

SmaRP: Smart Retirement Planning

March 26, 2018

SmaRP has been designed and developed by [Mirai Solutions GmbH](#) to support users in an educated decision-making process towards their retirement.

Assumptions and limitations

- SmaRP is originally based on the Swiss retirement system. Most of the functionalities are general, but the basic configuration and parameters are specifics of Switzerland.
- SmaRP applies only to employees, persons whose main income is a salary. Self-employed people are not considered.
- As Pillar I is law and salary dependent only, SmaRP takes into account ONLY the Pillar II and Pillar III, the ones where one can make decisions during his working career.
- SmaRP takes into consideration the tax saving generated by the voluntary retirement contributions, assuming that all tax benefits generated are 100% reinvested in retirement as an additional private fund.
- When calculating the tax savings, the salary (minus a factor?) is taken as proxy of the taxable income.

Parameters

Personal parameters

Income parameters

Tax parameters Direct: postal code, civil states and n kids Second level: Kanton, Gemeinde, Tarif, Taxable income Final param: Tax rate

Case:

```
## [1] "Swiss"
```

Given the Inputs:

- Salary

```
## [1] 100000
```

- Birthdate

```
## [1] "1980-12-31"
```

- Salary Growth Rate

```
## [1] 0.02
```

- CurrentPillar II

```
## [1] 100000
```

- Amount of Pillar II purchase

```
## [1] 0
```

- Type of Pillar II purchase

```
## [1] "SingleP2"
```

- BVGMindestzinssatz Rate

```
## [1] 0.01
```

- Amount of Pillar III purchase

```
## [1] 0
```

- Current Pillar III

```
## [1] 50000
```

- Pillar III return

```
## [1] 0.01
```

- Postal Code of residence

```
## [1] 8001
```

- Kanton of residence

```
## [1] "ZH"
```

- Number of Kids

```
## [1] 0
```

- Church Affiliation

```
## [1] "N"
```

- Rate Group

```
## [1] "A"
```

- Maximum of Tax contribution

```
## [1] 6768
```

- Desired Retirement Date

```
## [1] "2045-12-31"
```

- Retirement Age

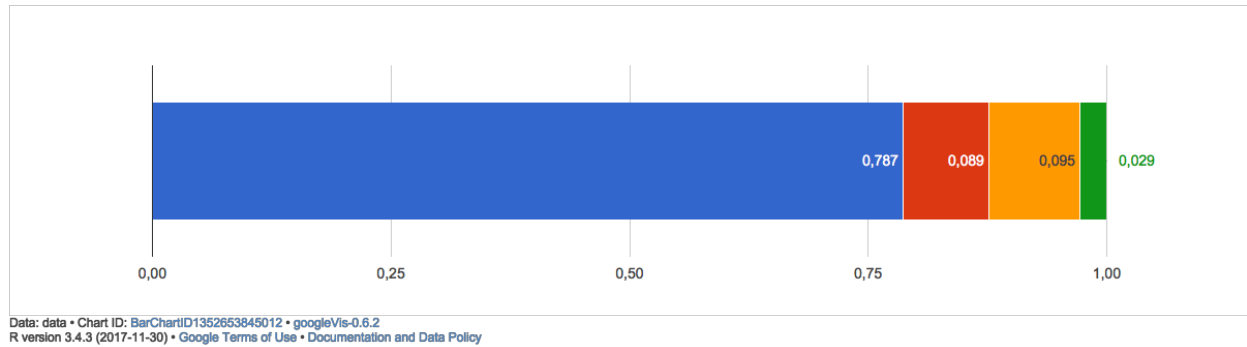
```
## [1] 65
```

- TaxRate

```
## [1] "calculated"
```

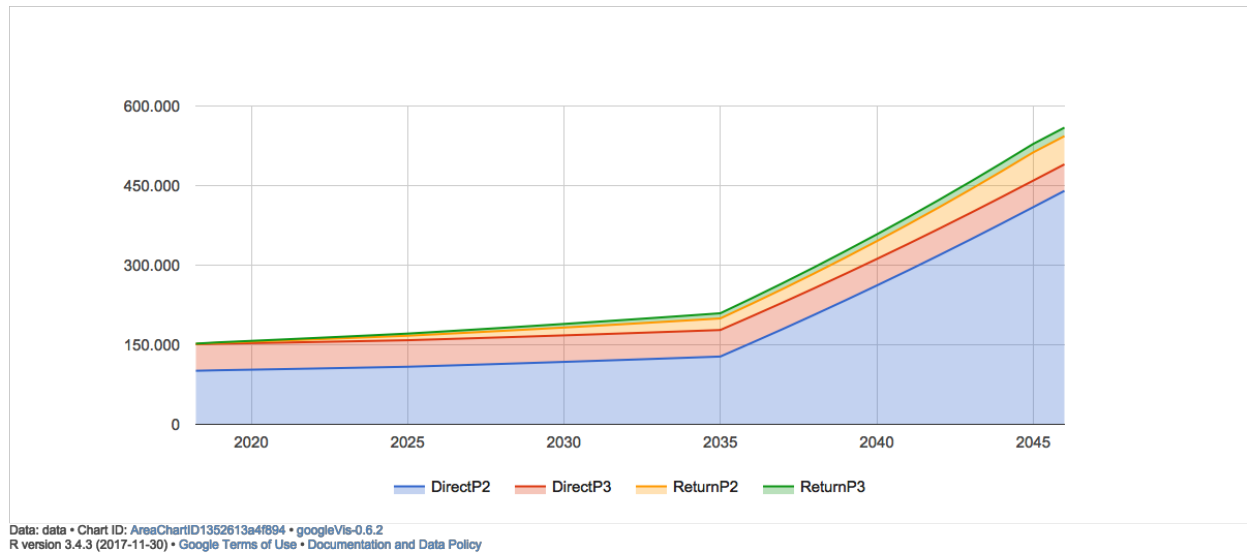
Results

BarPlot



Timeseries Plot

```
webshot::webshot(plot(plot1), file = "plot1.png", delay = 5)
```



Tabular Results

Table 1: Road2Retirement (continued below)

calendar	AgePath	BVGcontriburionrates	DirectP2	ReturnP2	TotalP2
2018-03-26	37	0.01	101000	777.8	101778
2018-12-31	38	0.01	102020	1811	103831
2019-12-31	39	0.01	103060	2868	105928
2020-12-31	40	0.01	104122	3943	108065
2021-12-31	41	0.01	105204	5040	110244
2022-12-31	42	0.01	106308	6159	112467
2023-12-31	43	0.01	107434	7304	114738
2024-12-31	44	0.01	108583	8469	117051
2025-12-31	45	0.015	110340	9663	120003
2026-12-31	46	0.015	112133	10887	123020
2027-12-31	47	0.015	113962	12145	126106
2028-12-31	48	0.015	115827	13431	129258
2029-12-31	49	0.015	117729	14749	132478
2030-12-31	50	0.015	119669	16100	135770
2031-12-31	51	0.015	121649	17488	139137
2032-12-31	52	0.015	123667	18907	142574
2033-12-31	53	0.015	125727	20361	146087
2034-12-31	54	0.015	127827	21850	149677
2035-12-31	55	0.18	153535	23617	177153
2036-12-31	56	0.18	179758	25661	205419
2037-12-31	57	0.18	206505	27995	234500
2038-12-31	58	0.18	233787	30626	264413
2039-12-31	59	0.18	261615	33571	295185
2040-12-31	60	0.18	289999	36823	326822
2041-12-31	61	0.18	318951	40398	359349
2042-12-31	62	0.18	348482	44307	392788
2043-12-31	63	0.18	378603	48569	427172
2044-12-31	64	0.18	409327	53170	462498
2045-12-31	65	0.18	440051	53170	493222

Table 2: Table continues below

t	BVGDirect	BVGContributions	BVGpurchase	ExpectedSalaryPath
0.7671	101000	1000	0	1e+05
1	1020	1020	0	102000
1.003	1040	1040	0	104040
1	1061	1061	0	106121
1	1082	1082	0	108243
1	1104	1104	0	110408
1.003	1126	1126	0	112616
1	1149	1149	0	114869
1	1757	1757	0	117166
1	1793	1793	0	119509
1.003	1828	1828	0	121899
1	1865	1865	0	124337
1	1902	1902	0	126824
1	1940	1940	0	129361
1.003	1979	1979	0	131948
1	2019	2019	0	134587

t	BVGDirect	BVGContributions	BVGpurchase	ExpectedSalaryPath
1	2059	2059	0	137279
1	2100	2100	0	140024
1.003	25708	25708	0	142825
1	26223	26223	0	145681
1	26747	26747	0	148595
1	27282	27282	0	151567
1.003	27828	27828	0	154598
1	28384	28384	0	157690
1	28952	28952	0	160844
1	29531	29531	0	164061
1.003	30122	30122	0	167342
1	30724	30724	0	170689
0	30724	30724	0	170689

Table 3: Table continues below

DirectP3	ReturnP3	TotalP3	P3ContributionPath	P3purchase	DirectTax
50000	385	50385	50000	0	0
50000	891.4	50891	0	0	0
50000	1404	51404	0	0	0
50000	1921	51921	0	0	0
50000	2443	52443	0	0	0
50000	2970	52970	0	0	0
50000	3504	53504	0	0	0
50000	4041	54041	0	0	0
50000	4584	54584	0	0	0
50000	5133	55133	0	0	0
50000	5689	55689	0	0	0
50000	6248	56248	0	0	0
50000	6814	56814	0	0	0
50000	7385	57385	0	0	0
50000	7963	57963	0	0	0
50000	8545	58545	0	0	0
50000	9134	59134	0	0	0
50000	9728	59728	0	0	0
50000	10330	60330	0	0	0
50000	10936	60936	0	0	0
50000	11549	61549	0	0	0
50000	12167	62167	0	0	0
50000	12794	62794	0	0	0
50000	13425	63425	0	0	0
50000	14062	64062	0	0	0
50000	14706	64706	0	0	0
50000	15358	65358	0	0	0
50000	16015	66015	0	0	0
50000	16015	66015	0	0	0

ReturnTax	TotalTax	TaxBenefits	TaxRatePath	TotalContr	Total
0	0	0	0.1083	0	152163

ReturnTax	TotalTax	TaxBenefits	TaxRatePath	TotalContr	Total
0	0	0	0.1092	0	154722
0	0	0	0.11	0	157332
0	0	0	0.1112	0	159986
0	0	0	0.1121	0	162687
0	0	0	0.113	0	165437
0	0	0	0.1139	0	168242
0	0	0	0.1145	0	171093
0	0	0	0.1154	0	174587
0	0	0	0.1161	0	178153
0	0	0	0.1169	0	181795
0	0	0	0.1176	0	185506
0	0	0	0.1183	0	189292
0	0	0	0.119	0	193154
0	0	0	0.1199	0	197100
0	0	0	0.1207	0	201120
0	0	0	0.1219	0	205221
0	0	0	0.123	0	209405
0	0	0	0.1244	0	237483
0	0	0	0.1255	0	266356
0	0	0	0.1266	0	296049
0	0	0	0.1276	0	326580
0	0	0	0.1285	0	357979
0	0	0	0.1294	0	390247
0	0	0	0.1302	0	423411
0	0	0	0.131	0	457494
0	0	0	0.1318	0	492530
0	0	0	0.1326	0	528513
0	0	0	0.1326	0	559237

Calculations / Methodology

In Switzerland retirement pension is based on a three-pillar regime. The first Pillar, common to most developed countries, is a state-run pay-as-you-earn system with minimum benefits. The so-called Pillar II (P2) is a compulsory tax-deductible company occupational pension insurance fund. Voluntary additional Pillar II buy-ins (VBP2) are regulated but allow for benefits improvement at retirement age while reducing the tax burden during the working career. The voluntary contribution (P3) is a privately-run, tax-deductible insurance fund. 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.

Pillar II

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

$$PensionableSalary(t) = \max(Salary(t) - AHVsalary^1, 30 * AHVsalary)$$

Contribution Rates under Pillar II defined in BVG law² (art.16)

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

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

$$r^3 = 1\%$$

$$PillarII = \sum_{t=0}^T (MandatoryContributions + VoluntaryContributions) * \exp^{r*(T-t)}$$

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

Pillar 3

$$r = \text{Interest Rate pillar 3 } PilarIII = \sum_{t=0}^T (VoluntaryContributions * \exp r * (T - t))$$

Tax benefits

$Tax = \sum_{t=0}^T T(VoluntarycontributionsP2 + VoluntarycontributionsP3) * Taxrate(t) * \exp^{r*(T-t)}$ Taxrate(t): Marginal tax rate based on the following criteria: Salary⁴, Tarif (based on civil status and family structure), number of kids under 18, church denomination flag and residence (from the postal code gets retrieved municipality and kanton).

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 deducted from the gross salary. The amount remaining after all those deductions is the taxable income, the base to calculate your tax bill. TODO: a rough and quick approximation could be reduce your 10% of your gross salary.

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>

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