−0.006***	−0.006***	0.006***
	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.004***	−0.003***	0.003***
	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−1.061***	−0.603***	0.381*
	(0.261)	(0.228)	(0.231)
Tax rate on lump sum	0.777**	1.093***	−1.438***
	(0.389)	(0.383)	(0.396)
Observations	12,320	12,320	12,320
R^2	0.071	0.116	0.134
Canton FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. The discounting rate used for the calculation of the MWR is equal to the interest rate of the long-term government bond (10 years) for Switzerland varying by the year of retirement plus a constant spread of 0.03. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A5 The role of financial incentives, robustness check III: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Conversion rate	0.115***		0.142***		−0.150***	
	(0.011)		(0.010)		(0.011)	
MWR		1.834***		2.092***		−2.167***
		(0.099)		(0.098)		(0.099)
Female	−0.020	−0.070***	−0.023	−0.080***	0.018	0.077***
	(0.018)	(0.018)	(0.016)	(0.016)	(0.017)	(0.017)
Pension wealth	0.039***	0.088***	0.056***	0.110***	−0.063***	−0.120***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Pension wealth * Female	0.059***	0.064***	0.042***	0.046***	−0.026*	−0.030**
	(0.015)	(0.014)	(0.013)	(0.013)	(0.013)	(0.012)
Pension wealth2	−0.003***	−0.005***	−0.004***	−0.005***	0.004***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.004***	−0.004***	−0.003***	−0.003***	0.002*	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.104	−0.518**	0.295	−0.134	−0.547**	−0.119
	(0.277)	(0.259)	(0.255)	(0.234)	(0.254)	(0.234)
Tax rate on lump sum	1.399***	1.163***	1.586***	1.308***	−1.773***	−1.482***
	(0.409)	(0.389)	(0.424)	(0.395)	(0.442)	(0.409)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.053	0.068	0.096	0.115	0.116	0.134
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Year	Yes	Year	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 100,000 CHF. We assume the partner's pension income to be zero for male individuals and 25% higher than that of the spouse for female individuals. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A6 The role of culture, robustness check III: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Share annuity	(3) Capital only
Latin	−0.050**	−0.034*	0.030
	(0.021)	(0.020)	(0.021)
MWR	1.834***	2.092***	−2.167***
	(0.098)	(0.098)	(0.099)
Female	−0.071***	−0.080***	0.078***
	(0.018)	(0.016)	(0.017)
Pension wealth	0.087***	0.110***	−0.119***
	(0.010)	(0.009)	(0.010)
Pension wealth * Female	0.064***	0.046***	−0.030**
	(0.014)	(0.013)	(0.012)
Pension wealth2	−0.005***	−0.005***	0.006***
	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.004***	−0.003***	0.002*
	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.526**	−0.139	−0.115
	(0.259)	(0.234)	(0.235)
Tax rate on lump sum	1.168***	1.311***	−1.485***
	(0.389)	(0.394)	(0.409)
Observations	12,320	12,320	12,320
R^2	0.069	0.115	0.134
Canton FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. We assume the partner's pension income to be zero for male individuals and 25% higher than that of the spouse for female individuals. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A7 The role of financial incentives, robustness check IV: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Conversion rate	0.117***		0.144***		−0.153***	
	(0.011)		(0.011)		(0.011)	
MWR		1.850***		2.110***		−2.187***
		(0.099)		(0.099)		(0.099)
Female	−0.017	−0.070***	−0.019	−0.079***	0.014	0.075***
	(0.018)	(0.018)	(0.016)	(0.016)	(0.017)	(0.017)
Pension wealth	0.046***	0.094***	0.062***	0.115***	−0.069***	−0.124***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth * Female	0.066***	0.067***	0.050***	0.050***	−0.036***	−0.036***
	(0.014)	(0.014)	(0.013)	(0.012)	(0.013)	(0.012)
Pension wealth2	−0.003***	−0.005***	−0.004***	−0.006***	0.004***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.005***	−0.004***	−0.004***	−0.003***	0.003**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.251	−0.633**	0.126	−0.265	−0.362	0.028
	(0.276)	(0.259)	(0.253)	(0.234)	(0.254)	(0.235)
Tax rate on lump sum	1.213***	0.986**	1.564***	1.296***	−1.837***	−1.556***
	(0.409)	(0.387)	(0.436)	(0.403)	(0.451)	(0.414)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.053	0.068	0.095	0.115	0.115	0.134
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Year	Yes	Year	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. We assume the partner's pension income to be zero for male individuals and double that of the spouse for female individuals. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A8 The role of culture, robustness check IV: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Share annuity	(3) Capital only
Latin	−0.051**	−0.034*	0.030
	(0.021)	(0.020)	(0.021)
MWR	1.850***	2.110***	−2.187***
	(0.099)	(0.098)	(0.099)
Female	−0.070***	−0.079***	0.076***
	(0.018)	(0.016)	(0.017)
Pension wealth	0.094***	0.115***	−0.124***
	(0.010)	(0.010)	(0.010)
Pension wealth * Female	0.068***	0.050***	−0.036***
	(0.014)	(0.012)	(0.012)
Pension wealth2	−0.005***	−0.006***	0.006***
	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.004***	−0.003***	0.002**
	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.643**	−0.272	0.034
	(0.260)	(0.234)	(0.235)
Tax rate on lump sum	0.989**	1.298***	−1.557***
	(0.386)	(0.402)	(0.413)
Observations	12,320	12,320	12,320
R^2	0.069	0.115	0.134
Canton FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. We assume the partner's pension income to be zero for male individuals and double that of the spouse for female individuals. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A9 The role of financial incentives, robustness check V: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Conversion rate	0.106***		0.133***		−0.142***	
	(0.011)		(0.011)		(0.011)	
MWR		1.764***		2.017***		−2.088***
		(0.099)		(0.098)		(0.099)
Female	−0.005	−0.062***	−0.002	−0.066***	−0.008	0.059***
	(0.018)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
Pension wealth	0.006	0.068***	0.019	0.088***	−0.025**	−0.096***
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)
Pension wealth * Female	0.054***	0.053***	0.045***	0.043***	−0.035***	−0.034***
	(0.012)	(0.012)	(0.011)	(0.010)	(0.011)	(0.010)
Pension wealth2	−0.002***	−0.004***	−0.002***	−0.004***	0.002***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pension wealth2 * Female	−0.004***	−0.004***	−0.003***	−0.003***	0.003***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	0.470*	−0.091	0.814***	0.215	−1.013***	−0.411*
	(0.258)	(0.242)	(0.242)	(0.223)	(0.247)	(0.228)
Tax rate on lump sum	1.343***	1.193***	1.481***	1.306***	−1.632***	−1.450***
	(0.312)	(0.298)	(0.306)	(0.286)	(0.325)	(0.302)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.055	0.069	0.099	0.116	0.119	0.135
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Year	Yes	Year	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. We assume a gender pension gap equal to 25% between spouses. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A10 The role of culture, robustness check V: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Share annuity	(3) Capital only
Latin	−0.048**	−0.032	0.029
	(0.021)	(0.020)	(0.021)
MWR	1.763***	2.016***	−2.088***
	(0.099)	(0.098)	(0.099)
Female	−0.063***	−0.067***	0.059***
	(0.018)	(0.017)	(0.017)
Pension wealth	0.067***	0.088***	−0.095***
	(0.013)	(0.012)	(0.012)
Pension wealth * Female	0.053***	0.043***	−0.033***
	(0.012)	(0.010)	(0.010)
Pension wealth2	−0.004***	−0.004***	0.005***
	(0.001)	(0.001)	(0.001)
Pension wealth2 * Female	−0.004***	−0.003***	0.002**
	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.092	0.215	−0.410*
	(0.242)	(0.223)	(0.229)
Tax rate on lump sum	1.186***	1.301***	−1.446***
	(0.297)	(0.286)	(0.302)
Observations	12,320	12,320	12,320
R^2	0.069	0.116	0.135
Canton FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. We assume a gender pension gap equal to 25% between spouses. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A11 The role of culture, OLS, no controls.

Variables	(1) Only annuity	(2) Share annuity	(3) Capital only
Latin	−0.017	−0.030**	0.038***
	(0.014)	(0.014)	(0.013)
Observations	12,320	12,320	12,320
R^2	0.001	0.001	0.001
Canton FE	No	No	No
Age FE	No	No	No
Age × Female FE	No	No	No
Year FE	No	No	No

Note: OLS estimate. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. No controls included. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; OLS, ordinary least square.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A12 The role of the municipal mortality risk, robustness check I: Probit.

Variables	(1) Annuity only	(2) Annuity only	(3) Capital only	(4) Capital only
Death rate (60–79)	−1.417*		1.795**	
	(0.745)		(0.769)	
MWR	2.135***		−2.511***	
	(0.125)		(0.125)	
MWR (mun)		1.127***		−1.292***
		(0.091)		(0.093)
Female	−0.077***	−0.042**	0.089***	0.045**
	(0.021)	(0.020)	(0.020)	(0.019)
Pension wealth	0.131***	0.095***	−0.160***	−0.113***
	(0.012)	(0.012)	(0.012)	(0.011)
Pension wealth * Female	0.052***	0.058***	−0.052***	−0.059***
	(0.013)	(0.013)	(0.011)	(0.012)
Pension wealth2	−0.006***	−0.005***	0.007***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Pension wealth2 * Female	−0.003**	−0.004***	0.003***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−1.255***	−0.916***	0.558**	0.077
	(0.277)	(0.283)	(0.266)	(0.268)
Tax rate on lump sum	0.755*	1.209***	−1.349***	−1.994***
	(0.430)	(0.420)	(0.477)	(0.472)
Observations	12,320	12,320	12,320	12,320
Pseudo-R^2	0.0550	0.0467	0.104	0.0923
Municipal controls	Yes	No	Yes	No
Canton FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Note: Probit estimates, marginal effects. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Municipal controls include share of foreigners, municipal income, and share of individuals with upper-secondary education. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A13 The role of the municipal mortality risk, robustness check II: Different discounting rates.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Death rate (60–79)	−1.306*		−1.558**		1.584**	
	(0.692)		(0.665)		(0.691)	
MWR	1.874***		2.135***		−2.218***	
	(0.099)		(0.098)		(0.097)	
MWR (mun)		0.971***		1.080***		−1.114***
		(0.076)		(0.078)		(0.079)
Female	−0.082***	−0.046***	−0.091***	−0.048***	0.086***	0.042**
	(0.018)	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)
Pension wealth	0.117***	0.085***	0.137***	0.098***	−0.146***	−0.105***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Pension wealth * Female	0.053***	0.059***	0.050***	0.057***	−0.044***	−0.051***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth2	−0.006***	−0.005***	−0.006***	−0.005***	0.007***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Pension wealth2 * Female	−0.004***	−0.004***	−0.003***	−0.004***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−1.074***	−0.770***	−0.646***	−0.269	0.434*	0.034
	(0.256)	(0.264)	(0.225)	(0.234)	(0.228)	(0.235)
Tax rate on lump sum	0.661*	1.075***	0.893**	1.429***	−1.214***	−1.787***
	(0.398)	(0.391)	(0.391)	(0.390)	(0.406)	(0.403)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.072	0.061	0.118	0.102	0.136	0.120
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	No	Yes	No	Yes	No

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Municipal controls include share of foreigners, municipal income, and share of individuals with upper-secondary education. The discounting rate used for the calculation of the MWR is equal to the interest rate of the long-term government bond (10 years) for Switzerland varying by the year of retirement plus a constant spread of 0.03. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A14 The role of the municipal mortality risk, robustness check III: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Death rate (60–79)	−1.349*		−1.584**		1.603**	
	(0.694)		(0.666)		(0.692)	
MWR	1.831***		2.095***		−2.172***	
	(0.099)		(0.098)		(0.099)	
MWR (mun)		1.004***		1.121***		−1.152***
		(0.078)		(0.080)		(0.081)
Female	−0.076***	−0.049***	−0.086***	−0.056***	0.084***	0.052***
	(0.018)	(0.017)	(0.017)	(0.016)	(0.017)	(0.016)
Pension wealth	0.090***	0.059***	0.116***	0.077***	−0.126***	−0.085***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)
Pension wealth * Female	0.065***	0.054***	0.048***	0.034***	−0.033***	−0.017
	(0.014)	(0.014)	(0.013)	(0.012)	(0.012)	(0.012)
Pension wealth2	−0.005***	−0.004***	−0.006***	−0.004***	0.006***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.004***	−0.004***	−0.003***	−0.002**	0.002**	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.545**	−0.143	−0.197	0.306	−0.044	−0.579**
	(0.255)	(0.259)	(0.232)	(0.236)	(0.232)	(0.237)
Tax rate on lump sum	1.066***	1.331***	1.135***	1.499***	−1.288***	−1.680***
	(0.398)	(0.394)	(0.405)	(0.406)	(0.419)	(0.422)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.070	0.061	0.117	0.104	0.136	0.122
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	No	Yes	No	Yes	No

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Municipal controls include share of foreigners, municipal income, and share of individuals with upper-secondary education. We assume the partner's pension income to be zero for male individuals and 25% higher than that of the spouse for female individuals. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A15 The role of the municipal mortality risk, robustness check IV: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Death rate (60–79)	−1.333*		−1.573**		1.593**	
	(0.694)		(0.666)		(0.692)	
MWR	1.847***		2.111***		−2.191***	
	(0.099)		(0.099)		(0.099)	
MWR (mun)		1.013***		1.131***		−1.164***
		(0.078)		(0.080)		(0.081)
Female	−0.076***	−0.047***	−0.085***	−0.053***	0.082***	0.048***
	(0.018)	(0.017)	(0.017)	(0.016)	(0.017)	(0.016)
Pension wealth	0.097***	0.066***	0.121***	0.082***	−0.130***	−0.089***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Pension wealth * Female	0.068***	0.060***	0.053***	0.041***	−0.039***	−0.026**
	(0.014)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)
Pension wealth2	−0.005***	−0.004***	−0.006***	−0.005***	0.006***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pension wealth2 * Female	−0.004***	−0.004***	−0.003***	−0.003***	0.003**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.663***	−0.269	−0.329	0.162	0.103	−0.419*
	(0.255)	(0.259)	(0.231)	(0.236)	(0.233)	(0.237)
Tax rate on lump sum	0.875**	1.159***	1.108***	1.493***	−1.347***	−1.759***
	(0.394)	(0.394)	(0.411)	(0.416)	(0.424)	(0.429)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.070	0.061	0.117	0.103	0.136	0.122
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	No	Yes	No	Yes	No

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Municipal controls include share of foreigners, municipal income, and share of individuals with upper-secondary education. We assume the partner's pension income to be zero for male individuals and double that of the spouse for female individuals. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A16 The role of the municipal mortality risk, robustness check V: Different assumptions on the partner pension income.

Variables	(1) Only annuity	(2) Only annuity	(3) Share annuity	(4) Share annuity	(5) Capital only	(6) Capital only
Death rate (60–79)	−1.350*		−1.593**		1.616**	
	(0.694)		(0.667)		(0.693)	
MWR	1.760***		2.022***		−2.098***	
	(0.099)		(0.098)		(0.099)	
MWR (mun)		0.960***		1.074***		−1.105***
		(0.077)		(0.079)		(0.080)
Female	−0.070***	−0.035**	−0.075***	−0.034**	0.068***	0.025
	(0.019)	(0.017)	(0.017)	(0.016)	(0.017)	(0.016)
Pension wealth	0.070***	0.029**	0.094***	0.043***	−0.103***	−0.049***
	(0.013)	(0.012)	(0.012)	(0.011)	(0.012)	(0.011)
Pension wealth * Female	0.053***	0.049***	0.044***	0.038***	−0.035***	−0.028***
	(0.012)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Pension wealth2	−0.004***	−0.002***	−0.005***	−0.003***	0.005***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pension wealth2 * Female	−0.004***	−0.003***	−0.003***	−0.003***	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax rate on annuity	−0.113	0.364	0.144	0.748***	−0.323	−0.967***
	(0.237)	(0.240)	(0.220)	(0.223)	(0.227)	(0.228)
Tax rate on lump sum	1.158***	1.308***	1.232***	1.437***	−1.364***	−1.586***
	(0.301)	(0.301)	(0.290)	(0.289)	(0.306)	(0.306)
Observations	12,320	12,320	12,320	12,320	12,320	12,320
R^2	0.070	0.062	0.118	0.106	0.137	0.125
Canton FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	No	Yes	No	Yes	No

Note: Ordinary least square estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. Pension wealth is in 10,000 CHF. Municipal controls include share of foreigners, municipal income, and share of individuals with upper-secondary education. We assume a gender pension gap equal to 25% between spouses. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; MWR, Money Worth Ratio.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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TABLE A17 The role of the municipal mortality risk, OLS, no controls.

Variables	(1) Only annuity	(2) Share annuity	(3) Capital only
Death rate (60–79)	−1.850***	−0.845	0.215
	(0.666)	(0.640)	(0.675)
Observations	12,320	12,320	12,320
R^2	0.001	0.020	0.000
Canton FE	No	No	No
Age FE	No	No	No
Age × Female FE	No	No	No
Year FE	No	No	No

Note: OLS estimates. Sample of years 2011–2015. Annuity = 1 if the amount of pension wealth withdrawn as annuity = total pension wealth, 0 otherwise; Capital = 1 if the amount of pension wealth withdrawn as annuity = 0, 0 otherwise. No controls included. Robust standard errors clustered at the municipal level are in parentheses.

Abbreviations: FE, fixed effects; OLS, ordinary least square.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

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