SmaRP: Smart Retirement Planning

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Contents

Introduction

Smart Retirement Planning (**SmaRP**) is a Mirai Solutions initiative designed to guide people working in Switzerland towards a strategic decision-making process for their retirement.

It is implemented as an R Shiny pension calculator web app, in the form of an R package. The source code is available on GitHub and the app itself online at http://mirai-solutions.ch/apps/smarp/.

SmaRP is based on the three pillars pension system and reflects the complexity of its legal framework. The bulk of the retirement income are the second and third pillar, which employees can actively manage and make decisions impacting their total pension fund at retirement. The first pillar is not considered as it is a pay-as-you-go universal system whose benefits depend on the income earned during the working life and the number of years contributed. In addition, since non-mandatory contributions are tax favored, SmaRP incorporates an additional fund -the Tax benefits fund- to outline the effects of those tax reliefs on the long run.

SmaRP is based on assumptions and includes some simplifications. Thus, it is advisable to use the app to perform different "what-if" scenarios and assess their feasibility. Any outcome should consider some degree of uncertainty.

The main drivers of the retirement pension fund are:

- **Salary** - the higher the stipend, the higher the future pension. The salary growth rate can be used as a proxy of the inflation or a general economic growth.

- **Non-compulsory contributions** - voluntary contributions have the advantage that the government tops it up with tax relief (up to a certain limit). Thus both direct contributions as well as tax benefits are generated.

- **Interest rates** - where a pension is invested and its return rate can have a huge impact on what the user will receive at retirement. Performing different scenarios with minimum return rate (1%) and other more optimistic returns (e.g. 2%, 4%, 6%) is highly recommendable.

- **Residence** - location has an impact on the tax bill and consequently on the tax relief generated by voluntary contributions.

- **Time** - the sooner the employee will start investing, the higher the final return will be.

Note that SmaRP does not make any consideration about the usage of the retirement pension funds.

The main outcome is displayed in the "Results" section with a more detailed drill down in Appendix 2; formulas used to obtain these results are explained in Appendix 1. In addition, a list of assumptiuons and limitations is provided in a separate section as well as a brief explantation of the Swiss retirement system.

Results

Based on the information inserted in the three pillars, the total retirement fund as of 30-12-2045 is calculated to be **604,840 CHF**, which is 5.31 times the last salary.[1]

The two plots below represent the time evolution of the different funds and their contribution to the total retirement fund at retirement, respectively.
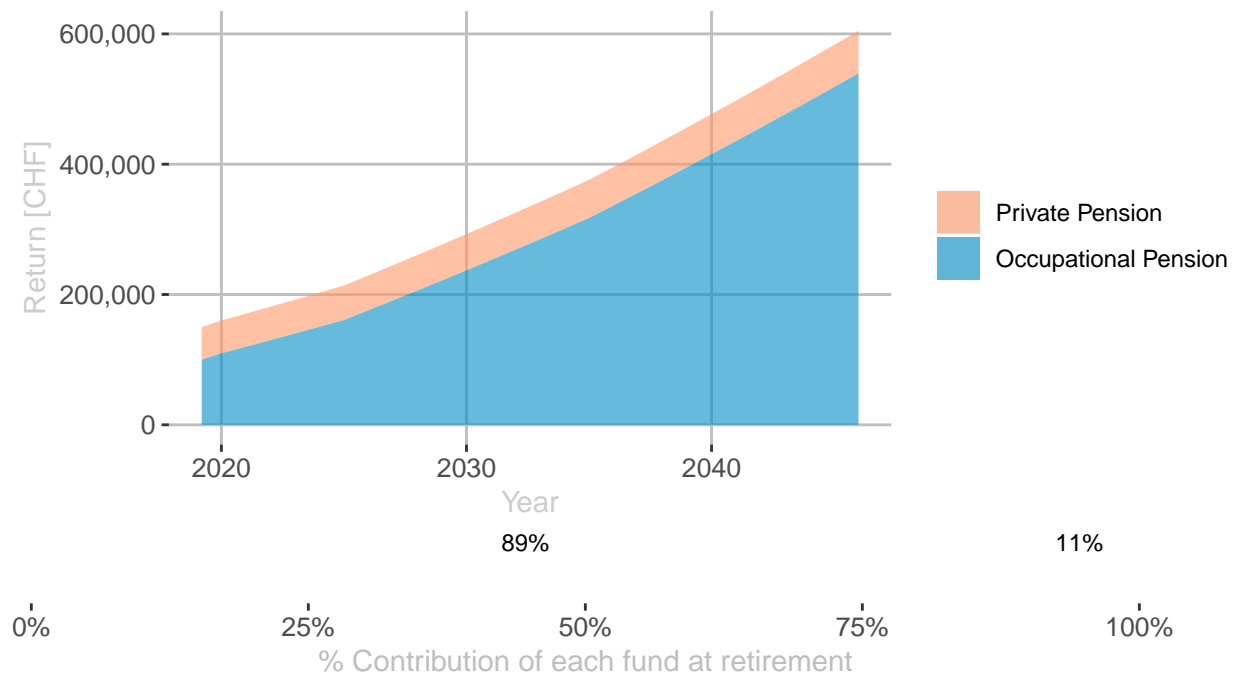
The graphs above display the amounts at the end of each year for the Pillar I, Pillar II and Tax Benefit fund. The corresponding formulas are in Appendix 1 of this document and a more detailed break down of the amounts can be found in Appendix 2. A comprehensive set of values calculated can de downloaded as well from the Table tab.

Parameters

The results shown above are based on the following inputs set by the user on the left hand side panels of SmaRP.

- Residence is in Zürich, ZH and the postal code is 8001.

- The date of birth is 30-12-1980.

- At the age of 65, the retirement date is 30-12-2045.

- The current salary is **100,000 CHF**, with a growth rate of 0.5%, which is assumed constant until retirement.

- The occupational pension fund (Pillar II) is of **100,000 CHF**.

- No voluntary contribution to Pillar II is made.

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[1]SmaRP does not make any consideration about the usage of the retirement pension funds. For the Occupational pension fund, the Swiss pension law allows retirees to take the full amount as a lump sum or receive their pension in the form of a life annuity, or a mix of both. In that case, the minimum conversion rate is 6.8% (since 2017) and can vary depending on the retirement age. The Private fund, however, gets always paid as a lump sum.

- Pillar II has an interest rate of 1%. We ensure that the amount considered in the analysis is always higher than the minimum required by law.

- The private pension fund (Pillar III) is of 50,000 CHF.

- The annual contribution to Pillar III is of 0 CHF, with an expected return of 1%.

- Civil status is Single with 0 children.

- A church affiliation.[2]

Assumptions and limitations

SmaRP is valid for employees only, i.e. persons whose main income is a salary. Self-employed people do not belong to this category.

SmaRP takes into account only the occupational (Pillar II) and the private (Pillar III) pension funds. The state-run pay-as-you-earn system (Pillar I) is law and salary dependent only, meaning there is no active decision-making from the employee's side. Therefore, it is not explicitly considered.

When calculating contributions to the Occupational Pension Fund (Pillar II) any salary above minimum threshold is taken into account to generate the retirement benefits.

SmaRP considers the tax saving generated by the voluntary retirement contributions, assuming that all generated tax benefits are 100% reinvested as an additional fund. The return from these tax benefits is set to be the same as those of the private pension fund.

In case of married couples with double-income, SmaRP assumes that all monetary amounts are split 50% and both members have the same age. For more information, please refer to Appendix 3.

A proxy of the taxable income is used to calculate tax savings.[3] The taxable income is computed by detracting the following deductions from the gross salary:[4]

- Old-age and survivor's insurance (AHV/AVS)
- Unemployment, accident and invalidity insurance (ALV)
- Health insurance
- Civil status: Married, Married double income or Single
- Number of children
- Any additional voluntary contributions.

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[2]Church taxes differ based on the type (Evangelische or Roeman-katolische Kirche) and canton of residence. SmaRP does not make such distinction and always assumes the highest of the values. Moreover, when the church-tax depends on the cantonal tax rate (instead of being a fixed factor), an approximation is made and treated as the maximum possible factor (relevant for cantons: VS, BS, BL).

[3]Taxes on assets are not considered.

[4]Although most of those parameters can vary a bit depending on the canton, we use the federal values as proxy.

The basics of the Swiss retirement system

The Swiss social retirement system is based on a three-pillar regime.
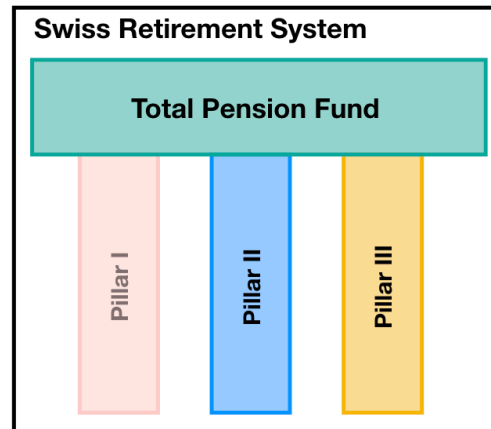

Pillar I is a state-run pay-as-you-earn system with minimum benefits[5]. It aims at providing a subsistence level of income to all retirees. The annuity at retirement depends on the amount of income earned and the number of years contributed. Since all parameters are law dependent, it is not explicitly considered in SmaRP.

Pillar II is a compulsory, tax-deductible company occupational pension insurance fund[6]. Its goal is to maintain pre-retirement living standards. Voluntary additional buy-ins are regulated, but allow for benefits enhancements at retirement age while reducing the tax burden during the working career. The pensionable salary is defined as part of the AHV with a range between 7/8 and 3 times the AHV salary (between 24.675 and 84.600 as of 01-01-2018). The amount within this range is called the "Mandatory Component" and all employers are required by law to insure at least this compulsory share. However, they are free to offer coverage for the salary above the upper threshold, which the vast majority provides as this extra coverage has become a de facto "must have" to attract employees.

Pillar III is a voluntary contribution; it is a privately-run, tax-deductible insurance fund. The private pension fund is modeled as an asset of a given amount ("Current assets"), to which contributions can be added annually ("Annual contribution"). The annual expected return of this asset is given as an input and assumed constant until the retirement date.

Tax benefits are always a key factor towards a smart retirement project. SmaRP takes them into consideration and implements them as an additional fund.

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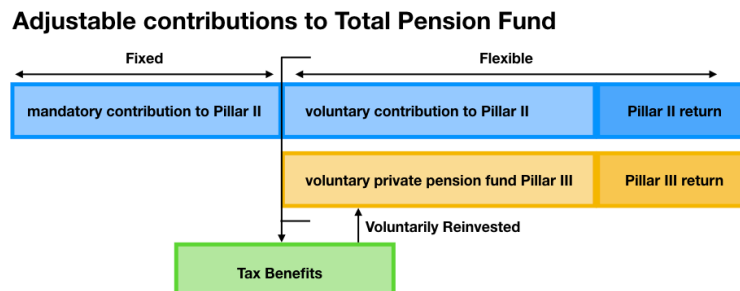
[5]For more information regarding the first pillar, check the official site here

[6]All details of current legislation on Pillar II can be found in German, French or Italian here

Taxation is municipality-dependent. It can be either provided as an input or inferred from the user's inputs. If inferred, it is computed in two parts: federal tax (same for all cantons) and cantonal tax (different in each canton). A third tax is calculated by multiplying the cantonal tax with a municipality-specific percentage rate. An additional contribution to the cantonal tax is given by the optional affiliation to a church.

Retirement age can be either explicitly provided as an input or inferred from the gender. In the latter case, age is set at 65 for male and 64 for females.

Disclaimer

While **SmaRP** was developed under the utmost care and diligence, Mirai Solutions does not guarantee for its accuracy and correctness. In addition, **SmaRP** is based on assumptions and projections and as such computed figures should be understood as general references and do not hold any legal value.

Appendix 1: Methodology

Pillar II

The savings process for retirement benefits starts on January 1st following the year in which the person turns 24.

$$PeS(t) = max(S(t) - \frac{7}{8}S_{AHV}(t), 0)$$

where

- $PeS(t)$ is the Pensionable Salary at year t,
- $S(t)$ is the current Salary at year t,
- S_{AHV} is the AHV salary[7].

Contribution rates under Pillar II are defined by law.[8]

Age	25-34	35-44	45-54	55-64/65
Contribution	7%	10%	15%	18%

$$MCon(t) = PeS(t) \cdot ConR(t)$$

where

- $MCon(t)$ is the Mandatory Contribution at year t,
- $ConR(t)$ is the Contribution Rate at year t

$$r = 1\%$$

$$PillarII = \sum_{t=t_0}^{T}(MCon + VCon) * \exp^{r*(T-t)}$$

where

- $VCon$ is the Voluntary Contribution

Pillar III

The private pension fund ($PillarIII$) at year t is calculated as:

$$PillarIII(t) = \sum_{t=t_0}^{T} VCon * e^{r(T-t)}$$

where

- r is the interest rate applied to the private pension fund[9],
- t_0 is today's date,
- T is the retirement age.

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[7]AHV salary as of 01.01.2018: 2350 month, 28200 year. Find official information here

[8]831.40. Bundesgesetz über die berufliche Alters-, Hinterlassenen- und Invalidenvorsorge (Art.16).

[9]Minimum interest rate on the retirement assets since 01.01.2017.

Tax Benefit

Granted that the marginal tax rate is provided as an input, the tax benefit (TBe) at year t is calculated as:

$$TBe(t) = \sum_{t=t_0}^{T} VCon(t) * TR(t) * e^{r(T-t)}$$

where

- $VCon(t)$ is the Voluntary contributions at year t,
- TR is the marginal rate at year t,
- t_0 is today's date,
- T is the retirement age.

The tax benefits are computed as[10]:

$$TBe(t) = Tax_S(t) - Tax_{inc}(t)$$

where

- $Tax_S(t)$ is the tax bill based on the gross salary at each t,
- $Tax_{inc}(t)$ is the tax bill based on the Taxable income at each t,
- $TBe(t)$ is the Tax Benefit generated by the difference of the tow.

Taxable income (I) at time t is computed as:

$$I(t) = \max(S(t) - \min(TotalCon, MaxConTax), 0)$$

where

- $TotalCon$ is the sum of the Pillar II and Pillar III purchases,
- $MaxConTax$ is the maximum deductible amount allowed by law.[11]

The TaxPaid function

The amount of taxes paid is the sum of the federal and cantonal taxes. Generally speaking, it is based on the taxable income at certain year $I(t)$ plus other personal factors.

Federal tax at year t is computed as:

$$FedTax(t) = \sum_{t=t_0}^{T} (I(t) \cdot FedTR) - 251 \cdot NC$$

where

- $I(t)$ is the income at time t,
- NC is the number of children under 18,
- $FedTR$ is a factor based on the civil status and family structure.

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[10]The taxable income is calculated by subtracting the gross salary from social insurance contributions and other deductions.
[11]Click here for more official information.

Cantonal tax at year t is computed as:

$$KanTax(t) = \sum_{t=t_0}^{T}(I(t) \cdot KanTR) \cdot (F_{kanton} + F_{municipality} + F_{church})$$

where

- $KanTR$ is a factor based on the civil status and family structure,
- F_{kanton} is a canton-dependent factor,
- $F_{municipality}$ is a municipality-dependent factor,
- F_{church} is a church affiliation-dependent factor.

The canton-dependent multiplication factor for canton ZH is 1.

The municipality-dependent multiplication factor for Zürich is 1.19.

The church affiliation dependent multiplication factor for Zürich is 0.1. In case of no church affiliation, this factor is 0.

Appendix 2: Tabular Results

Tabular results from calculations are shown in the following tables.

Table 1: Total Pension Fund

Calendar	Salary	Occupational Fund	Private Fund	Tax Benefits
2019-Mar	100,000	100,000	50,000	0
2019-Dec	100,500	109,697	50,400	0
2020-Dec	101,002	119,698	50,908	0
2025-Dec	103,553	175,671	53,520	0
2030-Dec	106,168	252,759	56,265	0
2035-Dec	108,849	336,470	59,152	0
2040-Dec	111,597	435,433	62,188	0
2045-Dec	113,846	539,462	65,378	0

Table 2: Occupational Pension Fund - Pillar 2

Calendar	Direct Contribution	Total Contribution	Return	Occupational Fund
2019-Mar	0	100,000	0	100,000
2019-Dec	8,896	108,896	800	109,697
2020-Dec	8,896	117,792	1,906	119,698
2025-Dec	13,344	166,721	8,950	175,671
2030-Dec	13,344	233,441	19,318	252,759
2035-Dec	16,013	302,831	33,639	336,470
2040-Dec	16,013	382,896	52,537	435,433
2045-Dec	16,013	462,961	76,502	539,462

Table 3: Private Pension Fund - Pillar 3

Calendar	Direct Contribution	Total Contribution	Return	Private Fund
2019-Mar	50,000	50,000	0	50,000
2019-Dec	0	50,000	400	50,400
2020-Dec	0	50,000	908	50,908
2025-Dec	0	50,000	3,520	53,520
2030-Dec	0	50,000	6,265	56,265
2035-Dec	0	50,000	9,152	59,152
2040-Dec	0	50,000	12,188	62,188
2045-Dec	0	50,000	15,378	65,378

Appendix 3: Notes on "Married double income"

In case of married couples with double income, the following considerations should be taken into account. Pension funds are individual (not familiar). However, the tax rates are familiar, i.e. number of children and marital status are considered. That implies that the user can perform two calculations, both with some level of inaccuracy.

1. The user can simply enter all the information individually, without taking into account his partner. It that case, most likely, the tax rate will be underestimated and as a consequence the tax benefit generated.

2. The user can enter the combined amount of all variables (salary, current assets and purchases). In this case, however, note that two simplifications have been taken into account.

- A 50% split of all monetary variables is assumed.

- Both members of the couple are the same age and will retire together.

Since these results vary on a case-by-case basis, it is appropriate to run SmaRP with respect to both options to achieve a more accurate understanding and assessment. However, assumptions in Option 2 belong to a very specific scenario and thus it is advisable for users with double income to accept results from Option 1.