SmaRP: Smart Retirement Planning

August 17, 2018

SmaRP, **Sma**rt **R**etirement **P**lanning has been designed and developed by Mirai Solutions GmbH to support users in an educated decision-making process towards their retirement.

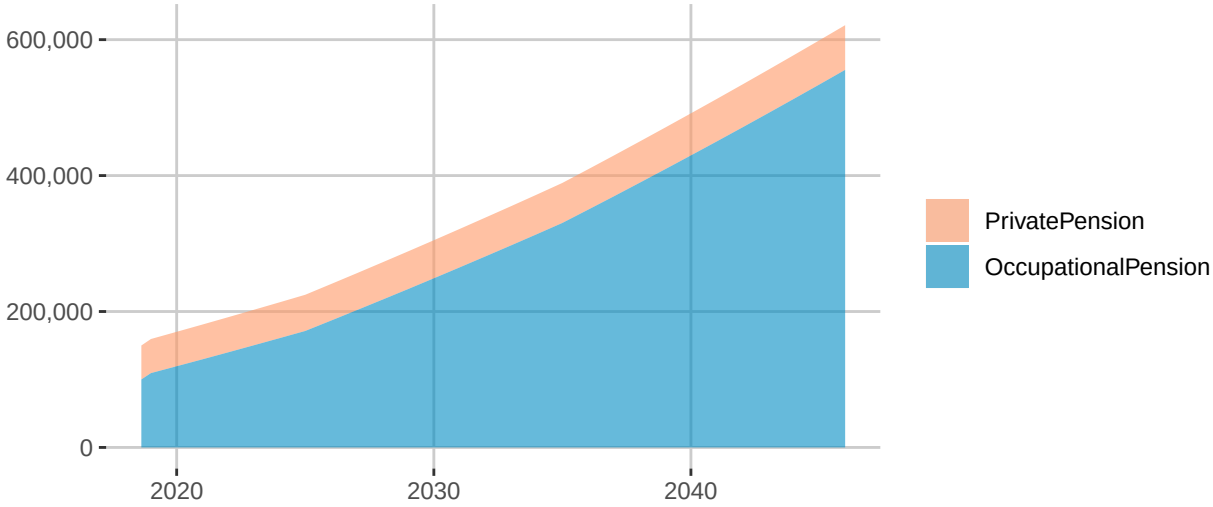
The SmaRP code is available on GitHub.

The SmaRP app is available online at http://mirai-solutions.ch/apps/smarp/.

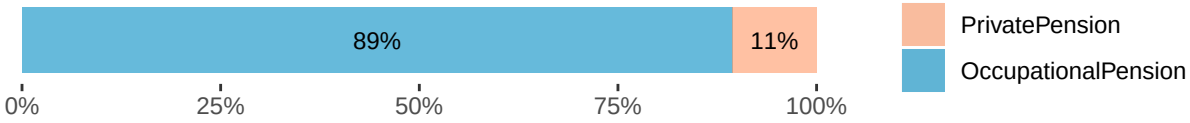
Main Results

The total retirement fund as of 2045-12-31 is 621,310 which is 5.43 times your last salary.

This plot represents the time-evolution of the different contributions to the total retirement fund.



This plot represents the percentage of each contribution to the total retirement fund.



Assumptions and limitations

SmaRP is based on the Swiss retirement system. Most of the functionalities are generic, but the basic configuration and parameters are specific of Switzerland.

SmaRP applies only to employees, i.e. persons whose main income is a salary. Self-employed people are not considered.

SmaRP takes into account ONLY the occupational pension fund (Pillar II in Switzerland) and a private fund (Pillar III in Switzerland), those where one can teke decisions during the working career. 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 which could affect it. Therefore, it is not explicitly considered in SmaRP.

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

In case of married and double-income couples, the aggregated amonunt of all variables should be entered and a 50% income distribution is assumed.

When calculating the tax savings, a proxy of the taxable income is used. The taxable income is computed by detracting from the gross salary the following deductions:

- Old-age and survivor's insurance (AHV/AVS): 0.05
- Unemployment, accident and invalidity insurance (ALV): 0.01
- Deduction for:
- Health insurance: 1700.00 plus 3500.00
- Married people: 2600.00
- Married people with double income: 13400.00
- Deduction per child: 6500.00

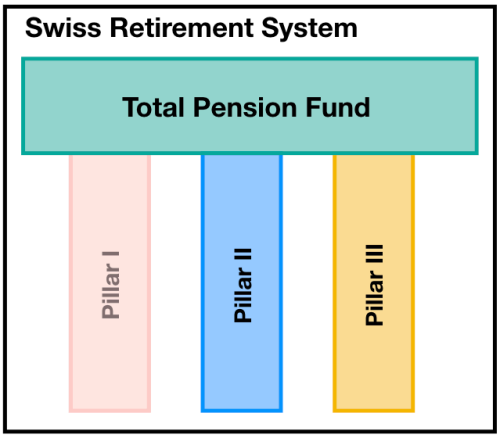
In case of voluntary contributions to pension funds, those contributions are deducted as well.

The input and output values are expressed in monetary units and assumed to be of the same currency. No currency conversion is applied in SmaRP.

Case specific information

The Swiss case has been selected.

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

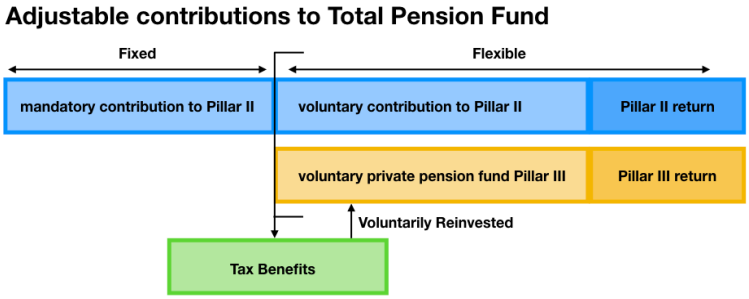


The first Pillar is a state- run pay-as-you-earn system with minimum benefits. It is law and salary dependent only and it is not expliciedly considered in SmaRP.

The Pillar II is a compulsory, tax-deductible company occupational pension insurance fund. Voluntary additional Pillar II buy-ins are regulated, but allow for benefits improvement at retirement age while reducing the tax burden during the working career.

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

Since the tax benefits are always a key factor of a smart retirement project, SmaRP takes them into consideration and are implemented as an additional fund.



The taxation is municipality-dependent. It can either be provided as an input or inferred from the user provided inputs. If inferred, it is computed as two parts: the federal tax that is the same for all kantons, and kantonal tax that depends on the kanton. The kantonal tax is further modulated at municipality level via a factor. An ulterior contribution to the kantonal tax is given by the optional affiliation to a church.

The retirement age can either be explicitedly provided as an input, or can be inferred from the genere.

Swiss-case specific assumptions and limitations

If married double-income, SmaRP assumes that all the inputs correspond to the aggregated amounts and a 50% income distribution is assumed.

In certain kantons there is a different church tax based on the type of church the user belongs to (Evangelische Kirche and Roeman-katolische Kirche). SmaRP does not make such distinction and always assumes the highest of the values. Moreover, when the church-tax depends on the kantonal tax rate (in stead of being a fixed factor), an approximation is made and treated as the maximum possible factor (relevant for kantons: VS, BS, BL).

In SmaRP only taxes on the income are considered and not on those on the assets. This has an inpact for kantons FR and BL.

Sources

BVG law https://www.admin.ch/opc/de/classified-compilation/19820152/index.html

AHV https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-62487.html

Mindestzinssatz https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-64228.html

Swiss Tax System https://www.estv.admin.ch/estv/de/home/allgemein/steuerinformationen/dienstleistungen/publikationen-und-formulare-bestellen.html

Parameters

Input parameters are:

- The date of birth provided as input is 1980-12-31.
- With a retirement age of 65, the retirement year is 2045-12-31.
- The current salary is 100000, with a growth rate of 0.005, which is assumed constant until retirement.
- The occupational pension fund (Pillar II) has a current amount of 100000 monetary units.
- The contribution to the Pillar II is of 0 monetary units, and is purchased as a single purchase.

T* he interest rate of of the Pillar II is given by 0.01, and we ensure that the amount considered in the calculation is always higher than the minimum required by law.

- The private pension fund (Pillar III) has a current amount of 50000 monetary units.
- The annual contribution to the Pillar III is of 0 monetary units, with an expected return of 0.01.
- The maximum amount of deductable from the taxable income via voluntary contributions to retirement funds is given by law and equal to 6768.
- The tax rate is not provided as an input and it is therefore calculated.
- The postal code of residence 8001 is used to infer the kanton of residence ZH and can be used for the tax rate computation.
- The user's marital status is A, with 0 children. This information has an inpact on the total tax benefits.
- The user's declares to have no church affiliation. This information has an inpact on the total tax benefits.

Methodology

Pillar II

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

$$PensionableSalary(t) = max(Salary(t) - \frac{7}{8}AHVSalary(t), 30 * AHVSalary)$$

[1]

Contribution Rates under Pillar II are defined by law[2] (art.16)

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

$$MandatoryContributions(t) = PensionableSalary(t) * ContributionRate(t)$$

$$r = 1\%$$

[3]

$$PillarII = \sum_{t0}^{T}(MandatoryContributions + VoluntaryContributions) * \exp^{r*(T-t)}$$

[1] AHV salary: 2350 month, 28200 year.
[2] 831.40. Bundesgesetz über die berufliche Alters-, Hinterlassenen- und Invalidenvorsorge (Art.16)
[3] Minimum interest rate on the retirement assets as of. 01.01.2017

Private pension fund Pillar III

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

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

where $VoluntaryContributions$ is provided as input, r is the interest rate applied to the private pension fund, t_0 is today, and T is the retirement age.

Tax Benefit

The tax benefit ($TaxBenefit$) at year t, if the marginal tax rate is provided as an input ($TaxRate$), is calculated as:

$$TaxBenefit(t) = \sum_{t_0}^{T} VoluntaryContributions(t) * TaxRate(t) * e^{r(T-t)}$$

where $VoluntaryContributions$ is provided as input, t_0 is today, and T is the retirement age.

If the tax rate is not provided as an input, the tax benefits are computed as:

$$TaxBenefit(t) = TaxPaid_{Salary}(t) - TaxPaid_{TaxableIncome}(t)$$

[4]

The $TaxPaid$ is a function that calculates the amount of taxes to pay given a certain income. The tax benefit is the difference between the taxes due for the salary and those due once all deductions are considered (taxable income).

In SmaRP the taxable income ($TaxableIncome$) at time t is computed as:

$$TaxableIncome(t) = max(Salary(t) - min(TotalContr, MaxContrTax), 0)$$

where $Salary(t)$ is the salary at year t, $TotalContr$ is the sum of the Pillar II and Pillar III purchases and $MaxContrTax$ is the maximum deductable amount allowed by law.

The TaxPaid function

The $TaxPaid$ function is the sum of the federal and kantonal taxes.

The Federal tax at year t is computed as:

$$FederalTax(t) = \sum_{t_0}^{T} (Income(t) * FederalTaxRate) - 251 * Nkids$$

where $Income(t)$ is the income at time t, $Nkids$ is the number of kids under 18 and $FederalTaxRate$ is a factor based on the civil status and family structure.

[4] Important: The taxable income does not correspond to the net or gross salary. Social insurance contributions and a wide range of other deductions are substracted from the gross salary. The amount remaining is the taxable income, the base to calculate your tax bill.

The kantonal tax at year t is computed as:

$$KantonalTax(t) = \sum_{t_0}^{T}(Income(t) * KantonalTaxRate) * (F_{kanton} + F_{municipality} + F_{church})$$

where $Income(t)$ is the income at time t, $KantonalTaxRate$ is a factor based on the civil status and family structure, F_{kanton} is a kanton-dependent multiplication factor, $F_{municipality}$ is a municipality-dependent multiplication factor and F_{church} is a curch affiliation dependent multiplication factor.

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

The municipality-dependent multiplication factor for municipality Zürich is 1.19.

The curch affiliation dependent multiplication factor for municipality Zürich is 0.1. If there is no church affiliation this factor is `0`.

Results

The time-dependent data is shown in the following tables.

Table 1: Detailed Private Pension Fund Contribution

calendar	ExpectedSalary	OccupationalPension	PrivatePension	TaxBenefits
2018-Aug	100,000	100,000	50,000	0
2018-Dez	100,500	109,347	50,187	0
2020-Dez	101,508	129,598	51,202	0
2025-Dez	104,071	186,515	53,829	0
2030-Dez	106,699	264,756	56,590	0
2035-Dez	109,393	349,702	59,493	0
2040-Dez	112,155	450,059	62,547	0
2045-Dez	114,415	555,555	65,755	0

Table 2: Detailed Occupational Pension Fund Contribution

calendar	P2ContributionPath	P2purchase	DirectP2	ReturnP2	TotalP2
2018-Aug	0	0	100,000	0	100,000
2018-Dez	8,974	0	108,974	373	109,347
2020-Dez	8,974	0	126,922	2,676	129,598
2025-Dez	13,461	0	176,279	10,236	186,515
2030-Dez	13,461	0	243,584	21,171	264,756
2035-Dez	16,153	0	313,582	36,120	349,702
2040-Dez	16,153	0	394,348	55,712	450,059
2045-Dez	16,153	0	475,114	80,441	555,555

Table 3: Detailed Provate Pension Fund Contribution

calendar	P3ContributionPath	P3purchase	DirectP3	ReturnP3	TotalP3
2018-Aug	50,000	0	50,000	0	50,000
2018-Dez	0	0	50,000	187	50,187
2020-Dez	0	0	50,000	1,202	51,202

calendar	P3ContributionPath	P3purchase	DirectP3	ReturnP3	TotalP3
2025-Dez	0	0	50,000	3,829	53,829
2030-Dez	0	0	50,000	6,590	56,590
2035-Dez	0	0	50,000	9,493	59,493
2040-Dez	0	0	50,000	12,547	62,547
2045-Dez	0	0	50,000	15,755	65,755

Disclaimer

All figures in this report should be understood as general references and are not binding in any case. Mirai Solutions offers no guarantees for the completeness or accuracy of the information in this report and declines any responsibility in case of mistakes.