UNIVERSITÄT LIECHTENSTEIN

Co-funded by the Rights, Equality and Citizenship Programme of the European Union (2014-2020)

Project MIGAPE: Work Package 3: Results of the Dynamic Simulations for Switzerland

Tanja Kirn[1] and Nicolas Baumann[2]

March 29th, 2021

[1] University of Liechtenstein, tanja.kirn@uni.li

[2] University of Liechtenstein, nicolas.baumann@uni.li

Project – Mind the GAp in PEnsions (MIGAPE)

Abstract - This report presents provisional simulation results of the gender pension gap (GPG) in Switzerland, using the dynamic microsimulation model MIDAS-CH and the socio-economic projections of Swiss Statistical Office.

MIGAPE is co-funded by the Rights, Equality and Citizenship Programme of the European Union (2014-2020) via Grant Agreement no. 820798. The content of this report represents the view of the author only and is his/her sole responsibility. The European Commission does not accept any responsibility for use that may be made of the information it contains

Table of contents

Acknowledgements

As all country reports of the MIGAPE project are based on the same methodology and general background, this report is partly directly built on the Belgian country report by Gijs Dekkers and Karel Van den Bosch, both scientific coordinators of the MIGAPE project and members of the Belgian team. Several sections, common to all countries participating in the MIGAPE project are therefore copied here from the Belgian document. We are indebted to these authors for the abovementioned contents, and more generally, for their scientific management of the general MIGAPE process. Further, we are indebted to Mikkel Barslund (CEPS, Belgium) for the general coordination of the project.

We also greatly benefited from useful comments on a working version of this report by Karel van den Bosch and Gijs Dekkers (Federal Planning Bureau, Belgium), as well as all other partners in MIGAPE.

Introduction

The Gender Pension Gap (GPG) measures the relative difference between the retirement income of women and men. The gender pension gap is usually much higher than the gender pay gap, since the income differences between the sexes and gendered behaviour (prevalence of part-time work, leaves due to care obligations, sectoral segregation) add up. In addition to the pay gap and the impact of gendered behaviour affect redistributive elements of pension systems the gender pension gap. As a result, the relation between the earnings gap and differences in labour market participation on the GPG is not linear.

In this report, we present projections of the GPG in Switzerland, using the dynamic microsimulation model MIDAS-CH. Initially, it was planned to perform the dynamic microsimulation as well as the static analysis before with Liechtenstein data (Kirn and Thierbach, 2020). However, since microdata is not available for Liechtenstein, the results of this report are based on Swiss microdata and the model represents the Swiss pension system. Since the pension systems of the two countries differ only marginally and thus the cause-effect relationships are very similar, the institutional aspects are very similar, however, the labour market participation of women in Liechtenstein is lower compared to Switzerland.

The MIDAS-CH model used for this report, is a first version and is was newly developed in the context of MIGAPE. As no retrospective data is used as input date for the model, the character of the model, as well as well as the projections, which can be made with this model, differ from MIDAS and the models of the project partners. However, it is planned to integrate also retrospective data into the model and thus to extend it.

In order to develop a scenario, which is based on agreed assumptions and methods, projections from official agencies, such as the Swiss Federal Statistical Office are implemented in the model. Thus, the projections used in this report differ from the other country reports of the working group, which base their projections on the country-specific projections prepared for the Ageing Report 2021 by the Ageing Populations and Sustainability Working Group (AWG) of the Economic Policy Committee (EPC) (European Commission, 2020).

This report is part of the European-funded international research project, called “Mind the Gap in Pensions”.[1] The goal of the project is to analyze gender differences in pension income, and to do this from various perspectives and to communicate the lessons learned to policy makers and the audience at large.[2]

[1] This project is funded by the European Union's Rights, Equality and Citizenship Programme (Grant Agreement number: 820798 — MIGAPE — REC-AG-2017/REC-RGEN-PENS-AG-2017).

[2] See www.migape.eu for the project description, project partners and other information about the project.

The remainder of the report is organized as follows. The next section briefly describes the institutional background with reference to simulated scenarios. Section 2 outlines the data used, the setup of the dynamic simulation model and the definition of the scenarios. Section 3 presents the results of the reference model. Section 4 uses three different scenarios to examine how differences in labour force behaviour, part-time work, and wage differentials affect the GPG. In doing so, a reference scenario was developed, in which labour market participation, unemployment rates and all other rates as well as other characteristics of the employed and of the not working or in-active population are kept constant at their 2021 levels. In contrast to this "constant scenario" further "equalized" scenarios are developed to analyze the evolution of the GPG against the background of changing labour market behaviour of men and women and decreasing wage differentials.

1 Institutional background

Life events, such as the raising of children, care for relatives, unemployment and divorce trigger a number of consequences in terms of social security law. For example, periods spent bringing up and caring for children are credited in the 1st pillar. Other life events, such as unemployment, also affect pension income. The next sections provide an overview about the institutional background. Section 1.1 provides an overview of the Swiss pension system, section 1.2 outlines the sociopolitical benefit objectives of the Swiss pension system.

1.1 The Swiss Pension System

The construct of the Swiss social insurance system is assembled on three-pillar principle:

- The OASI (old age and survivors' insurance; German: AHV – Alters- und Hinterlassen-versicherung) and the DI (disability insurance; German: IV - Invalidenversicherung), in conjunction with the SB (supplementary benefits; German: EL - Ergänzungsleistungen) form the **1st pillar.** It is intended to cover subsistence needs and is mandatory – simple the compulsory state old-age insurance.
- The occupational pension plan (pension fund), which is also compulsory, forms the **2nd pillar.**
- The **3rd pillar** represents the restricted (3a) and unrestricted (3b) pension provision, also called the voluntary self-provision.

1.1.1 The First Pillar: OASI, DI and SB

The 1st pillar includes insurance for old age, survivors and disability (OASI/AHV & DI/IV) as well as supplementary benefits (SB/EL). Furthermore, income compensation (IC; German: EO – Erwebsersatzordnung) during military service, civilian service, protective service and maternity compensation (ME; German: MSE – Mutterschaftsentschädigung), as well as unemployment insurance (UI; German: ALV – Arbeitslosenversicherung), are also included in the 1st pillar. In old age or in case of death and injury, the AHV/IV takes over the insured's livelihood. If the pension income is not sufficient to ensure subsistence, tested supplementary benefits (SB) also help cover the necessary living requirements. Both citizens working and living in Switzerland are, in principle, covered by the 1st pension foundation. The coverage ratio of the Swiss 1st pillar is 98,8% (Kuhn, 2020). The aim of the AHV is to compensate, at least in part, for the income from work that has decreased or disappeared due to old age and/or death.

The basic principle of the state pension is the pay-as-you-go system and the associated solidarity between the generations.

For the first principle, the contributions paid in by the active insured are not set aside but are paid out directly to the pensioners through the pay-as-you-go system. The neglect of interest rate developments and inflation play a subordinate role and represent as clear advantages of the pay-as-you-go system. On the other hand, there is the disadvantage of a possible imbalance in the ratio of the number of pensioners to contributors. If unemployment is high and wages are low, the state pension system may lack important revenues and incur large deficits (BSV, 2021, p. 11) The second principle of intergenerational solidarity is thereby reinforced by another aspect of interpersonal solidarity in Switzerland.

There is a supportive transfer mechanism between the higher earners and the poorer insured. The former pay higher contributions through their higher income than would actually be necessary to finance their own pensions. The poorer insured thus receive more benefit than their contributions would account for. This transfer mechanism contributes significantly to the balance in the AHV in Switzerland. Likewise, the supportive transfer mechanism for childcare and care credits contributes to the solidarity-based equalization. Persons who are not required to care for children or who have dependents in need of care make their contributions in favor of those persons for whom care is part of their current circumstances and who accordingly receive benefits.

A differentiation is made between a full pension and a partial pension (Art. 29 AHVG, 1948) The first is paid out if the full AHV contributions have been paid in regularly from the age of 21 until the regular retirement age. In this case, the pension amount is calculated from the elements of eligible contribution years (pension scale of maximum 44 years), the average earned income and education and care credits (Art. 29bis AHVG, 1948). A partial pension occurs when there was a failure to contribute during the contribution years, resulting in a missing contribution year in the pension calculation. The pension reduction usually results in a reduction of 1/44 (2.3%) per missing contribution year. However, those contribution gaps can still be paid retroactively for up to 5 years during the contribution obligation and prevent a corresponding pension reduction.

The personal pension entitlement is calculated according to Art. 30ter (AHVG, 1948) based on the so-called "individual account" (IK). This account records the earned income of a person during his obligation to contribute. Consequently, two IKs are kept for married couples, which take into account the division of income over the years, the so-called "splitting". Mutual immutability of half of the earned income of the respective spouses thus contributes to the equalization. Consequently, the corresponding example serves to illustrate the facts:

1. spouse: earnings in the calendar year CHF 150’000 (remaining share due to splitting CHF 75’000)

2. spouse: earnings in the calendar year CHF 100’000 (remaining share through splitting CHF 50’000)

Creditable income on the "individual account" (IK) after mutual creditability through splitting:

IK 1st spouse: CHF 125'000 (CHF 75'000 plus CHF 50'000)

IK 2nd spouse: CHF 125'000 (CHF 50'000 plus CHF 75'000)

If one of the two persons reaches retirement age earlier, the other income is credited undivided. If the second person reaches retirement age, the pension is recalculated on the basis of the new starting position (Art. 31 AHVG, 1948). This is then composed of three possible blocks: the undivided income before the marriage (block 1), the divided income during the marriage (block 2) and the possible undivided income due to the different retirement age entry (block 3).

The average earned income is calculated by looking backward at all incomes up to the time of retirement (Art. 30 AHVG, 1948). The circumstance of a low wage level from different years is taken into account by a revalued sum of the earned income according to the corresponding pension index of the average wage and price development in accordance with Art. 33ter (AHVG, 1948). The pension index for the adjustment of pensions to the wage and price development is created by the arithmetic mean of the determined wage index and the national consumer price index. The number of eligible years and months is used as a quotient in the calculation of the average of the revalued earned income. Accordingly, in the case of the full pension, taking into account the full contribution period and the average income, this results in a minimum ordinary full retirement pension of CHF 1’195 per month (CHF 14’340 per year) and a maximum payment of CHF 2’390 (CHF 28’680 per year), which is below the risk-of-poverty threshold (CHF 30’0345 per year) (see Figure 1). In the case of the child's pension, taking the same account of the contribution period and average income, the ordinary payment is a minimum of CHF 478 and a maximum of CHF 956 per month.

Gaps in contributions, as well as early retirement, are penalized by a partial pension in the Swiss pension system and, as a consequence, a full contribution period and full contribution obligation is rewarded by a full pension. A pension is regularly paid out monthly in arrears and, in accordance with the Swiss pension system, 12 times in one year (Art. 44 AHVG, 1948).

The child-raising and care credit are due to those persons who care for children under 16 years of age or relatives in need of care during their contribution years (Art. 29sexies and Art. 29septies AHVG, 1948). It is important to note that it is not possible to receive childcare credits simultaneously during the years in which the childcare credits are claimed. Both credits correspond to three times the minimum annual pension (CHF 3’585 per month, which is about 60% of the median income of women (CHF 6’067 per month)) (BFS, 2020d) Those credits are added to the annual income relevant for the OASI pension and allow the corresponding annual payment to be increased up to the maximum amount prescribed by law for individuals upon retirement. For spouses, the education and care credit lead to an offset of half the credit. Parents who are divorced or not married to each other but share parental care have the following two options to choose from: Full creditability of the care credit in favor of one parent or creditability of half the credit.

Individuals without contribution gaps receive a maximum AHV pension of CHF 2350 per month. The situation is different for married couples with a full contribution period, who receive 150% of the maximum pension (CHF 2'350) accordingly, but not more than a total of CHF 3'525. If the maximum amount is exceeded, both pensions are reduced proportionately. However, both spouses retain their own separate entitlement to the retirement pension. The calculation is called the ceiling formula (German: Plafonierungsformel). The following example from Rajic (2019) is intended to clarify the situation, if both spouses demonstrate a full contribution period (pension scale 44):

- Plafonated pension man:

$$\frac{Pension\ man * \ 150\%\ of\ the\ maximum\ pension}{Pension\ man\ +\ woman} = \frac{2294\ *\ 3525}{2294\ +\ 2181} = CHF\ 1'807$$

- Plafonated pension women:

$$\frac{Pension\ women * \ 150\%\ of\ the\ maximum\ pension}{Pension\ women +\ man} = \frac{2181\ *\ 3525}{2181\ +\ 2294} = CHF\ 1'718$$

If a spouse or parent dies, a survivor's pension is payable in accordance with Art. 33 of the Swiss AHV Act (AHVG, 1948) to prevent loss of income. Depending on the degree of relationship with the deceased, the survivor's pension is called: Widow's pensions, widower's pensions and orphan's pensions. The first type of survivor's pension for females has different eligibility requirements than those of widowers, again depending on the marital relationship. Female spouses can claim a widow's pension if there was at least one child in the marriage at the time of widowhood or if the marriage lasted at least 5 years in combination with the fact that the spouse has passed the age of 45. On the other hand, divorced women can only receive a widow's pension if there were joint children at the time of their former spouse's death and there were at least 10 years of divorced marriage. Other conditions for receiving a widow's pension for divorced wives are, on the one hand, the fact of having reached the age of 45 and having been married for at least 10 years, or if the youngest child reaches the age of 18 after the divorced mother has reached the age of 45. For widowers, the right to receive a widower's pension exists only until the time when a joint child has not yet reached the age of 18. The circumstance of marriage, divorced or married, does not matter. Children who have lost one parent are entitled to an orphan's pension or a two-orphan's pension in the event of the death of both parents. This orphan's pension expires when the child reaches the age of 18 or completes an education up to the age of 25. The amount of the survivor's pension is calculated in the same way as an old-age pension by the contribution period and the amount of the average income. If both claims for old-age and survivors' pensions arise at the same time, only the pension with the higher amount is paid out.

If a married couple decides to divorce, this triggers the splitting procedure. The splitting procedure has effects on all three pillars. In the following, the 1st pillar, as the AHV, will be dealt with specifically and the effects explained. In the case of the 1st pillar, couples can apply to their OASI compensation fund

for immediate "splitting" due to the divorce. If this is not applied for by the couple, then the splitting will be carried out automatically by the compensation office at the pension calculation time. With the application for splitting, all income earned during the spouses' marriage is divided equally between both parties. A prerequisite for income splitting is that both spouses are entitled to a pension (Art. 29quinquies Ziffer 3 AHVG, 1948). The year of marriage and the year of divorce are not taken into account in this calculation (Art. 29quinquies Ziffer 4 AHVG, 1948). Consequently, a minimum marriage duration of one calendar year can be noted to apply the splitting procedure. The following examples illustrate the topic:

Case 1:

- Marriage: December 2001
- Divorce: March 2019

→ Income earned from the years out of 17 (2002-2018) is split.

Case 2:

- Marriage: January 2019
- Divorce: October 2020

→ Splitting procedure cannot be applied.

If the divorce occurs at the retirement age of an OASI beneficiary of the spouses, the persons will receive two individual pensions after the divorce.

Disability insurance (IV) and supplementary benefits (EL) form an integral part of the 1st pillar. All persons who live in Switzerland or are gainfully employed in Switzerland are in principle considered to be compulsorily insured with the IV and the EL (Art. 1b IVG, 1959; Art. 4 ELG, 2008).

In the case of a health impairment of employment, the disability insurance aims at the integration measures or the cash benefits to secure the basis of existence (Art. 1a IVG, 1959) The benefits of the IV can be received by insured persons who are partially or completely restricted in their employment or in their previous field of activity due to health impairment. In this context, whether there is a physical, psychological or mental restriction is irrelevant (Art. 4-5 IVG, 1959).

The third and last element in the 1st pillar, the so-called supplementary benefit (EL), ensures the coverage of a gap in the minimum living costs (Art. 2 ELG, 2008). Benefits can be claimed if there is an entitlement to an AHV or IV pension, the single insured person has net assets below the asset threshold of no more than CHF 100’000 in assets or CHF 200’000 for married couples (Art. 4 and 9a ELG, 2008). According to Article 3 of the Federal Law on Supplementary Benefits to Old-Age, Survivors' and Disability Insurance, the benefits consist of annual cash benefits and the reimbursement of illness and disability costs in the form of benefits in kind.

1.1.2 The Second Pillar: Occupational pension

The 2nd pillar of the Swiss pension system is the occupational pension (BVG), which is intended to allow the previously accustomed and adequate living standard after retirement. A pension income of about 60 percent of the last salary is targeted in combination with the 1st pillar of the AHV (see chapter 1.1.4). The pension is contingent on the amount and duration of the payments made and the employee's covered earnings. Any contractor that hires workers who are entitled to compulsory benefits must set up or enter a pension fund registered in the registry of occupational pension schemes (Art. 11 BVG, 1985). For this reason, the 2nd pillar is based on employer responsibility (correct insurance coverage in the occupational pension plan (BVG)) and can be mandatory or voluntary, depending on the work situation. The group of persons subject to compulsory insurance under the BVG refers to all employees who have exceeded the age of 17, are insured under the 1st pillar and receive an annual salary of more than CHF 21'330 (until 2020) and CHF 21'510 (from 2021) (Art. 2, Abs. 1 and Art. 5 BVG, 1985).

The obligation to contribute to the occupational pension scheme does not apply to specific groups of persons if, among other things, their annual income is less than CHF 21'510 or CHF 1'792.50 per month (from 2021) (Art. 2, Abs. 1 BVG, 1985), if they have a fixed-term employment contract of fewer than 3 months, if there is no obligation for the employer to contribute in favor of the employees or if they are at least 70% disabled within the meaning of the IV (Art. 22, Abs. 3b BVG, 1985). On the other hand, self-employed persons or non-insured persons of the aforementioned group of persons can voluntarily take out insurance with the competent association compensation fund or with the supplementary institution (Art. 4 BVG, 1985). Self-employed persons pay the entire contribution themselves (Art. 4 BVG, 1985). In addition to the fixed contributions from earned income, insured persons can make voluntary contributions to the to the pension fund, which are tax-deductible and therefore particularly attractive for persons with a high income.

The former is the contributory wages, which are between the minimum rate (minimum BVG mandatory) of CHF 21'330 (until 2020) and CHF 21'510 (from 2021) and the maximum qualifying annual salary (maximum BVG mandatory) of CHF 85'320 (until 2020) and CHF 86'040 (from 2021), which corresponds to three times the maximum AHV annual pension of CHF 2'390 by 2021. The supplementary part is defined as the benefit that exceeds the maximum eligible annual salary of CHF 85'320 (until 2020) and CHF 86'040 (from 2021) and is allocated to the pension fund as a voluntary benefit. Most pension funds also insure income above the maximum qualifying annual salary up to the legal threshold of CHF 86,040, or they apply higher contribution rates than the legal minimum. Pension funds are also free to set the interest rate in the supplementary part. Many pension funds apply lower income thresholds for part-time workers. Unfortunately, there are no official statistics on average contribution rates or interest rates. The coverage ratio of occupational pensions is 49% (Kuhn, 2020).

In the case of the compulsory contribution to the 2nd pillar, the contribution amount varies depending on the relevant annual income. As already mentioned, the relevant annual income (minimum BVG mandatory) from CHF 21'510 (from 2021) serves as the starting point for the obligation to contribute. However, this annual income (gross) only serves as the basis for calculating the contribution amount. A coordination deduction of CHF 25'095 (2021) is duly deducted from the respective relevant annual income, which coordinates the pensions of the 1st and 2nd pillar. This ultimately ensures that the pension fund only levies contributions on those parts of the salary for which the 1st pillar does not already pay benefits. Accordingly, it can be avoided that the salary component of the AHV pension is insured twice. The amount of the coordination deduction is 7/8 of the maximum AHV pension (CHF 2'390 * 12 = CHF 28'680), i.e. CHF 25'095 in 2021. If the coordination salary is deducted from the relevant annual salary (gross), this results in the so-called coordinated salary. However, the lower limit of the contribution amount is decisive here. Between the gross annual salary of CHF 21'330 (minimum BVG mandatory) and the gross annual salary of CHF 28'680, there is a minimum coordinated salary of CHF 3'585. Each additional annual salary from CHF 28'680 onwards results in a corresponding increase in contributions up to the cap of the maximum qualifying annual salary (maximum BVG mandatory) of CHF 86'040 (from 2021). Accordingly, the maximum coordinated salary is capped at CHF 60'945 in 2021 and does not increase with each additional annual salary share.

That coordinated salary is subject to compulsory insurance. This means that that part of the annual salary is offset against the retirement assets with a corresponding retirement credit over the corresponding contribution years. In other words, the retirement credits of the 2nd pillar are not all calculated based on the last insured salary, but separately for each year. The amount of the retirement credit is age-dependent and is determined as a percentage of the insured salary. In accordance with Art. 16 (BVG, 1985), the contribution rates increase with age (from 7% for employees aged 25 to 34 to 18% for employees older than 55 years of age).

The retirement assets consist of the retirement credits contributed by the employer and the employee, the vested benefits contributed and the voluntary purchase payments including interest, whereas a minimum interest rate is stipulated by the Federal Council. The retirement credits are financed jointly by the employee and the employer and credited annually to the retirement account of the insured person.

For the final calculation of the amount of the annual pension of the 2nd pillar, the conversion rate of 6.8% is applied to the calculated retirement assets (Art. 14 BVG, 1985). This conversion rate has continuously decreased over the past year. In 1985, the conversion rate (then 7.2%) was chosen together with the old-age credit in such a way that the constitutional benefit target (approx. 60%) is achieved, taking into account the interest on the old-age credits and the salary increase. The so-called "golden rule" that the interest rate and the salary increase are in the same measure was assumed at that time in order to set the conversion rate at 7.2% and the corresponding retirement credits. According to BSV (2010), however, this assumption is no longer realistic, since measured against the minimum interest rate of 2% (2010),

the interest on retirement credits (an average of 2.3% per year since 1985 to 2008) exceeded the nominal salary increase of an average of 2.3% per year. With the current BVG minimum interest rate of 1%, which was again left unchanged by the Federal Council at the end of 2020, the level of the conversion rate of 6.8% will continue to lead to discussions.

In case of divorce, the pension fund assets acquired during the marriage up to the time of the initiation of the divorce proceedings are equalized (Art. 122 ZGB, 1912). For this purpose, the termination benefit for each spouse (what would be received if the assets were paid out in cash) is determined at the time of marriage and the initiation of divorce proceedings. Interest is added to the credit balance at the time of marriage. The difference between the two withdrawal benefits is the pension credit balance saved by each spouse during the marriage (Art. 22a FZG, 2000). In the event of divorce, each spouse is entitled to half of the credit balance accumulated jointly during the marriage. The court orders the pension funds involved (or one of them) to make the settlement.

In case of death, the surviving spouse is entitled to a widow's or widower's pension if he or she meets one of the following two conditions at the time of the spouse's death:

- he/she must be responsible for the support of at least one child;
- he/she must be at least 45 years old and have been married for at least 5 years.

The amount of the BVG minimum pension is 60% of the retirement pension or the entire IV pension. The surviving spouse who does not meet any of the requirements as mentioned above is entitled to a one-off settlement amounting to three annual pensions.

1.1.3 The Third Pillar: Private pension

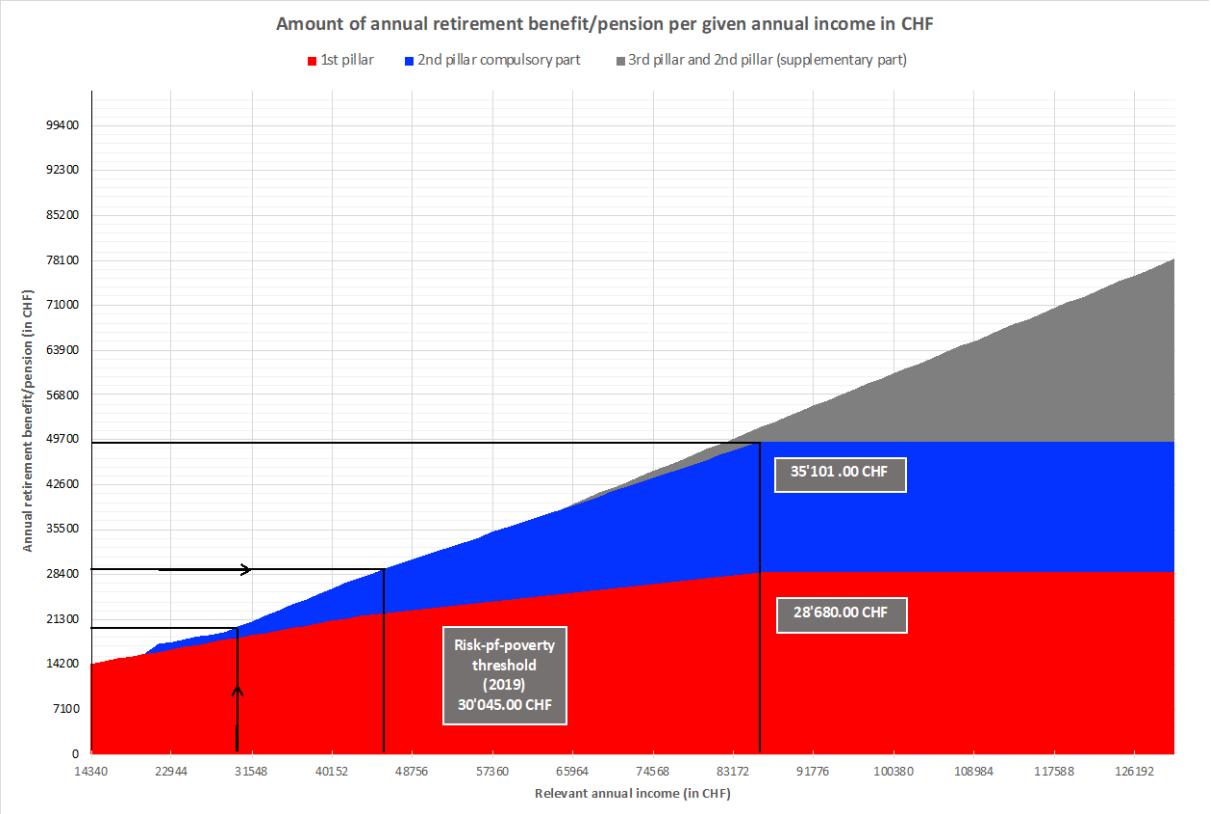
The 3rd pillar, private pension provision, aims to cover additional individual needs. It is voluntary and is intended to reduce or close gaps in pension provision from the 1st and 2nd pillars. This involves payments either into a predefined bank account or into a life insurance policy by employed persons. Accordingly, the goal is to build up an additional privately saved pension by the time of retirement, which can be deducted from annual taxable income up to a maximum amount of CHF 6’883 (The maximum annual pension payment applies for 2021). The saving is based on the principle of the savings bank. The saved amount is increased by the regular payments and the interest and is distributed with the final value. In general, the blocking of savings remains until retirement, but amounts can be withdrawn early under certain exceptions. The use of the privately saved pension is freely available to the recipient from retirement. The 3rd pillar comprises all private savings and voluntary old-age insurance policies. Regarding life insurances, a distinction can be made between whole life insurance policies (endowment and annuity policies) and term life insurance policies which last for a certain period of time and pays the death benefit only if the policyholder dies during that time.

1.2 The sociopolitical benefit objective of the Swiss pension system

The sociopolitical benefit objective of the Swiss pension system is to enable the "continuation of the accustomed standard of living" (Art. 113 (2) BV, 2000), whereby the "accustomed standard of living" is defined by the replacement ratio. In doing so, the replacement ratio refers to the pension amount as a percentage of the last gross salary (AHV salary), which is targeted by the Federal Council at 60%.

Figure 1 illustrates the relationship between the annual retirement benefit and the average annual lifetime income, whereby an uninterrupted working career of 44 years is assumed and by computing the 2nd pillar pension income (compulsory part) a conversion rate of 6.8% is applied.

Figure 1 Amount of annual retirement benefit/pension per given annual income in CHF for a 60% replacement ratio



Source: own computations.

Figure 1 illustrates the degressive character of the 1st pillar (red area), since the replacement rate from the 1st pillar decreases with increasing wages. Thus, for wages below CHF 31'000, the benefit target of 60% is already met by the 1st pillar pension alone. However, for wages above CHF 96'078, the 1st pillar pension covers only 30% of the last gross wage.[3] In order to achieve a constant coverage of 60% from the 1st pillar and the compulsory 2nd pillar, the insured salary for the 2nd pillar is coordinated, i.e. reduced

[3] Above an annual income of 86,040 (cap for 1st and 2nd pillar), the percentage of the 1st pillar is only 55% of the pension target of 60%. Above 96,078, it falls below the 50% limit. Compared to the relevant annual income, the 1st pillar can still cover 33% of the relevant annual income/the last gross salary at 86,040 (cap for 1st and 2nd pillar) and 30% from 96,078.

by a fixed amount compared to the salary subject to the 1st pillar pension. Hence, the 1st pillar and compulsory 2nd pillar pension income achieve within the min. and max. contribution threshold of the 2nd pillar a replacement ratio of about 60% (cf. red and blue area). From the maximum insured compulsory 2nd pillar pension income salary of CHF 86'040, the replacement rate from the compulsory 2nd pillar pension decreases, since the compulsory 2nd pillar pension does not increase further.

With regard to the risk-of-poverty threshold, which is CHF 30'045 for a one-person household as defined by the Swiss Federal Statistical Office (BFS, 2021b), it becomes apparent that an average annual income below CHF 38'700 leads to a pension income below the at-risk-of-poverty threshold.[4] According to the Swiss Federal Statistical Office (BFS, 2021a, p. 2), in 2019 the at-risk-of-poverty threshold applied to 16% of the Swiss population. In absolute numbers, according to the BSV (2021a), this would result in 1'376'624 Swiss citizens affected by this at-risk-of-poverty threshold, based on the population size in 2019 (8'603'900).

[4] Always provided that the full contribution obligation is fulfilled, no contribution gaps occur or other reasons of a reduction arise.

2 Current reform discussions

Demographic change requires consolidation in the area of old-age and survivors' insurance (1st pillar) as well as in occupational pension provision (2nd pillar). In order to ensure the sustainability of the social security systems, two reform proposals are currently being discussed.

2.1 Reform of the 1st pillar - OASI 21 reform proposal

The OASI 21 reform proposal aims to secure the financial equilibrium of the OASI until 2030 and to maintain the benefit level of the old-age pension system. The financial situation of the OASI has been deteriorating for more than ten years. Since 2014, wage contributions and contributions from the public sector have no longer been sufficient to finance current OASI pensions. In 2019, the pay-as-you-go deficit - the difference between revenues and expenditures - was CHF 1.17 billion. This situation will worsen with the retirement of the baby boomers.

With OASI 21, the Federal Council is proposing measures on the expenditure side, such as raising the retirement age to 65 for women. On the one hand, but also additional revenue, such as an increase in value-added tax, which is to be used to cover the apportionment deficit of the 1st pillar.

The following points are discussed:

- Raising the statutory retirement age for women from 64 to 65. This would mean that the retirement age for men and women would be the same. This proposal is to be accompanied by compensatory measures, which can be claimed by women who are particularly affected by the increase in the retirement age.

- The time of retirement is to be made more flexible: Between the ages of 62 and 70, it should be possible to draw all or part of the OASI pension. The possibility of early withdrawal and deferral of part of the pension is also to be anchored in occupational pension plans. Those who continue to work beyond the reference age should be able to improve their later OASI retirement pension with contributions paid from the reference age and close contribution gaps. Smaller incomes should continue to be exempt from contributions (monthly allowance of CHF 1’400).

2.2 Reform of occupational pension provision (BVG 21)

Switzerland's social security network is solid, but there has been increased pressure on occupational pension plans for some time, especially on the long-term financing of pensions. The reasons are varied and complex, but the two main drivers of rising life expectancy and low interest rates can be clearly identified (BSV, 2020c). As a result, on November 25, 2020, the Federal Council sought to submit a corresponding proposal (OASI Reform 21) to parliament. Since the rejection of the “2020 pension reform” in 2017, the Federal Council has received support in the drafting of the proposal from the Swiss

Employers' Association (Schweizerischen Arbeitgeberverband - SAV), the Swiss Federation of Trade Unions (Schweizerischen Gewerkschaftsbund - SGB) and Travail.Suisse. Those social partners have already submitted their initial proposals to the Federal Council in 2019, which serve as the basis for the OASI Reform 21 presented by the Federal Council (Müller-Brunner, 2019). The proposal of the Federal Council (OASI Reform 21) focuses on securing long-term financing of pensions, maintaining the pension level and improving pension provision for lower incomes. Specifically, the following changes are planned (BSV, 2020c):

- **Securing funding: lowering the minimum conversion rate.**
  The current financial market situation cannot guarantee an expected average return of approx. 5% at the current minimum conversion rate of 1% in the long term. Consequently, the minimum conversion rate is to be reduced from 6.8% to 6% (BSV, 2020c, p. 59).
- **Preservation of the pension level: compensatory measures**
  With the new lower minimum conversion rate, a compensatory measure to ensure the mandatory benefit level is unavoidable. Consequently, a combination of changes in the coordination deduction, the rates of the old-age credit and a solidarity-financed pension supplement for future pensioners is envisaged. According to BSV (2020c, p. 2), the following measures are intended to secure the benefit level across all incomes, but also to improve the situation for people with lower incomes, part-time employees and multiple employees even immediately. Consequently, the situation for women is to be improved the most.
- **Coordination deduction**
  The BSV reform 21 provides for a halving of the coordination deduction from the current CHF 25’095 (7/8 of the maximum AHV retirement pension in 2021: CHF 28’680) to CHF 12’548 (BSV, 2020, p. 58). The effect is thus particularly noticeable for lower annual salaries (including part-time and especially women).
- **Old-age credit**
  In the case of the old-age credit rates, a different division is proposed for attribution: 9% for the age group 25 to 44 years and 14% from 45 years (BSV, 2020c, p. 59). The reduction to two age categories and the increase for older workers is intended to eliminate the age disadvantage.
- **Pension supplement**
  Regardless of their BVG retirement pension, pensioners are to receive a pension supplement of CHF 200 per month if they retire in the first five years after the reform comes into force. CHF 150 is planned for transition years 6-10 and CHF 100 for transition years 11-15 (BSV, 2020c, p. 60) continued. Subsequently, the Swiss Federal Council is to determine the pension supplement per calendar year on an ongoing basis. Accordingly, the beneficiaries will be insured persons with low and medium incomes, part-time employees and, in particular, women.

2.2.1 Static simulation of the second pillar reform proposal

In order to show possible relations between the changes in the individual factors, as referred in the BVG Reform 21, a static approach of a sample calculation is applied in the following. The static simulation, since it focuses on selected cases, can be used to show the effect of varying the coordination deduction and the strength of the interest effect. However, in contrast to the dynamic model, corresponding wage increases and price developments are therefore neglected for the time being. Also, the pension supplement of the OASI Reform is not taken into account for the time being, since the pension supplement is paid regardless of the amount of the second pillar old-age pension. The starting point is a working career of 40 years[5], a conversion rate of 6.8% and the corresponding Old-age credit/retirement credits as a percentage of the insured salary.

Table 1 reports the 2nd pillar annual pension income in relation to different wage levels. Due to the static approach, the significant increase in the pension income of the 2nd pillar due to the higher annual salary can be seen in table 2. Consequently, a tripling of the annual salary from CHF 28'680 to CHF 86'040 leads to a significant increase of 1600% in the annual pension income at retirement, taking into account the model assumption. The reason for this is the significant accumulation of saved pension capital over the contribution period of 40 years. The time effect is once again impressively illustrated here. The linear increase of the annual pension benefit in the 2nd pillar from the threshold value of CHF 28'680 up to the maximum insurable salary of CHF 86'040 can also be seen in Figure 1. Here, each additional annual income plays a decisive role in the development of the annual pension advantage at retirement. Income above the maximum insurable salary of CHF 86'040 does not contribute to any change for the 1st pillar (AHV) and 2nd pillar (compulsory part).

Table 1: Listing of the annual pension (2nd pillar) depending on different wages

Year	2020	2020	2020	2020
Retirement credit	Table 2021	Table 2021	Table 2021	Table 2021
Conversion rate	6.8%	6.8%	6.8%	6.8%
Coordination deduction	25'095.00 CHF	25'095.00 CHF	25'095.00 CHF	25'095.00 CHF
Change of Key Element	Wage	Wage	Wage	Wage
	P_1	P_2	P_3	P_4
Wage	21'510.00 CHF	28'680.00 CHF	30'045.00 CHF	86'040.00 CHF
Coordination deduction	25'095.00 CHF	25'095.00 CHF	25'095.00 CHF	25'095.00 CHF
Insured wage	3'585.00 CHF	3'585.00 CHF	4'950.00 CHF	60'945.00 CHF
Retirement capital at 65	17'925.00 CHF	17'925.00 CHF	24'750.00 CHF	304'725.00 CHF
Annual pension	**1'218.90 CHF**	**1'218.90 CHF**	**1'683.00 CHF**	**20'721.30 CHF**
Delta	0.0%	0.0%	38.1%	1600.0%

Source: Own calculations.

[5] As the contribution period for the second pillar starts at the age of 25 and is therefore 40 years.

In conclusion, also considering the static approach, an annual gross income of CHF 30'045 leads to a significantly lower annual pension below the at-risk-of-poverty threshold. However, with an annual pension of about CHF 24'000 based on the assumed gross income at the at-risk-of-poverty threshold, the respective pensioner would have to rely on supplementary benefits or other financial support in order to be able to overcome the at-risk-of-poverty threshold at least in retirement.

Table 2 and Table 3 compare the pension reforms of the past and its impact of the 2nd pillar pension entitlements. Whereas Table 2 focuses on the lower threshold, reports Table 3 the impact on pension income at the upper threshold.

The OASI Reform 2021 has, apart from the disregard of the pension supplement and considering the static aspect of the model, a clear change for lower income classes. For an annual income of CHF 28'680, the changes in the halved coordination deduction, the reduced conversion rate and the new breakdown of the retirement credit as a percentage of the insured salary would lead to a significant increase in the annual pension credit. This 265% increase represents an absolute increase of CHF 3'233.67 in the annual pension credit, which would thus be additionally available each year. A closer look reveals the decisive factor in the OASI Reform 2021: The halving of the coordination deduction has its primary effect on lower incomes.

Table 2 Listing of the annual pension (2nd pillar) with an annual wage of CHF 28'680.- depending on the modified factor (1. OASI Reform 2015 vs. BVG 2020 vs. OASI Reform 21)

Year	1. BVG-Revision (2005)	2020	BVG-Reform 2021	BVG-Reform 2021	BVG-Reform 2021
Retirement credit	Table 2021	Table 2021	Table 2021	Table 2021	Table BVG Ref 21
Conversion rate	7.20%	6.80%	6.80%	6.00%	6.00%
Coordination deduction	27'360 CHF	25'095 CHF	12'548 CHF	12'548 CHF	12'548 CHF
Change of Key Element	BVG-Status	BVG-Status	BVG-Status	BVG-Status	BVG-Status
	P_1	P_2	P_3	P_4	P_5
Wage	28'680.00 CHF	28'680.00 CHF	28'680.00 CHF	28'680.00 CHF	28'680.00 CHF
Coordination deduction	27'360.00 CHF	25'095.00 CHF	12'547.50 CHF	12'547.50 CHF	12'547.50 CHF
Insured wage	1'320.00 CHF	3'585.00 CHF	16'132.50 CHF	16'132.50 CHF	16'132.50 CHF
Retirement capital at 65	6'600.00 CHF	17'925.00 CHF	80'662.50 CHF	80'662.50 CHF	74'209.50 CHF
Annual pension	**475.20 CHF**	**1'218.90 CHF**	**5'485.05 CHF**	**4'839.75 CHF**	**4'452.57 CHF**
Delta	-61%	0%	350%	297%	265%

Source: Own calculations.

The examination in higher wage classes supports this statement. If the annual salary is again assumed to triple, the maximum insurable salary of CHF 86'040 also increases the accumulated retirement capital from CHF 304'725 to CHF 338'065. However, in contrast to lower salary classes (at CHF 28'680: from CHF 17'925 to CHF 74'209), the change is not to the same extent in absolute terms. The change in the conversion rate from the former 6.8% to 6% compensates a part of the effect of the increased annual pension credit, but this happens on all salary classes to the same percentage extent. The last significant effect of the OASI Reform 2021 is the adjustment of the retirement credit. A small graduation for incomes at a lower age is intended to reduce the contribution differences between younger and older

insured persons. Consequently, this change also has a balancing effect on the halved coordination deduction and even leads to a reduction in the annual pension credit for higher incomes.

Table 3 Listing of the annual pension (2nd pillar) with an annual wage of CHF 86'040.- depending on the modified factor (1. OASI Reform 2015 vs. BVG 2020 vs. OASI Reform 21)

Year	1. BVG-Revision (2005)	2020	BVG-Reform 2021	BVG-Reform 2021	BVG-Reform 2021
Retirement credit	Table 2021	Table 2021	Table 2021	Table 2021	Table BVG Ref 21
Conversion rate	7.20%	6.80%	6.80%	6.00%	6.00%
Coordination deduction	27'360 CHF	25'095 CHF	12'548 CHF	12'548 CHF	12'548 CHF
Change of Key Element	BVG-Status	BVG-Status	BVG-Status	BVG-Status	BVG-Status
	P_1	P_2	P_3	P_4	P_5
Wage	86'040.00 CHF	86'040.00 CHF	86'040.00 CHF	86'040.00 CHF	86'040.00 CHF
Coordination deduction	27'360.00 CHF	25'095.00 CHF	12'547.50 CHF	12'547.50 CHF	12'547.50 CHF
Insured wage	58'680.00 CHF	60'945.00 CHF	73'492.50 CHF	73'492.00 CHF	73'492.50 CHF
Retirement capital at 65	293'400.00 CHF	304'725.00 CHF	367'462.50 CHF	367'462.50 CHF	338'065.50 CHF
Annual pension	**21'124.80 CHF**	**20'721.30 CHF**	**24'987.45 CHF**	**22'047.75 CHF**	**20'283.93 CHF**
Delta	2%	0%	21%	6%	-2%

Source: Own calculations.

3 Methodology

3.1 Database: The Swiss SILC dataset

The SILC survey (EU-SILC) at the European level was launched in 2003. However, Switzerland did not join the survey project until 2007. Accordingly, the Swiss Statistics on Income and Living Conditions (SILC) data set has been collected on behalf of the Federal Statistical Office (FSO) since 2007. This survey aims to record Swiss householders' income and living conditions through a broad range of questions. Through those social and economic recorded living conditions, statements on the interrelations between influencing factors can be made.

The data structures include longitudinal data, which captures variations in observation over time, and cross-sectional data, which captures observation for a specific given point in time. The sample size of the Swiss SILC dataset is approximately 7'000 households, representing the equivalent of approximately 15'000 individuals (BFS, 2020b, pp. 1–2). SILC-2018 refers to the current dataset, which will be renewed in 2021 by the next available version SILC-2019. The methodology of the SILC survey is a simple telephone survey of households, which are randomly sampled. The sample register of the BFS, which is compiled based on the Swiss municipalities and cantons' official population registers, is the basis for the selection. The survey participants are interviewed by the BFS over a period of several years, thus enabling the two data structures of cross-sectional and longitudinal data and fundamentally allowing the recording and investigation of crucial different life stages among the participating persons.

The survey uses the permanent resident population in private households as the primary population and survey unit. This includes persons without a permanent residence who live together with at least one other permanent resident person due to their living circumstances. However, the SILC data excludes people living in collective households, notably older people in care homes. As those persons consist mainly of the oldest old and women are in the majority, it affects the estimated GPG. Since older people, especially women, receive on average a lower pension, due to their employment history and as they receive a survivor pension, the GPG will be a bit smaller among pensioners living in care homes than that of other retired women. In the survey on work, education and health, persons are only interviewed from the age of 16, as they are entitled to take up work in Switzerland under the Youth Employment Protection Act.

The survey includes demographic characteristics, data points on income, social exclusion, housing situation (housing type, housing conditions, housing costs), education, employment, health (health status, access to health care), values and satisfaction with living conditions, trust in institutions, sense of security, social relationships, and childcare. Thus, questions on income distribution, satisfaction level of care for children can be answered or the assessment of living conditions in different age structures can be made possible.

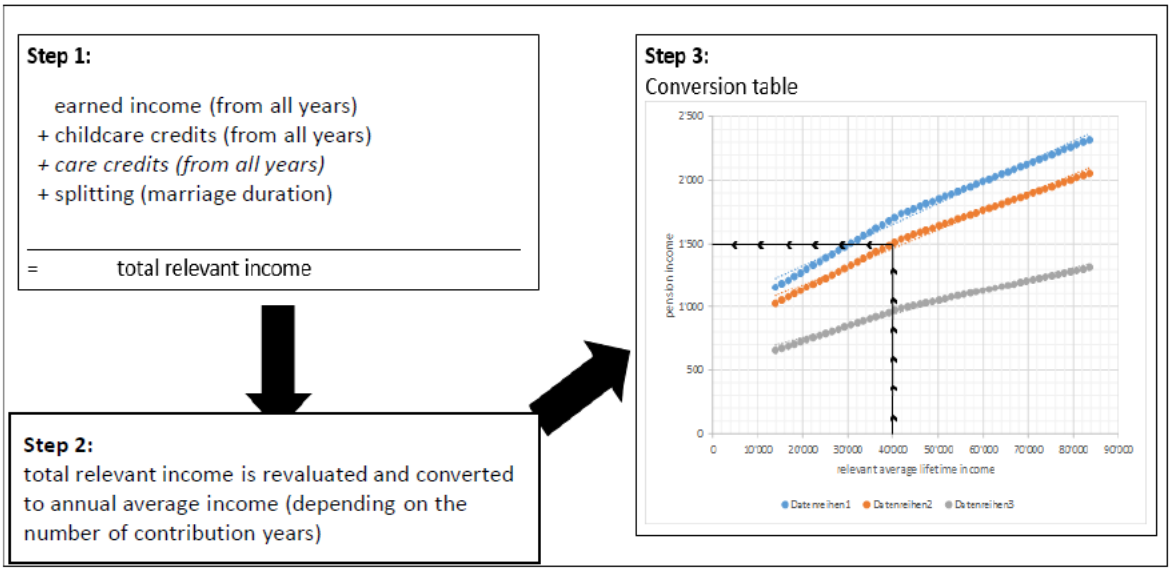
The legal basis for the SILC survey is provided by the federal statistics laws and ordinances of the Federal Statistical Office (BFS; Bundesamt für Statistik), which upholds the strict basic principles of data protection. Inferences about the persons based on the collected data are not possible since the collection of personal information (names, addresses and telephone numbers) is done in separate data sets and deleted after the survey. Thus, the SILC data set consists exclusively of the data characteristics already mentioned above (income, age, etc.) and does not allow any conclusions drawn about individual households or persons' circumstances.

3.2 Setup of the dynamic microsimulation model

The projections are modeled by MIDAS-CH, which is a dynamic microsimulation model with dynamic cross-sectional ageing. The base is the CH-SILC dataset, which is a cross-sectional dataset representing the Swiss population in the year 2018. This is different as e.g. in the Belgian microsimulation model, which is based on retrospective panel data (Dekkers and van den Bosch, 2021).

Based on the cross-sectional dataset, the model simulates the life spans of the existing and newborn individuals, including interactions, such as marriage and divorce, family formation and resolution, for the years between 2018 and 2070. A special focus is laid on labour market participation, as employment, but also interruptions and reductions in employment, significantly determine pension income. In doing so, MIDAS-CH covers employees and self-employed pensions. Beyond this, MIDAS-CH covers unemployment benefits and thematic leaves, such as childcare leaves. As however, the dataset contains no information about care activities, care credits are not included in the model. In addition to labour income, social benefits are also modeled.

Figure 2: Conversion of earned income and credits to pension income



Source: Own calculations.

For the second pillar, only compulsory pension income is modeled. Here, the retirement assets and the current annual contributions are compounded in accordance with the minimum conversion rate. The retirement assets determined in this way are converted into pension assets at retirement in accordance with the statutory conversion rate. In the base scenario, it is assumed that the conversion rate decreases over time (to 5.2% in 2070). In the constant scenario, on the other hand, the conversion rate is left at the current level (6.8%) over the simulation period. Thus, when interpreting the results, it should be noted that the variation of the conversion rate has a major impact on the second pillar pension income and thus also on the GPG. In general, the higher the assumed conversion rate, the higher the GPG, since men on average have higher retirement savings. The effect of the minimum interest rate is similar. The higher it is, the more capital can be accumulated in the course of working life, and the greater the differences in pension income among the genders at retirement age.

At the time of retirement, pensioners can choose between capital withdrawal and annuitization of their occupational pension entitlements. Bütler and Ramsden (2016) find that the choice between capital withdrawal and annuitization is influenced by life expectancy, future income, tax rates and individual preferences. In the microsimulation model it is assumed, that all pensioners choose annuitization of their occupational pension entitlements, which makes the pension incomes comparable. However, with regard of the comparison of the GPG derived from the SILC-data and the microsimulation results, it has to be kept in mind, that the SILC data reports pension income (and not a hypothetical pension income without capital withdrawal), and the microsimulation reports pension income without capital withdrawal. Those differences are substantial, since at retirement, 48% chose annuities, 33% capital and 19% a combination of capital and yearly pensions. With regard to gender differences, women more often received only a yearly pension (53%) than men (44%). In contrast, men more often received both a withdrawal and annuitisation (24% vs. 13% for women) (BFS, 2020a). These differences in withdrawal behaviour could lead to an apparent reduction in the GPG, since the higher share of lump-sum withdrawals among men means that they receive a lower second pillar pension in later years.

To assure that the simulations are consistent with exogenous semi-aggregate projections and assumptions, MIDAS-CH has an extensive alignment procedure. The alignment methodology used is called “alignment by sorting”. This method has the advantage over Monte Carlo (MC) simulation that more information can be used and that the resulting proportions will be closer to the target proportions than MC simulations. Dekkers, Inagaki, and Desmet (2012) illustrate the benefit of "alignment by sorting" using mortality as an example. If the death of a man is modelled with an MC simulation, then a random number between zero and one is drawn from a uniform distribution. If this number is lower than the exogenous mortality rate of males of that specific age (which by itself can be the result of a logistic regression or a deterministic number), the individual “dies”, otherwise the event takes not place and the individual remains “alive”. In doing so, the a-priori risk of death is the same for all males of that age, and the MC simulation procedure decides for which individuals in the dataset the event of death

actually takes place. In contrast to this, the “alignment by sorting” procedure ranks the male individuals of that specific age according to their risk of dying, whereas this ranking can be deterministic or the result of a logistic regression. In the second step, the alignment procedure takes the first x%, where x is an exogenous deterministic mortality rate, and marks them for death. Hence, in contrast to MC simulation, each individual can be assigned an individual a priori risk and the overall result can be aligned to the target proportions.

To take advantage of a particularly broad information base and ensure consistency with forecasted target proportions, the following states were modelled using an "alignment by sorting" process: *mortality* (by age, gender, and year of simulation); *fertility* (by age, gender, and year of simulation); *employment rate* (by gender, and year of simulation); *part-time employment* (by gender, extend of part-time employment, and year of simulation); and *unemployment rate* (by age classes, gender, and year of simulation).

Although the proportion of retired individuals is not aligned, the number of retired individuals is “indirectly” aligned, since these are residual states, as employment and unemployment. For individuals younger than 60, the ‘other inactive’ state is the residual state (Dekkers, et al. ,2012).

In addition to the alignment of the states, the consistency with the macroeconomic forecasts is achieved through the inclusion of the assumptions regarding the development of aggregate earnings (through ‘monetary alignment’, the aggregate of the simulated micro-level earnings is aligned with the growth rate of productivity to gender) and the social policy hypothesis pertaining to the relation between the growth rate of inflation and wages and social security benefits. By flanking the alignment of states with the alignment of macroeconomic forecasts, the results of the dynamic microsimulation model MIDAS-CH reflect the impact of macroeconomic projections as well as the assumptions underlying the alignment process.

The projections of the dynamic model rely on socio-economic scenarios about labour market participation rates, wage growth and other macroeconomic forecasts. In contrast to the other country reports of the working group, which based their projections on the EU's Ageing Working Group (AWG) and reported in the Ageing Report (European Commission, 2018), separate projects were used, as the EU AWG does not produce projections for Switzerland. In order to develop scenarios based on agreed assumptions and methods, the scenarios used are based on projections from official agencies, such as the Swiss Federal Statistical Office. Thus, the baseline scenario is based on official projections, and individual projections are adapted in the variants to the baseline scenario.

The next section describes the base scenario and the underlying sources and assumptions. In the following, we specify the variant simulations. According to Dekkers and van den Bosch (2021) these variants consist of a «constant variant», where relevant socio-economic variables are kept constant, and an «equality variant», where equality between women and men regarding relevant socio-economic variables is imposed.

In order to model a reference scenario, official forecasts and projections are used to assure, that the reference scenario is based on agreed assumptions and methods. The forecasted data is aligned according to projections of the following socioeconomic variables:

- Population trends, deaths, births (according to the reference scenario A-00-2020, BFS (2020d))
- Labour market participation rates by gender and age group
- Unemployment by gender and age group
- Hours worked: Regarding hours worked, the following assumptions are made: i) total amount of hours worked per person (in 2018) are kept constant by gender and type of work (part-time versus full time); and ii) the part-time share of total work by gender is kept constant over the entire projection period
- Growth rate of labour productivity per hour, which is assumed to be (in the long term) equal to the growth of the hourly wage.

The age groups distinguished in the report are: 15-24, 25-54 and 55-74.

A possible extension of the model would be to include migration. This may affect the GPG, as there are considerable differences among immigrants to Switzerland in terms of educational background, occupational situation, age, migration status and country of origin. Moreover, it is evident that integration into the labor market is rapid but not fully successful, and that households with a migration background have lower incomes and assets. Furthermore, immigrants may have fewer contribution years to the pension systems, if they enter the Swiss labour market at a later stage of their professional career. As contribution gaps result in lower pension incomes, it would be important to analyze those aspects.

Table 4: Overview of the data sources for alignment tables

Data format													
Page		mortality	Überlebende (Sx)	Sterbewahrscheinlichkeit (Qx)	Todesfälle (Dx)	Verbleibende Lebensdauer (ex)	Sterbewahrscheinlichkeit (Qx) Ref. Szen. (Referenzszenario A-00-2020)	Überlebenswahrscheinlichkeit (1-Qx)	Ständige Wohnbevölkerung (Px)	Geburtenziffern Ref. Szen. (Referenzszenario A-00-2020)	Lebendgeburten (Gx)	Fertilität - Wahrscheinlichkeit einer Geburt nach Lebensalter der Frau	Fertilität plus Ref. Szen
Gender	Male	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	NONE	NONE	NONE	NONE	NONE
	Female	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	NONE	FALSE	FALSE	FALSE	FALSE
Age	Floor	0	0	0	0	0	0	0	NONE	0	13	13	0
	Cap	120	120	120	120	100+	120	120	NONE	120	59	59	120
Period	Floor	2001	2000	2000	2000	2010	2019	2000	2010	2019	2000	2000	2000
	Cap	2070	2030	2030	2030	2019	2070	2030	2019	2019	2019	2019	2070
Data Information/ Metainformation													
Status of the database:		April 2019	April 2019	April 2019	April 2019	April 2019	Mai 2020	April 2019	**August 2020**	Mai 2020	**September 2020**	April 2019	Mai 2020
Last updated:		25.04.19	25.04.19	25.04.19	25.04.19	25.04.19	**28.05.20**	25.04.19	**27.10.20**	28.05.20	25.04.19	25.04.19	28.05.20
Regional reference:		Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland	Switzerland
Data sources:		BEVNAT, ESPOP, STATPOP	BEVNAT, ESPOP, STATPOP	BEVNAT, ESPOP, STATPOP	BEVNAT, ESPOP, STATPOP	BEVNAT, ESPOP, STATPOP	BFS	BEVNAT, ESPOP, STATPOP	**VZ, ESPOP, STATPOP**	BFS	BEVNAT, ESPOP, STATPOP	BEVNAT, ESPOP, STATPOP	BFS
Original data sources of the data set		Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	SZENARIEN Bevölkerungsszenarien - BFS	Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	Eidgenössische Volkszählung - VZ	SZENARIEN Bevölkerungsszenarien - BFS	Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	Statistik der natürlichen Bevölkerungsbewegung - BEVNAT	SZENARIEN Bevölkerungsszenarien - BFS
		Statistik des jährlichen Bevölkerungsstandes - ESPOP	Statistik des jährlichen Bevölkerungsstandes - ESPOP	Statistik des jährlichen Bevölkerungsstandes - ESPOP	Statistik des jährlichen Bevölkerungsstandes - ESPOP	Statistik des jährlichen Bevölkerungsstandes - ESPOP		Statistik des jährlichen Bevölkerungsstandes - ESPOP	Statistik des jährlichen Bevölkerungsstandes - ESPOP		Statistik des jährlichen Bevölkerungsstandes - ESPOP	Statistik des jährlichen Bevölkerungsstandes - ESPOP	
		Statistik der Bevölkerung und der Haushalte - STATPOP	Statistik der Bevölkerung und der Haushalte - STATPOP	Statistik der Bevölkerung und der Haushalte - STATPOP	Statistik der Bevölkerung und der Haushalte - STATPOP	Statistik der Bevölkerung und der Haushalte - STATPOP		Statistik der Bevölkerung und der Haushalte - STATPOP	Statistik der Bevölkerung und der Haushalte - STATPOP		Statistik der Bevölkerung und der Haushalte - STATPOP	Statistik der Bevölkerung und der Haushalte - STATPOP	
Link		**https://www.bfs.admin.ch/asset/de/px-x-1403030300161**	**https://www.bfs.admin.ch/asset/de/px-x-0102020300101**	**https://www.bfs.admin.ch/asset/de/px-x-0102020300102**	**https://www.bfs.admin.ch/asset/de/px-x-0102020300103**	**https://www.bfs.admin.ch/asset/de/px-x-0102020300104**	**https://www.bfs.admin.ch/asset/de/px-x-0104000000103**	**https://www.bfs.admin.ch/asset/de/px-x-0102020300102**	**https://www.bfs.admin.ch/asset/de/px-x-0102030000101**	**https://www.bfs.admin.ch/asset/de/px-x-0104000000103**	**https://www.bfs.admin.ch/asset/de/px-x-0102020204111**	**https://www.bfs.admin.ch/asset/de/px-x-0102020300101**	**https://www.bfs.admin.ch/asset/de/px-x-0104000000103**

4 Base results

The GPG is often defined as one minus the ratio of average pensions of women and men. In a general form it can be expressed as $1 - \frac{l(x)_f}{l(x)_m}$. According to the Eurostat definition of the GPG, pension income includes gross retirement pensions, gross survival pensions as well as the means-tested supplementary benefits for the elderly. People with zero pensions, as well as everyone below age 65 are excluded from the calculation.

In addition to this general definition of the GPG, there are numerous variants that can be distinguished on the basis of four dimensions (G Dekkers & van den Bosch, 2021). First, the underlying definition of pension income can be restricted on retirement pensions (covering all pillars), both old-age and survivors' pensions, and exclude the means-tested "guaranteed minimum income" (denoted SB) for the elderly.

Second, zero-pension values could be excluded. This exclusion is based on the assumption, that people who do not have a retirement benefit (i.e. equal to 0) are not retired. However, in some cases, especially if coverage gaps occur, it may be interesting to compare the GPG with and without zero-pension values. Hence, the GPG including zero-pensions can be interpreted as a combination of the standard GPG and the gender pension coverage gap, which measures the extent to which women have their own independent access to pension system benefits (European Commission, 2018, p. 71) contrast to the other reports of the project, we do not analyze zero-pension income in our analysis. Since persons who are not gainfully employed must also contribute to the OASI, there are almost no persons in Switzerland who do not have OASI pension entitlements, which has the consequence that the coverage gap is close to zero in Switzerland and zero-pension income is very rare (i.e. women have the same access to pension income as men). However, this is in contrast to second pillar pension income, where the coverage ratio is 49% (Kuhn, 2020). This would argue for examining zero-pensions as well. However, since the sum of both pension incomes is also considered, where there is again a coverage gap of almost zero, zero pensions are also included when analyzing the GPG of the sum of first and second pillar pensions.

Third, the GPG can be calculated by using a measure of location, such as percentiles or deciles. In this report, we focus on the GPG at the mean and the 25th percentile. Fourth, the GPG can be derived separately for age groups., the group of pensioners aged and 65-74 and 75+, as the composition of pensioners changes over time (women have a higher life expectancy) and with this change the types of pension income (old-age and survivors' pensions). As however an increasing share of women have built up a significant own retirement pension, the share of women with only a survivor pension is near to extinction in 2070.

Finally, it is interesting to analyze the GPG of people in the year when they retire, as this reflects the pure differences of a cohort (apart from early retirees). Since 44 years of contributions are required for

a full pension in the Swiss pension system, full careers are estimated for 2062 (2018+44, retirement in 2062) and beyond (at retirement, 65-74 with pension).

4.1 Overview

Table 5 gives an overview of the projection results, where the GPG is evaluated at the mean of various pension concepts. With regard to first-pillar pension income, it is noticeable that there are almost no gender differences in pension income in 2018, but these increase in 2070. This is possibly due to the ceiling effect for spousal pensions, which is discussed in section 4.2.

Table 5: Base results: Overview of the projected indicators of the GPG at mean

	status quo	base results	
	2018	**2062**	**2070**
A. first pillar pensions			
All 65+ with pension	-0.017	n.a.	n.a.
65-74 with pension	-0.038	n.a.	0.080
75+ with pensions	0.052	n.a.	n.a.
At retirement	0.056	0.141	0.134
B. second pillar pensions			
All 65+ with pension	0.588	n.a.	n.a.
65-74 with pension	0.583	n.a.	0.410
75+ with pensions	0.585	n.a.	n.a.
At retirement	0.425	0.388	0.331
C. first and second pillar pensions			
All 65+ with pension	0.316	n.a.	n.a.
65-74 with pension	0.291	n.a.	0.240
75+ with pensions	0.311	n.a.	n.a.
At retirement	0.258	0.257	0.230
D. pensions and SB			
All 65+ with pension	0.309	n.a.	n.a.
65-74 with pension	0.288	n.a.	0.222
75+ with pensions	0.300	n.a.	n.a.
At retirement	0.255	0.240	0.231

Notes:

Second pillar pensions include only compulsory pensions (no supplementary pensions).

SB: supplementary benefits.

Source: SILC (2018) and MIDAS-CH projections.

For the compulsory second pillar pension income, the earnings gap and differences in labour market participation rates directly translate into differences in pension income. Due to the increasing labour market participation of women and lower wage differentials, the GPG for the 65-74 decreases from

about 60% in 2018 to about 40% in 2070. This reduction in the GPG for the second pillar also leads to a reduction in the GPG of total pension income, which decreases at retirement from 26% to 23%.

Since in the basic model it is assumed that the conversion rate will fall to 5.2% by 2070, the pension income from the second pillar will be 23.5% lower than today, when a conversion rate of 6.8% applies.[6] Thus, when interpreting the results, it should be noted that the variation of the conversion rate has a major impact on the second pillar pension income and thus also on the GPG of the sum of pension incomes, which is discussed in section 4.3. In order to show the effect of the conversion rate, the conversion rate is not changed in the constant scenario and is left at the current level of 6.8% (see section 5.1).

4.2 Impact of ceiling for household pensions

Among married couples residing in Switzerland, where both spouses receive a retirement pension, the pensions are capped at 150% of the maximum pensions, which affected around 88% of married couples in 2019 (BSV, 2020a). Since spouses' pensions are reduced proportionally, the larger the differences in reduced spouses' pensions, the more significant the differences in pension income were before the reduction. As however the ceiling is only applied if both spouses are retired, the ceiling may affect the pension income of men later in life, as the women are on average younger than the men. Hence, if the husband is older and retires, he receives at the time of retirement an uncapped pension. If the wife retires later, her pension income will be capped, as than both spouses are retired and the ceiling rule applies.

Thus, the pension amount not only depends on the employment history but is also significantly determined by the marital status. If only the monthly retirement pensions of married persons without a partner entitled to a pension (i.e. without a ceiling) are considered, the average pension of men in 2019 is CHF 2012 and that of women CHF 1’518, which corresponds to a GPG of 0.246. This gap is significantly larger than for other marital statuses (see Table 6).

Table 6: Average pension income of spouses (all pensioners)

	single	married	widowed	divorced
2019 – GPG	-0.014	0.249	0.019	0.022
2070 – GPG	0.050	0.103	0.005	0.031

Source: AHV-Statistik 2019 and MIDAS-CH projections.

Table 7 reports the average pension income of spouses at retirement age in 2070. In case of uncapped pension income, the GPG is about 12%, and hence at a significant lower level than that of 2019. If

[6] 1-5.2/6.8=0.235.

however the ceiled pension incomes are considered, the GPG amounts to 28%. Hence, the GPG is higher for spouses which receive ceiled pension incomes.

Table 7: Average pension income of spouses at retirement age (projections for 2070)

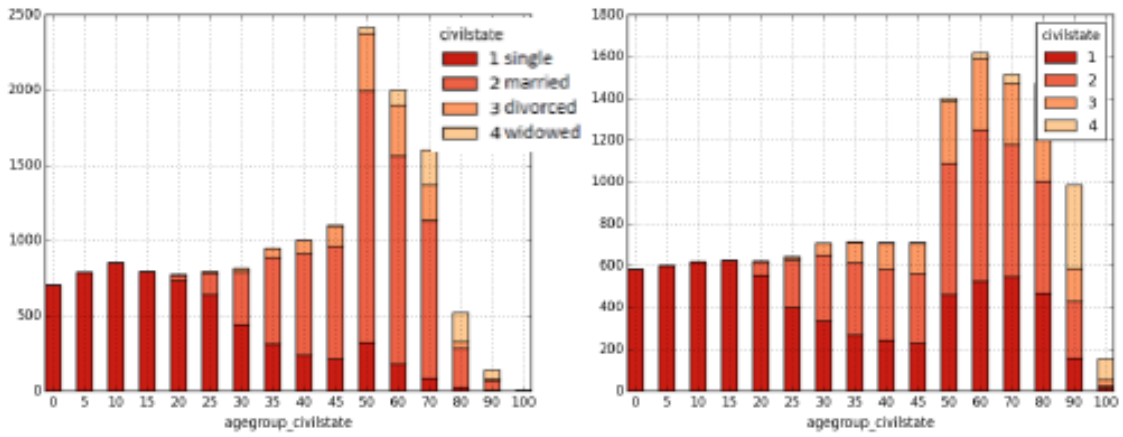
	Women	Men	Total	GPG
Pension income - without ceiling	29'236	33'329	31'599	0.123
Pension income - with ceiling	23'739	33'134	29'164	0.284

Source: SILC (2018) and MIDAS-CH projections.

As more married couples are allowed to spend more years together at retirement age due to rising life expectancy, the relative share of retirees with ceiled pensions increases. Since the GPG is larger for ceiled pensions than for uncapped pensions, the increasing share of spouses among retirees leads to an increasing GPG. Graph 1 illustrates the relative share of the different civil states in 2018 and 2019, whereas civil state 2 denotes married persons.

Graph 1: Civilstate across agegroups

2018 2070



Source: SILC (2018) and MIDAS-CH projections

4.3 Impact of the minimum conversion rate

The retirement pension of the second pillar (BVG compulsory) is calculated as a percentage of the retirement assets that the insured persons have saved upon reaching retirement age.[7] The conversion rate is the percentage at which an insured person's retirement assets are converted into a life annuity. Its amount depends on the technical interest rate and the average life expectancy according to the applied technical bases.

[7] For example, for a retirement savings of 100'000 Swiss francs, one receives an annual pension of 6'800 Swiss francs upon reaching the regular retirement age with a conversion rate of 6.8%.

This conversion rate has been 7.2% since the BVG came into force in 1985. Since the average life expectancy of pensioners has increased since then, which means that more annual pensions have to be paid out per pensioner on average, the conversion rate had to be reduced. E.g. in 1980, the remaining life expectancy of a 65-year-old man was calculated at 15.3 years. In 2005, the life expectancy of a 65-year-old was 18.2 years, which means that the accumulated retirement assets must last almost three years longer. Hence, the 1st BVG revision in 2003 reduced the conversion rate from 7.1% (men) and 7.2% (women) to a uniform 6.8% by 2014.

In addition to life expectancy, which determines the period of expected pension payments, the technical interest rate (actuarial interest rate) is a second decisive factor. The technical interest rate refers to the interest rate used by the pension fund to discount or determine the present value of future pension payments. It serves as a calculation assumption about high the life-long interest on the capital set aside for pension payments can be. In other words, it is the interest rate that the pension fund must earn annually on the actuarial reserve of current pension beneficiaries in order to ensure that the promised benefits are covered by the set aside capital without redistribution.

The reduction in the conversion rate provided for in the 1st BVG revision is based on an expected return of 4.5% and a technical interest rate of 4%. The minimum conversion rate of 6.4% as of 2011 is based on a return expectation of 3.85% and a technical interest rate of 3.35%.

Life expectancy and expected returns are therefore decisive for the amount of the retirement pension, which is owed for life. The higher the life expectancy and the lower the technical interest rate, the lower the conversion rate and the pension.

Since the remaining life expectancy of a 65-year-old in 2008 is 18,9 years in 2018 and will increase for men and women born in 2017 up to an average of 28 and 30 years (BFS, 2017), it is assumed, that the future conversion rate is going to decline. This assumption is reinforced by the persistently low level of interest rates, which will be reflected in a lower technical interest rate in the future. For this reason, the base model assumes that the conversion rate will fall to 5.2% in 2070, which corresponds to an underlying technical interest rate of 3.0%, given the assumed life expectancies.

With regard to the compulsory second pillar pension, the reduction of the conversion factor will reduce the second pillar pension income significantly. A reduction of the conversion factor from 6.8% (status quo) to 5.2% (as assumed for 2070), will reduce the pension income by 23, 5% (1-5.2/6.8=0.235). As men have on average a higher level of accumulated retirement assets, the reduction of the conversion factor reduces the GPG significantly. In order to analyze the effect of the conversion rate on GPG, the conversion rate is not changed in the constant scenario and is left at the current level of 6.8% (see section 5.1).

5 Variant scenarios

In order to analyze the impact of changing labour market participation of women and men, as well as the effect of decreasing wage differential on the GPG, we contrast several "equalised scenarios" (EQs) to a "constant scenario" (also referred to as CO). In doing so, we contrast the "constant scenario", in which it is assumed, that labour market participation, unemployment rates as well as other characteristics of the employed and the not working or inactive population remains constant at their 2021 levels, to "equalized scenarios" (EQs), in which key socio-economic values in projection are equal for women and men. Hence, we contrast the situation of "if nothing would change" to scenarios "if there would be no differences between women and men".

By contrasting the constant scenario with equalized scenarios, equalization is enforced in a technical, rather brutal way. However, this methodological approach allows us to answer two research questions: First, what would the evolution of the GPG look like if the above key socioeconomic variables remained at their current levels by age group? Second, how fast or how slow would the GPG decline if these key socioeconomic variables were the same for women and men in the future?

As the GPG is a function of past labour market behaviour of men and women (Veremchuk, 2020), MIDAS-CH simulates the prospective development as a function of 1) the gender differential in currently observed pension benefits; 2) the gender differentials in previous labour market behaviour of currently active people, and 3) the gender differentials in prospective labour market behaviour of currently active people, as well as of future entrants into the labour market (Dekkers & van den Bosch, 2021).

Although those factors determine the GPG in combination, their effects become effective in different time frames. In doing so, the observed pension benefits in the starting dataset affect the GPG in the short run, and loses impact when the cohorts of current pensioners die. In the middle run, the GPG is affected by the impact of the previous labour market behaviour of currently active people. In the long run, the GPG is affected by the prospective labour market behaviour of current active people and future entrants. Therefore, those individuals who did not enter the labour market in the starting year because they are still too young have only a simulated labour market history at retirement. As no information about the retrospective employment history of the current population is available, only projections about the future GPG could be made, which is based on full simulated employment histories.

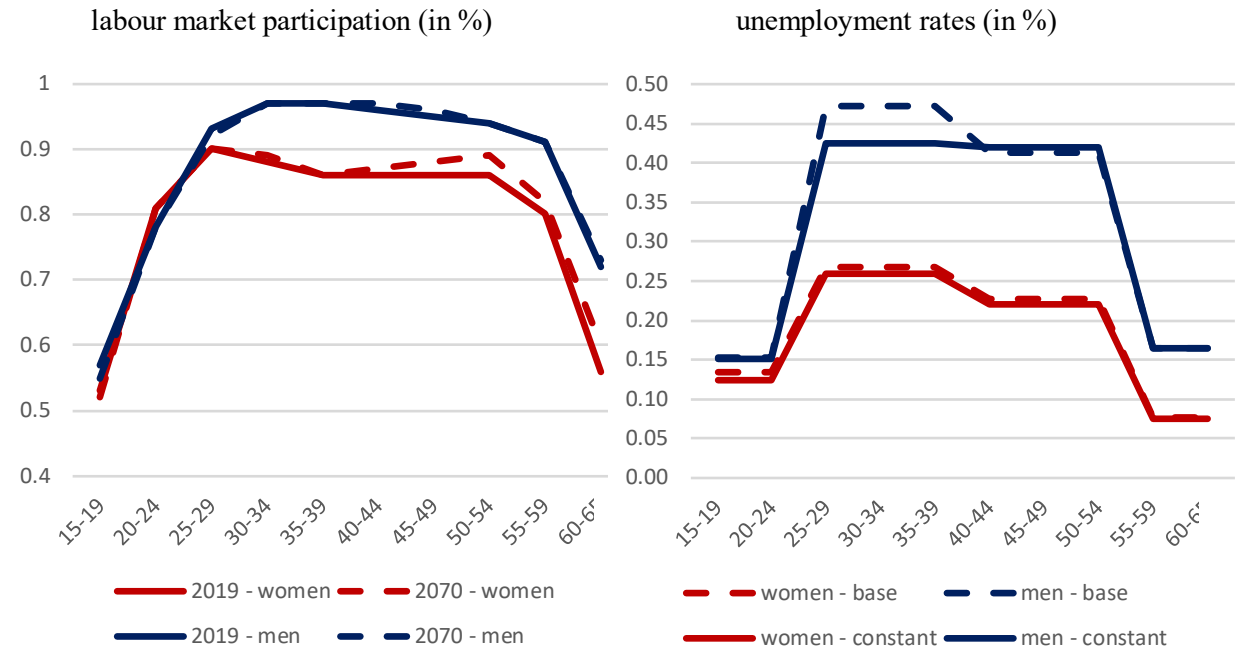
With this approach, we do not specify the mechanisms through which equality could come about, and we do not change any behavioural responses in the models. The equalized scenario is composed of three sub-scenarios (sections 4.2.1- 4.2.3 below), whereas the sub-scenarios are applied one by one, in order to see the impact of each of these (sets of) variables.

5.1 The Constant Scenario

In the constant scenario, a constant labour market behaviour by age category is assumed. Hence, labour market participation and unemployment rates by gender and age, as well as other distributions, both of the employed population and of the non-active population are kept at their 2021 levels. As the age distribution changes over time, constant rates by age category imply (slightly) changing overall rates for the whole population at active age. Hence, the term "constant" refers not to keeping the GPG constant, rather to keep the labour market behaviour constant.

Graph 2 illustrates the different assumptions with regard to labour market participation between the base model (dashed lines) and the constant scenario (full lines). Since the Swiss labour market is relatively stable and unemployment rates are low, the differences in projected unemployment rates are very small and thus the impact on the GPG is negligible. With regard to labour market participation, in the base model is assumed, that the overall labour market participation slightly increases, and that in 2070, the labour market participation of women is higher than today, however still below that of men, which keeps the GPG at a persistent level.[8]

Graph 2: Comparison of base scenario with constant scenario



Source: SILC (2018) and MIDAS-CH projections

In contrast to the assumptions of the base scenario, the conversion rate, which is used to convert an insured person's retirement assets into a life annuity, is kept constant at the current level (6.8%). This

[8] The base model refers to the projections of the reference scenario A-00-2020, Swiss Federal Statistical Office (BFS, 2020c).

follows the logic of the base scenario, whereas a situation of "if nothing would change" is assumed. With regard to the GPG, the higher the conversion rate, the greater the GPG, assuming that men, compared to women, can accumulate a higher amount of retirement assets over the course of their working lives.

Table 8 reports the projection results for the constant scenario, where the GPG is evaluated at the mean of various pension concepts. With regard to first-pillar pension income, the GPG in the constant scenario is slightly above the GPG of the base scenario. The slight differences in labour market participation between both scenario, translates into (albeit slight) differences in the first pillar GPG.

Table 8: Constant scenario: Overview of the projected indicators of the GPG at mean

	status quo	base results		constant scenario	
	2018	**2062**	**2070**	**2062**	**2070**
A. first pillar pensions					
All 65+ with pension	-0.017	n.a.	n.a.	n.a.	n.a.
65-74 with pension	-0.038	n.a.	0.080	n.a.	0.097
75+ with pensions	0.052	n.a.	n.a.	n.a.	n.a.
At retirement	0.056	0.141	0.134	0.155	0.148
B. second pillar pensions					
All 65+ with pension	0.588	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.583	n.a.	0.410	n.a.	0.416
75+ with pensions	0.585	n.a.	n.a.	n.a.	n.a.
At retirement	0.425	0.388	0.331	0.432	0.404
C. first and second pillar pensions					
All 65+ with pension	0.316	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.291	n.a.	0.240	n.a.	0.251
75+ with pensions	0.311	n.a.	n.a.	n.a.	n.a.
At retirement	0.258	0.257	0.230	0.285	0.272
D. pensions and SB					
All 65+ with pension	0.309	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.288	n.a.	0.222	n.a.	0.222
75+ with pensions	0.300	n.a.	n.a.	n.a.	n.a.
At retirement	0.255	0.240	0.231	0.258	0.247

Notes:

Second pillar pensions include only compulsory pensions (no supplementary pensions).

SB: supplementary benefits.

Source: SILC (2018) and MIDAS-CH projections.

With regard to compulsory second pillar pension income, the lower labour market participation of women (which is assumed in the constant scenario) leads to a smaller average pension wealth of women, which results in a lower second pillar pension income and a higher GPG. The different conversion rates,

which are assumed in both scenario, do not affect the second pillar pension gap, as the conversion is just a linear transformation of the gender specific differences of the accumulated pension capital.

With regard to the GPG of the overall pension income, it reaches almost the same level as the GPG in the status quo, which is not remarkable, as it is assumed in the constant scenario "that everything keeps the same". However, when comparing the results with the base scenario, which has only a slightly lower GPG, it has to be kept in mind, that this result is driven by the slightly higher labour market participation of women and by the lower conversion rate.

Whereas a changing conversion rate does not affect the second pillar pension gap, it affects the gap of the sum of first and second pillar pension income. As a lower conversion rate reduces the second pillar pension level, the relative share of second pillar pension income of total pension income decreases, which reduces the "impact weight" of the second pillar pension GPG on the GPG of total pension income. At time of retirement, compulsory second pillar pension income makes up about 42% (48%) of the total pension income of women (men) in the base scenario (conversion rate 5.2%). In the constant scenario, the share of second pillar pension income is 40% (49%) of the total pension income of women (men) (conversion rate 6.8%). As the gap of the second pillar pension income is higher than the first-pillar gap, a lower conversion rate decreases the gender gap of the pension income (sum of first and second pillar pension income), keeping gender specific differences in labour market participation equal. As however in the constant scenario a lower labour market participation of women is assumed as in the base scenario, women can accumulate a smaller amount of second pillar pension wealth, which counteracts the "conversion rate effect". With regard to the relative change of the GPGs, the gap reducing "conversion rate effect" seems to be stronger than the "labour market effect".

5.2 Equality scenario

In contrast to the constant scenario, in which a constant labour market behaviour is modeled by keeping the main socioeconomic variables constant, the equalized scenario assumes an equal labour market behaviour of women and men by using identical socioeconomic variables for both. In doing so, three sub-scenarios are defined, where various socioeconomic variables are set at equal levels for both women and men.

In order to analyze the impact of labour supply responses at the extensive and intensive margin, as well as wage differentials between women and men, the three sub-scenarios focus on i) labour market participation rates, unemployment and employment, ii) part-time work and hours of work and iii) equality of wage rate by hour worked, and of earnings of the self-employed.

5.2.1 Equalised scenario, sub-scenario 1 (EQS1) – equal labour market participation

Compared to other European countries, Switzerland has the second highest employment rate for women aged 15 to 64. In 2019, 76.3% of women in Switzerland were employed. Only in Iceland, where 81.9% of women are employed, the corresponding rate is higher. Sweden (75.4%), the Netherlands (74.1%) and Norway (73.1%) also have above-average employment rates (EU28: 64.1%) (BFS, 2020d).

Table 9: Labour market participation, unemployment and employment

workstate	Freq.	Percent	Cum.
in work, employee or self employed	6,547.1004	43.07	43.07
unemployed	292.294893	1.92	44.99
in education	2,892.9658	19.03	64.02
retired	2,614.5598	17.20	81.22
other inactive	2,854.0791	18.78	100.00
Total	15,201	100.00	

Source: SILC (2018), own computations.

However, there are significant differences in labour market participation between the genders and across age groups. Table 10 reports the economic status by age groups. These results of the Pearson's chi-square indicate that there is a statistically significant relationship between the type of self-defined economic status and age (chi-square with 9 degree of freedom = 8.5e+03, p = 0.00).

Table 10: Economic status by age groups

age groups	in work,	unemploye	workstate in educat	retired	other ina	Total
15-24	393.10461	48.380792	484.61284	0	679.04491	1,605.143
	24.49	3.01	30.19	0.00	42.30	100.00
	6.07	16.73	74.80	0.00	24.05	12.52
25-54	4,765.421	175.11056	157.200002	16.432744	1,397.149	6,511.314
	73.19	2.69	2.41	0.25	21.46	100.00
	73.57	60.55	24.26	0.64	49.48	50.77
55-74	1,303.293	65.693851	6.096551	1,422.221	640.17921	3,437.484
	37.91	1.91	0.18	41.37	18.62	100.00
	20.12	22.72	0.94	54.98	22.67	26.80
>74	15.627603	0	0	1,148.0896	107.34157	1,271.059
	1.23	0.00	0.00	90.33	8.45	100.00
	0.24	0.00	0.00	44.38	3.80	9.91
Total	6,477.447	289.1852	647.90939	2,586.744	2,823.715	12,825
	50.51	2.25	5.05	20.17	22.02	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Source: SILC (2018), own computations.

Table 11 reports the economic status by gender. These results of the Pearson's chi-square indicate that there is a statistically significant relationship between the type of self-defined economic status and gender ($p = 0.00$).

Table 11: Economic status by gender

gender	in work,	unemploye	workstate in educat	retired	other ina	Total
female	3,124.37	123.37034	1,396.584	1,389.578	1,609.223	7,643.126
	40.88	1.61	18.27	18.18	21.05	100.00
	47.72	42.21	48.28	53.15	56.38	50.28
male	3,422.73	168.92455	1,496.382	1,224.981	1,244.856	7,557.874
	45.29	2.24	19.80	16.21	16.47	100.00
	52.28	57.79	51.72	46.85	43.62	49.72
Total	6,547.1	292.294893	2,892.966	2,614.56	2,854.079	15,201
	43.07	1.92	19.03	17.20	18.78	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Source: SILC (2018), own computations.

In order to analyze the impact of differences in labour market participation rates, labour market participation, unemployment and employment rates by age category are set at equal levels for both women and men in the equalization scenario. Additionally, the rates of disability and other non-active states by age category are set at equal levels for both women and men, as people in those states build up pension rights, albeit to a limited extend. However, we do not equalize the proportions of wage-earners across sectors, professions etc, but to keep the current proportions, or the proportions that the model produces, after imposing the equality constraints mentioned.

Since the intention of the equalization process is not to model that women behave like men, but rather that the behaviour of the sexes converges, it is assumed that equality level is the average level of women and men together, according to the projections. This mean-oriented alignment has the additional advantage that overall rates (by age category) would not change relative to the base scenario.

Table 12 reports the results of the EQS1 scenario, where an equal labour market participation with regard to participation rates and unemployment is assumed. As the labour market participation of men is higher than of women, in the EQS1 scenario the labour market participation of women is increased. However, the unemployment rate of men is higher than that of women, so the unemployment rate of women is increased too. Thus, equalization triggers two opposing effects with regard to women's labour market participation. With respect to the GPG, which decreases due to equalization, the effect of higher labour market participation seems to more than compensate for the effect of higher unemployment.

The comparison of the change in the GPG of the first pillar shows the dampening effect of the compensation mechanism. Here, the GPG changes only marginally, whereas it is reduced more significantly in the second pillar due to the higher labour market participation.

Table 12: EQS1 – equal labour market participation: Projected indicators of the GPG at mean

	status quo	base results	constant scenario	EQ S1	
	2018	**2070**	**2070**	**2062**	**2070**
A. first pillar pensions					
All 65+ with pension	-0.017	n.a.	n.a.	n.a.	n.a.
65-74 with pension	-0.038	0.080	0.097	n.a.	0.085
75+ with pensions	0.052	n.a.	n.a.	n.a.	n.a.
At retirement	0.056	0.134	0.148	0.132	0.146
B. second pillar pensions					
All 65+ with pension	0.588	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.583	0.410	0.416	n.a.	0.391
75+ with pensions	0.585	n.a.	n.a.	n.a.	n.a.
At retirement	0.425	0.331	0.404	0.407	0.349
C. first and second pillar pensions					
All 65+ with pension	0.316	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.291	0.240	0.251	n.a.	0.234
75+ with pensions	0.311	n.a.	n.a.	n.a.	n.a.
At retirement	0.258	0.230	0.272	0.262	0.245
D. pensions and SB					
All 65+ with pension	0.309	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.288	0.222	0.222	n.a.	0.216
75+ with pensions	0.300	n.a.	n.a.	n.a.	n.a.
At retirement	0.255	0.231	0.247	0.240	0.231

Note: SB: supplementary benefits.

Source: SILC (2018) and MIDAS-CH projections.

5.2.2 Equalized scenario, sub-scenario 2 (EQS2) – equal part-time work rate scenario

In sub-scenario EQS2, the impact of labour supply responses at the intensive margin is analyzed, by equalizing part-time working rates and hours of work across age categories. As the sub-scenario EQS2 includes the characteristics of sub-scenario EQS1 (equal labour market participation), it shows the cumulative effect of equalizing labour market participation and equalizing work intensity.

Part-time employment rates differ significantly from one European country to another. Analogously to employment, Switzerland ranks second in terms of part-time employment, which means that although the overall employment rate of women in this country is high, it is often at a reduced employment level. In 2019, 62.7% of employed women in Switzerland worked part-time according to the European definition[9] (2010: 60.8%). This value is only surpassed by the Netherlands, despite a decrease between 2010 and 2019 (-1.1 percentage points to 75.5%) (BFS, 2020d).

If only part-time employed women are considered instead of all employed women, an increase in the average employment rate from 46% to 49% can be observed. This has increased especially among mothers (with youngest child under 7 years: from 42% to 47%; with youngest child between 7 and 14 years: from 44% to 48%). 25- to 39-year-old and 55- to 64-year-old part-time employed women also work at a significantly higher employment rate than in 2010 (from 48% and 47% to 52% and 51%, respectively). Even though the average employment rate has increased, it remains at a relatively low level, which can lead to low savings contributions to the second pillar and correspondingly low pension incomes (BFS, 2020d).

Table 13 reports the work intensity across gender. There is a significant difference between work intensity of men and women. Furthermore, about 85% of the part-time jobs with a work intensity below 50% are carried out by women, and only 15 % by men. Moreover, about 85% of part-time jobs with a work intensity below 50% are held by women and only 15% by men. Thus, women not only work part-time more often, but given that they work part time, also fewer hours than men.

[9] According to Eurostat's definition, employment levels of less than 100% are considered part-time. According to the Swiss definition, an employed person is considered to be working part-time if he or she has a degree of employment of less than 90% as part of his or her main job (BSV, 2020b).

Table 13: Work intensity across gender

gender	work intensity: not in wo	PT -50%	PT 50-69%	PT 70-89%	FT	Total
female	4,395.385	589.76254	487.28934	610.69587	1,559.993	7,643.126
	57.51	7.72	6.38	7.99	20.41	100.00
	52.57	81.24	81.72	71.61	33.44	50.28
male	3,966.22	136.161504	109.00693	242.11147	3,104.375	7,557.874
	52.48	1.80	1.44	3.20	41.07	100.00
	47.43	18.76	18.28	28.39	66.56	49.72
Total	8,361.605	725.92404	596.29627	852.80733	4,664.368	15,201
	55.01	4.78	3.92	5.61	30.68	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Source: SILC (2018), own computations.

Table 14 reports the work intensity across age categories. There is a significant difference between work intensity across age categories. Furthermore, the table shows that part-time work is often chosen during the "rush hour of life", i.e. the period when people are entering the workforce, taking important career steps and starting a family. And it is precisely during this period that it is predominantly women who hold part-time positions.

Table 14: Work intensity across age groups

age groups	work intensity: not in wo	PT -50%	PT 50-69%	PT 70-89%	FT	Total
0-14	2,238.089	0	0	0	0	2,238.089
	100.00	0.00	0.00	0.00	0.00	100.00
	26.77	0.00	0.00	0.00	0.00	14.72
15-24	1,176.171	22.092562	24.372788	38.226879	361.540586	1,622.4037
	72.50	1.36	1.50	2.36	22.28	100.00
	14.07	3.04	4.09	4.48	7.75	10.67
25-54	1,587.673	503.35809	417.90507	599.45298	3,472.943	6,581.3318
	24.12	7.65	6.35	9.11	52.77	100.00
	18.99	69.34	70.08	70.29	74.46	43.30
55-74	2,090.74	193.87847	150.94933	211.992894	826.88742	3,474.448
	60.17	5.58	4.34	6.10	23.80	100.00
	25.00	26.71	25.31	24.86	17.73	22.86
>74	1,268.931	6.5949224	3.0690828	3.1345783	2.9970674	1,284.727
	98.77	0.51	0.24	0.24	0.23	100.00
	15.18	0.91	0.51	0.37	0.06	8.45
Total	8,361.605	725.92404	596.29627	852.80733	4,664.368	15,201
	55.01	4.78	3.92	5.61	30.68	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Source: SILC (2018), own computations.

Since labour force intensity varies both in terms of gender and over the life course, this results in a complex and heterogeneous structure with regard to labour force behaviour. In order to capture this complex structure, work intensity is modeled in two steps. First, whether the person works part-time or full-time, second, if the person works part-time, it is estimated, whether the person has a small part-time contingent (PT<=50%), a medium part-time contingent (50%-69%) or a high part-time contingent (70%-89%).

In the equalization scenario, part-time work and hours of work are equalized in two steps. First, part-time work rates of female and male wage-earners are set equal by age category. Second, the average

number of hours work of male and female part-time works are set equal. In order to achieve a detailed alignment result, work intensity was aligned along three sub-categories: full time work (PT>0.9%), part time at bigger extent: 70% < PT < 89%; medium extent: 50% < PT < 69% and small extend (PT < 50%). Table 15, which reports work intensity across gender by age group illustrates the differences in employment rates. According to the CH-SILC 2018 data, 62% of employed women and 15% of the employed men worked-part time. With regard to the employment rates, 21% of employed women have an employment rate <50%, another share of 24% have an employment rate of 50%-69%.

Table 15: Work intensity across age groups without equalisation

Work intensity by age (without equalisation)

agegroup_awg	parttime 1	2	3	4	total
0	0.10	0.74	0.36	3.45	4.65
1	9.07	8.97	8.63	44.57	71.23
2	3.35	3.97	3.14	13.66	24.12
total	12.51	13.68	12.13	61.68	100.00

Work intensity of women by age (without equalisation)

agegroup_awg	parttime 1	2	3	4	total
0	0.00	1.07	0.49	2.99	4.56
1	15.39	16.04	12.40	27.63	71.46
2	5.40	6.54	4.65	7.39	23.98
total	20.79	23.66	17.54	38.01	100.00

Work intensity of men by age (without equalisation)

agegroup_awg	parttime 1	2	3	4	total
0	0.19	0.42	0.23	3.90	4.74
1	2.80	1.97	4.90	61.34	71.01
2	1.32	1.42	1.64	19.88	24.26
total	4.32	3.80	6.77	85.12	100.00

Source: SILC (2018) and MIDAS-CH projections

To equalize the employment rates of women and men, the part-time work rates of female and male wage-earners are set equal by age category. The result of this first step of the alignment process is reported in Table 16. As a result of the alignment process, the percentage share of employed women and men are set equal by age category and employment situation. In an equalized scenario, 38% of women and men work part-time. With regard to the employment rates, 13% of employed women and men have an employment rate <50%, another share of 14% have an employment rate of 50%-69%. The equalization procedure thus not only leads to an equalization of the employment rates of men and women; it also leads to a more even distribution of employees among the grouped employment rates.

Table 16: Work intensity across age groups after equalisation

```
Work intensity by age (with equalisation)
agegroup_awg | parttime |       |       |       |
             |        1 |     2 |     3 |     4 |  total
           0 |     0.11 |  0.76 |  0.34 |  3.43 |   4.65
           1 |     9.07 |  8.97 |  8.63 | 44.57 |  71.23
           2 |     3.33 |  3.97 |  3.16 | 13.66 |  24.12
       total |    12.51 | 13.70 | 12.13 | 61.66 | 100.00
Work intensity of women by age (with equalisation)
agegroup_awg | parttime |       |       |       |
             |        1 |     2 |     3 |     4 |  total
           0 |     0.10 |  0.75 |  0.33 |  3.38 |   4.56
           1 |     9.11 |  8.98 |  8.66 | 44.71 |  71.46
           2 |     3.32 |  3.94 |  3.16 | 13.57 |  23.98
       total |    12.53 | 13.67 | 12.14 | 61.67 | 100.00

Work intensity of men by age (with equalisation)
agegroup_awg | parttime |       |       |       |
             |        1 |     2 |     3 |     4 |  total
           0 |     0.13 |  0.77 |  0.35 |  3.48 |   4.74
           1 |     9.02 |  8.96 |  8.60 | 44.43 |  71.01
           2 |     3.35 |  3.99 |  3.16 | 13.76 |  24.26
       total |    12.50 | 13.72 | 12.11 | 61.66 | 100.00
```

Source: SILC (2018) and MIDAS-CH projections.

In the case of part-time work, the working hours are aligned in a second step. In doing so, the average number of work hours of male and female part-time workers are set equal. Suppose that h_{iga} represents the unadjusted hours of individual i with gender g in age cate-gory a, and that h_{ga} is the average of unadjusted hours for gender g in age category a, and that H_a is the targeted equal average number of hours for men and women after adjustment in age category a. Then the adjusted number of hours of individual i is $h°_{iga}° = h_{iga} * (H_a / H_{ga})$ (Dekkers & van den Bosch, 2021).

As the adjusted hours of work are aligned on the base of the average unadjusted hours of women and men jointly, it is implicitly assumed that behaviour of the sexes converges, and not that women simply behave like men. This assumption is analogous to the assumption of sub-scenario 1.

Table 17 reports the non-equalized and equalized average hours by age group and gender. By aligning along the dimensions of gender and age, the work-intensity across gender converges. In contrast to the average work-intensity of men which is rather stable over the life-course, the average work-intensity of women declines over the life-course. Equalizing working hours not only equalize employment intensity between the sexes, but also across the life cycle.

Table 17: Work intensity across age groups after equalisation

```
Avg hours worked by gender (non-equalised)
agegroup_awg | gender |       |
             |  False |  True | total
          -1 |    nan |   nan |   nan
           0 |  35.90 | 38.82 | 37.36
           1 |  30.67 | 39.55 | 35.14
           2 |  30.14 | 38.78 | 34.61
       total |  31.19 | 39.30 | 35.29
```

```
Avg hours worked by gender (equalised)
agegroup_awg | gender |       |
             |  False |  True | total
          -1 |    nan |   nan |   nan
           0 |  37.38 | 37.34 | 37.36
           1 |  35.14 | 35.15 | 35.14
           2 |  34.61 | 34.61 | 34.61
       total |  35.30 | 35.29 | 35.29
```

Source: SILC (2018) and MIDAS-CH projections.

In terms of employment intensity by employment type, the equalization also leads to an increase in average employment intensity for women and a decrease in employment intensity for men (Table 18). However, since the equalization was made according to the dimensions of age and gender, the average hours worked by workload differ, as they are distributed differently over the life cycle.

Table 18: Average hours worked by employment type

```
Avg hours worked by gender (non-equalised)
parttime | gender |       |
         |  False |  True | total
       1 |   8.55 | 19.71 | 16.62
       2 |  21.55 | 29.20 | 24.53
       3 |  25.98 | 41.69 | 31.54
       4 |  41.70 | 41.70 | 41.70
   total |  31.19 | 39.30 | 35.29
 Avg hours worked by gender (equalised)
parttime | gender |       |
         |  False |  True | total
       1 |   9.79 | 17.36 | 15.27
       2 |  25.48 | 25.03 | 25.30
       3 |  31.77 | 32.64 | 32.08
       4 |  44.30 | 39.37 | 41.26
   total |  35.30 | 35.29 | 35.29
```

Source: SILC (2.018) and MIDAS-CH projections.

Table 19 reports the results of the EQS2 scenario, where equal part-time work rates of female and male wage earners by age category are assumed, while also equalizing labour market participation of women and men. Hence, the reported GPGs capture the cumulative effect of EQS1 and EQS2. In other words, women and men behave equally with regard to their labour-market participation at the extensive and intensive margin. The only difference which prevails in this scenario are wage differentials, which will be equalized within the scenario EQS3 (see section 5.2.3).

When interpreting the results, however, two aspects have to be considered. The equalization of part-time working rates and hours of work in this scenario affects the earnings per year, increasing those of women and decreasing those of men. Second, it is important to keep in mind that the comparison of the different scenarios reflects not only the influence of the specific equalization strategies, but also dependencies between sociodemographic variables. For example, if the labour force intensity of women increases, this also leads to rising wages for women, as more career options are possible. Thus, on the one hand, an increase in labour intensity leads to a higher lifetime income through a larger workload,

and on the other hand, indirectly, through rising hourly wages due to better career prospects. With regard to men's lifetime earnings and wages, the effect is reversed: both flows are reduced, as is the amount of retirement assets, which is accumulated over the working phase.

Based on the fact that the majority of women can achieve higher lifetime income through equalization of part time work, as well as the above mentioned compounding effects, part-time work equalization has the strongest impact on the GPG. With regard to first pillar pension income, the GPG declines significantly. Concerning second pillar pension income, the GPG halves. If the overall pension income is regarded, the GPG is reduced by about 10% points.

Table 19: EQS2 – equal part time work rate scenario: Projected indicators of the GPG at mean

	status quo	base results	constant scenario	EQ S2	
	2018	**2070**	**2070**	**2062**	**2070**
A. first pillar pensions					
All 65+ with pension	-0.017	n.a.	n.a.	n.a.	n.a.
65-74 with pension	-0.038	0.080	0.097	n.a.	0.050
75+ with pensions	0.052	n.a.	n.a.	n.a.	n.a.
At retirement	0.056	0.134	0.148	0.093	0.095
B. second pillar pensions					
All 65+ with pension	0.588	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.583	0.410	0.416	n.a.	0.177
75+ with pensions	0.585	n.a.	n.a.	n.a.	n.a.
At retirement	0.425	0.331	0.404	0.165	0.192
C. first and second pillar pensions					
All 65+ with pension	0.316	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.291	0.240	0.251	n.a.	0.110
75+ with pensions	0.311	n.a.	n.a.	n.a.	n.a.
At retirement	0.258	0.230	0.272	0.126	0.142
D. pensions and SB					
All 65+ with pension	0.309	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.288	0.222	0.222	n.a.	0.094
75+ with pensions	0.300	n.a.	n.a.	n.a.	n.a.
At retirement	0.255	0.231	0.247	0.115	0.135

Note: SB: supplementary benefits.

Source: SILC (2018) and MIDAS-CH projections.

5.2.3 Equalised scenario, sub-scenario 3 (EQS3) – equalised wage rate scenario

The third sub-scenario consists of the equalization of hourly wage rates, i.e. the elimination of the gender wage gap. Like EQS2, this scenario is cumulative and also incorporates EQS1 and EQS2.

In 2016, the average gross monthly wage of women standardized to full-time was CHF 6'491 per month, while the on for men is CHF 7'946 per month. Measured against the mean, this results in a percentage wage difference of -18.3%. The median gross wage of women is CHF 5'908 and that of men CHF 6'786. Measured against the median, women thus earn 12.9% less than men. In the economy as a whole, the average wage gap in 2016 was around 17.4%. According to the results of the wage decomposition, more than half of this (56%) is due to the explanatory factors taken into account, such as age, level of education, industry, etc., while 44% remains unexplained (BFS, 2019).

The average wage differences between the sexes vary considerably in some cases between the different economic sectors. The smallest differences are found in industries with a low proportion of women.

It is also evident that the unexplained wage gap is significantly larger among older cohorts of employees than among younger employees (3.4% among those under 30, 9.1% among those over 49). Furthermore, the unexplained wage differences between women and men are more pronounced among full-time employees (8.4%) than among part-time employees (approx. 6% to 7%) (BFS, 2019). As the wage level differs across age groups and work intensity, the hourly wages are aligned along those two dimensions.

Table 20 reports the results of the EQS3 scenario, where equal wages for men and women across age groups and work intensity are assumed, while also equalizing working intensity and labour market participation of women and men. Hence, the reported GPGs capture the cumulative effect of all three equalization scenarios. However, since scenario EQS2 already increased gender wage equality, both scenarios EQS2 and EQS3 contribute to wage equalization. Here, the share of wage equality contributed by EQS2 could be interpreted as the share of variance explained by work intensity. In EQS3, the remaining unexplained and explained part of the variance is equalized.

Based on the fact that the majority of women can achieve higher lifetime income through equalization of part time work, as well as the above-mentioned compounding effects, part-time work equalization has the strongest impact on the GPG. With regard to first pillar pension income, the GPG declines significantly. Concerning to second pillar pension income, the GPG halves. If the overall pension income is regarded, the GPG is reduced by about 10% points.

As wages have been aligned along the dimensions of age groups and labour intensity, the variance of wages decreases significantly. This is reflected in a significantly reduced GPG of the first pillar. The equalization of the wage level is also reflected in the second pillar GPG, which will be further reduced.

Table 20: EQS3 – equalised wage rate scenario: Projected indicators of the GPG at mean

	status quo	base results	constant scenario	EQ S3	
	2018	**2070**	**2070**	**2062**	**2070**
A. first pillar pensions					
All 65+ with pension	-0.017	n.a.	n.a.	n.a.	n.a.
65-74 with pension	-0.038	0.080	0.097	n.a.	0.033
75+ with pensions	0.052	n.a.	n.a.	n.a.	n.a.
At retirement	0.056	0.134	0.148	0.055	0.089
B. second pillar pensions					
All 65+ with pension	0.588	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.583	0.410	0.416	n.a.	0.120
75+ with pensions	0.585	n.a.	n.a.	n.a.	n.a.
At retirement	0.425	0.331	0.404	0.088	0.182
C. first and second pillar pensions					
All 65+ with pension	0.316	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.291	0.240	0.251	n.a.	0.074
75+ with pensions	0.311	n.a.	n.a.	n.a.	n.a.
At retirement	0.258	0.230	0.272	0.070	0.133
D. pensions and SB					
All 65+ with pension	0.309	n.a.	n.a.	n.a.	n.a.
65-74 with pension	0.288	0.222	0.222	n.a.	0.062
75+ with pensions	0.300	n.a.	n.a.	n.a.	n.a.
At retirement	0.255	0.231	0.247	0.054	0.124

Note: SB: supplementary benefits.

Source: SILC (2018) and MIDAS-CH projections.

5.2.4 Comparison of all scenarios

In order to compare the impact of the various scenario on the GPG, the gender gaps of earnings and wealth, as well as the GPG, are compared. Table 21 illustrates how each of the equalizing scenarios has decreased the GPG further. Through the combination of all three equalization scenarios, the GPG on pension income declines from 30% to 7% by the simulation horizon.

However, the difference in GPGs between the base scenario and the constant scenario is rather small, which is driven by the fact, that labour market participation of women is already high and will increase only marginally. Since the current GPG (2018, status quo) is shaped by the labour force behaviour of the last decades, the increasing employment of women will reduce the GPG by five percentage-points over the simulation horizon.

However, if the work intensity of women does not change, i.e. if only labour market participation is equalized (EQS1), the reduction in the GPG will only be marginal and around two percentage-points. Albeit, if women's labour market participation increases at the extensive and intensive margins (EQS2), i.e., equal labour market participation combined with equal average hours worked, the GPG will more than halve to 11% over the simulation horizon. This cumulative effect also leads to a reduction in the pay gap, since an increasing labour intensity of women leads to rising wages for women, as more career options are possible. Thus, on the one hand, an increase in labour intensity leads to a higher lifetime income through a larger workload, and on the other hand, indirectly, through rising hourly wages due to better career prospects. This effect is also reflected in the reduction of the pay gap, measured by the average hourly wage, which declines significantly.

If we succeed in reducing the wage differences, which are attributable to explainable and unexplained factors (e.g. discrimination) (EQS3), the projected GPG will decline from currently 30% to 7%. Hence, wage equality would reduce the GPG by a further four percentage-points. In this respect, wage equality has a "stronger broad impact" than the equalization of wages through the equalization of the work intensities of men and women. While equal work intensities lead to an equalization of average wages per hour (which, however, says nothing about the dispersion of wages around the mean), it is only through wage equality that average lifetime annual incomes are equalized. This "broad effect" also leads to a reduction in the pension wealth gap, from 18% to 12%, which in turn reduces the second pillar GPG. Comparing across the three stages of the EQ scenario, it appears that the equalization of labour intensity has the strongest impact on average. However, closing the wage gap has a more evenly distributed impact.

Table 21: Comparison of the gender gaps in all scenarios

	2018 status quo	2070 base results	2070 constant scenario	2070 EQ S1	2070 EQ S2	2070 EQ S3
A. Earnings and pension wealth						
Average wage / hour	0.21	0.19	0.17	0.18	0.11	0.12
Average annual earnings	0.28	0.39	0.43	0.40	0.20	0.08
Average sp pension wealth (comp.)	0.58	0.34	0.40	0.35	0.18	0.12
B. average pension incomes [1]						
First pillar pension income	-0.04	0.08	0.10	0.09	0.05	0.03
Sencond pillar pension (compulsory)	0.58	0.41	0.42	0.39	0.18	0.12
Pension income [2]	0.29	0.24	0.25	0.23	0.11	0.07

Notes:

[1] 65-74 with pension.

[2] First and compulsory second pillar pension income.

Source: SILC (2018) and MIDAS-CH projections.

Table 22 compares the relation of pension income / average annual lifetime earnings and the relation of pension income / supplementary benefits, which is a means tested minimum income. Within all scenarios, the ratios of pension income / average annual lifetime earnings of women is above or close (EQS3) to 60%. Hence, in all scenario, on average, the sociopolitical benefit objective of the Swiss pension system is achieved. For men, this ratio is below 60%, which is due to the fact that they have higher pension incomes than women and that the pension system has a degressive effect. This means that the ratio of pensions to average lifetime income is below 60% for higher income groups.

The ratio pension income / supplementary benefits express the “distance” of pension income in relation to the general minimum income. Here, too, the "broad effect" of equal pay (EQS3) is evident: this ratio is highest.

Table 22: Comparison of ratios

	2018 status quo		2070 base results		2070 constant scenario		2070 EQ S1		2070 EQ S2		2070 EQ S3	
	wom.	*men*	*wom.*	*men*	*wom.*	*men*	*wom.*	*men*	*wom.*	*men*	*wom.*	*men*
C. ratios												
Pens. inc. / aver. ann. earn.	0.64	0.65	0.65	0.52	0.69	0.52	0.67	0.53	0.63	0.56	0.58	0.58
Pension income / SB	0.96	1.36	1.08	1.42	1.06	1.41	1.09	1.42	1.22	1.37	1.25	1.34

Notes:

[1] 65-74 with pension.

[2] First and compulsory second pillar pension income.

6 Summary and Conclusions

This study analyzes the Gender Pension Gap (GPG), which indicates how much women's pensions are differing from those of men. The gender pension gap is usually much higher than the gender pay gap, since the income differences between the sexes and gendered behaviour (prevalence of part-time work, leaves due to care obligations, sectoral segregation) add up. In addition to the pay gap and the impact of gendered behaviour affect redistributive elements of pension systems the gender pension gap. As a result, the relation between the earnings gap and differences in labour market participation on the GPG is not linear.

In this study, we attempt to identify some of the underlying developments that cause the GPG in Switzerland. The projections of the future development of the GPG (until year 2070), are made with the dynamic microsimulation model MIDAS-CH. When analyzing the GPG, we show results for several variant GPGs. We consider the GPG of first pillar pension income, GPG of second pillar pension (compulsory part), the GPG of the sum thereof, and the GPG with supplementary benefits, a means tested guaranteed minimum income. Furthermore, we distinguish a base scenario, where the overall employment and demographic projections follow the trends projected by the Swiss Statistical Office, and a constant scenario, where the employment rate and other factors are kept at their 2021 levels. Additionally, we project equality scenarios, where labour market participation, part-time working rate and wages of women and men are equal. We emphasize that these simulations are only carried out for analytical purposes, and do not represented realistic or necessarily desirable developments or policy options.

In the base scenario, the standard GPG of the total pension income decreases over the simulation period from to 29% to 25%. In the base scenario, the standard GPG of the total pension income decreases over the simulation period from to 29% to 25%. This means, that the overall GPG is relatively persistent. However, it should be noted, that the GPG of second pillar pension income for the 65-74 decreases significantly from about 60% in 2018 to about 40% in 2070. As the second pillar pension is based on a defined contribution scheme, it shows, how the prospective labour market behaviour will reduce the GPG. Furthermore, the change of the GPG of the total pension income is driven by the lower conversation rate, which was assumed in the base scenario. The conversion factor is used to translate the accumulated pension capital into a yearly pension. Whereas it is currently 6.8%, a conversion factor of 5.2% is assumed in 2070 in the base scenario. The conversion factor was reduced due to the expected increasing life expectancy and an expected lower technical interest rate. The reduction of the conversion factor will reduce the second pillar pension income by 23.5%. A variation of the conversion rate does not affect the second pillar pension gap, as the conversion is just a linear transformation of the gender specific differences of the accumulated pension capital. However, it affects the gap of the sum of first and second pillar pension income. As a lower conversion rate reduces the second pillar pension level, the relative share of second pillar pension income of total pension income decreases, which reduces the

“impact weight” of the second pillar pension GPG on the GPG of total pension income. As the gap of the second pillar pension income is higher than the first-pillar gap, a lower conversion rate decreases the gender gap of the pension income (sum of first and second pillar pension income), keeping gender specific differences in labour market participation equal.

A second finding is, that if employment rate and other labour market rates are kept at their 2021 levels, as assumed in the constant scenario, the decline in GPG would be smaller. Hence, albeit the assumed increase in labour market participation of women is small, it will reduce the GPG.

A third finding is, that the equality scenario results in a significant decrease of the GPG. The GPG would decline from initially 29% to 7%. Comparing across the three parts of the equality scenario, it appears that most of this reduction is due to equalization of part-time work rates of men and women. However, closing the Gender Wage Gap would also lead to an additional strong reduction of the GPG. Equalizing only the labour market participation rates has only as small impact of the GPG.

However, when interpreting the results, it should be noted that no migration was considered in the simulation. Thus, there are considerable differences among immigrants to Switzerland in terms of educational background, occupational situation, age, migration status and country of origin. Moreover, it is evident that integration into the labour market is rapid but not fully successful, and that households with a migration background have lower incomes and assets.

7 References

AHVG. (1948). *Bundesgesetz über die Alters- und Hinterlassenenversicherung*. https://www.fedlex.admin.ch/eli/cc/63/837_843_843/de

BFS. (2017) *Sterbetafeln für die Schweiz 2008/2013.* Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/statistiken/bevoelkerung/geburten-todesfaelle/lebenserwartung.assetdetail.2103067.html

BFS. (2019). *Analyse der Lohnunterschiede zwischen Frauen und Männern anhand der Schweizerischen Lohnstrukturerhebung (LSE) 2016*. Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/statistiken/arbeit-erwerb/loehne-erwerbseinkommen-arbeitskosten/lohnniveau-schweiz/lohnunterschied.assetdetail.8266033.html

BFS. (2020a). *Statistik der neuen Leistungsbeziehenden aus der Altersvorsorge (Neurentenstatistik)*. Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/statistiken/soziale-sicherheit/berichterstattung-altersvorsorge/neurentenstatistik.html

BFS. (2020b). *Erhebung über die Einkommen und Lebensbedingungen (SILC)* (p. 2). Bundesamt für Statistik. https://www.bfs.admin.ch/bfsstatic/dam/assets/11647542/master

BFS. (2020c). *Szenarien zur Bevölkerungsentwicklung. Ergebnisse des Referenzszenarios*. Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/statistiken/bevoelkerung/zukuenftige-entwicklung.assetdetail.12107020.html

BFS. (2020d). *Erwerbsbeteiligung der Frauen 2010-2019*. Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/statistiken/arbeit-erwerb.gnpdetail.2020-0517.html

BFS. (2021a). *Armut in der Schweiz hat 2019 weiter zugenommen*. Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/aktuell/medienmitteilungen.assetdetail.15344808.html

BFS. (2021b). *Armutsgefährdung*. Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/statistiken/wirtschaftliche-soziale-situation-bevoelkerung/soziale-situation-wohlbefinden-und-armut/armut-und-materielle-entbehrungen/armutsgefaehrdung.html

BSV. (2010). *Das Leistungsziel der beruflichen Vorsorge* (p. 3). https://www.bsv.admin.ch/dam/bsv/de/dokumente/das_leistungszielderberuflichenvorsorge.pdf.download.pdf/das_leistungszielderberuflichenvorsorge.pdf

BSV. (2020a). *AHV-Statistik* (p. 8). Bundesamt für Sozialversicherungen. https://www.bsv.admin.ch/dam/bsv/de/dokumente/ahv/statistiken/ahv_stat_2019_d.pdf.download.pdf/AHV-Statistik%202019.pdf

BSV. (2020b). *Arbeit und Erwerb*. Bundesamt für Statistik. https://www.bfs.admin.ch/bfs/de/home/statistiken/arbeit-erwerb.html

BSV. (2020c). *Botschaft zur Änderung des Bundesgesetzes über die berufliche Alters-, Hinterlassenen- und Invalidenvorsorge (Reform BVG 21).* (p. 94). Bundesamt für Sozialversicherungen. https://www.fedlex.admin.ch/eli/fga/2020/2684/de

BSV. (2021). *Die schweizerische Altersvorsorge—Ein bewährtes System einfach erklärt* (p. 21). Bundesamt für Sozialversicherungen. https://www.bsv.admin.ch/dam/bsv/de/dokumente/themenuebergreifend/broschueren/Altersvorsorge_Basis.pdf.download.pdf/Altersvorsorge_Basis.pdf

Bütler, M., & Ramsden, A. (2016). *Pricing annuities: The role of taxation in retirement decisions*. *D24-V3*. http://hdl.handle.net/10419/145525

BV. (2000). *Bundesverfassung der Schweizerischen Eidgenossenschaft*. https://www.fedlex.admin.ch/eli/cc/1999/404/de

BVG. (1985). *Bundesgesetz über die berufliche Alters-, Hinterlassenen- und Invalidenvorsorge*. https://www.fedlex.admin.ch/eli/cc/1983/797_797_797/de

Dekkers, G, & van den Bosch, K. (2021). *Projections of the Gender Pension Gap in Belgium using MIDAS (project MIGAPE; Work Package 3),*.

Dekkers, Gijs, Inagaki, S., & Desmet, R. (2012). Dynamic Microsimulation Modeling for Policy Support: An Application to Belgium and possibilities for Japan. *The Review of Socionetwork Strategies*, *6*(2), 31–47. https://doi.org/10.1007/s12626-012-0026-9

ELG. (2008). *Bundesgesetz über Ergänzungsleistungen zur Alters-, Hinterlassenen- und Invalidenversicherung*. https://www.fedlex.admin.ch/eli/cc/2007/804/de

European Commission. (2018). *The 2018 ageing report: Economic & budgetary projections for the 28 EU Member States (2016 2070).* Publications Office. https://data.europa.eu/doi/10.2765/615631

European Commission. (2020). *The 2021 Ageing Report: Underlying Assumptions and Projection Methodologies.* Economic and Social Affairs Institutional Paper 142. November 20th, 2020. doi:10.2765/733565 (online). https://ec.europa.eu/info/publications/2021-ageing-report-underlying-assumptions-and-pro-jection-methodologies_en [25/11/2020]

FZG. (2000). *Bundesgesetz über die Freizügigkeit in der beruflichen Alters-, Hinterlassenen- und Invalidenvorsorge (Freizügigkeitsgesetz, FZG)*. https://www.fedlex.admin.ch/eli/fga/2000/104/de

IVG. (1959). *Bundesgesetz über die Invalidenversicherung*. https://www.fedlex.admin.ch/eli/cc/1959/827_857_845/de

Kirn, T., & Thierbach, K. (2020). Project MIGAPE: Work Package 2: Results of the Standard Simulations for Liechtenstein. https://www.researchgate.net/profile/Tanja-Kirn-2/publication/342411104_Project_MIGAPE_Work_Package_2_Results_of_the_Standard_Simulations_for_Liechtenstein/links/5ef30cbd92851cba7a4624f0/Project-MIGAPE-Work-Package-2-Results-of-the-Standard-Simulations-for-Liechtenstein.pdf

Kuhn, U. (2020). Augmented wealth in Switzerland: The influence of pension wealth on wealth inequality. *Swiss Journal of Economics and Statistics*, *156*(1), 19. https://doi.org/10.1186/s41937-020-00063-9

Müller-Brunner, L. (2019). *Sozialpartnerkompromiss in der beruflichen Vorsorge bringt Modernisierung und gewährleistet Leistungsniveau. Schweizerischer Arbeitgeberverband.* https://www.arbeitgeber.ch/sozialpolitik/sozialpartnerkompromiss-in-der-beruflichen-vorsorge-bringt-modernisierung-und-gewaehrleistet-leistungsniveau/

Rajic, D. (2019). *Wie die AHV-Renten eines Ehepaars plafoniert werden*. https://zeitlupe.ch/app/uploads/2021/01/AHV-Ratgeber-Wie-die-AHV-Renten-eines-Ehepaars-pflafoniert-werden-Zeitlupe-6-2017.pdf

Veremchuk, A. (2020). Gender Gap in Pension Income: Cross-Country Analysis and Role of Gender Attitudes. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3662968

ZGB. (1912). *Schweizerisches Zivilgesetzbuch*. https://www.fedlex.admin.ch/eli/cc/24/233_245_233/de

8 Appendices

8.1 Institutional background: Conversion table of first pillar pensions

Table 23: Conversion Table

Skala 44 / Echelle 44

Monatliche Vollrenten
Rentes complètes mensuelles

Beträge in Franken
Montants en francs

Bestimmungsgrösse / Base de calcul Massgebendes durchschnittliches Jahreseinkommen / Revenu annuel moyen déterminant	Alters- und Invalidenrente / Rente de vieillesse et d'invalidité	Alters- und Invalidenrente für Witwen/Witwer / Rente de vieillesse et d'invalidité pour veuves/veufs	Hinterlassenenrenten und Leistungen an Angehörige / Rentes de survivants et rentes complémentaires aux proches parents			
			Witwen/Witwer / Veuves/Veufs	Zusatzrente / Rente complémentaire	Waisen- und Kinderrente / Rente d'orphelin ou pour enfant	Waisenrente 60 % *) / Rente d'orphelin 60 % *)
	1/1			1/1	1/1	1/1
bis / jusqu'à						
14 340	1 195	1 434	956	359	478	717
15 774	1 226	1 471	981	368	490	736
17 208	1 257	1 509	1 006	377	503	754
18 642	1 288	1 546	1 031	386	515	773
20 076	1 319	1 583	1 055	396	528	792
21 510	1 350	1 620	1 080	405	540	810
22 944	1 381	1 658	1 105	414	553	829
24 378	1 412	1 695	1 130	424	565	847
25 812	1 444	1 732	1 155	433	577	866
27 246	1 475	1 770	1 180	442	590	885
28 680	1 506	1 807	1 205	452	602	903
30 114	1 537	1 844	1 229	461	615	922
31 548	1 568	1 881	1 254	470	627	941
32 982	1 599	1 919	1 279	480	640	959
34 416	1 630	1 956	1 304	489	652	978
35 850	1 661	1 993	1 329	498	664	997
37 284	1 692	2 031	1 354	508	677	1 015
38 718	1 723	2 068	1 378	517	689	1 034
40 152	1 754	2 105	1 403	526	702	1 053
41 586	1 785	2 142	1 428	536	714	1 071
43 020	1 816	2 180	1 453	545	727	1 090
44 454	1 836	2 203	1 468	551	734	1 101
45 888	1 855	2 226	1 484	556	742	1 113
47 322	1 874	2 248	1 499	562	749	1 124
48 756	1 893	2 271	1 514	568	757	1 136
50 190	1 912	2 294	1 530	574	765	1 147
51 624	1 931	2 317	1 545	579	772	1 159
53 058	1 950	2 340	1 560	585	780	1 170
54 492	1 969	2 363	1 575	591	788	1 182
55 926	1 988	2 386	1 591	597	795	1 193
57 360	2 008	2 390	1 606	602	803	1 205
58 794	2 027	2 390	1 621	608	811	1 216
60 228	2 046	2 390	1 637	614	818	1 227
61 662	2 065	2 390	1 652	619	826	1 239
63 096	2 084	2 390	1 667	625	834	1 250
64 530	2 103	2 390	1 683	631	841	1 262
65 964	2 122	2 390	1 698	637	849	1 273
67 398	2 141	2 390	1 713	642	857	1 285
68 832	2 161	2 390	1 728	648	864	1 296
70 266	2 180	2 390	1 744	654	872	1 308
71 700	2 199	2 390	1 759	660	880	1 319
73 134	2 218	2 390	1 774	665	887	1 331
74 568	2 237	2 390	1 790	671	895	1 342
76 002	2 256	2 390	1 805	677	902	1 354
77 436	2 275	2 390	1 820	683	910	1 365
78 870	2 294	2 390	1 836	688	918	1 377
80 304	2 314	2 390	1 851	694	925	1 388
81 738	2 333	2 390	1 866	700	933	1 400
83 172	2 352	2 390	1 881	706	941	1 411
84 606	2 371	2 390	1 897	711	948	1 422
86 040	2 390	2 390	1 912	717	956	1 434
und mehr / et plus						

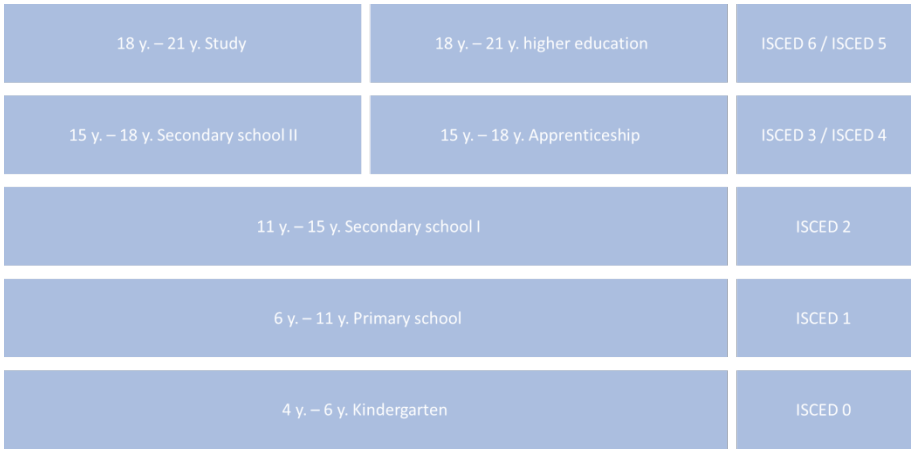
20

*) Beträge gelten auch für Vollwaisen- und ganze Doppel-Kinderrenten
*) Montants également applicables aux rentes d'orphelins doubles et aux rentes entières doubles pour enfants

8.2 The Swiss Educational System

Figure 3 provides an overview of the ISCED levels in the Swiss educational system.

Figure 3: Overview of the ISCE level



ISCED Level 0 includes two different levels. One level deals with children under the age of three. The focus is on language acquisition and the development of movement skills. The second level deals with children between the age of 3 and 6. At this level the children attend the kindergarten. The last two years of the kindergarten (between the age of 4 and 6) are obligatory. ISCED Level 1 includes an obligatory school visit. Children between the age of 6 and 11 have to visit the primary school. The children learn the basics of writing, reading and arithmetic. ISCED Level 2 also includes an obligatory school visit. School attendance at the Secondary School I takes place between the ages of 11 and 15. The Educational programmes are mainly subject-oriented. After successful completion of the ISCED 2 level you can decide whether to continue on the ISCED 3 level or on the ISCED 4 level.

ISCED 3 Level takes place between the age of 15 and 18 years. If a person decided to go further with ISCED 3 Level, he or she goes to Secondary school II. If one successfully completes the Secondary School II one receives at the end Matura. ISCED 3 would be the most “classic” way. ISCED 4 level is for all those who decide against the classic Matura and thus against ISCED 3. ISCED 4 can also be completed between the ages of 15 and 18. At the end of ISCED 4 one either has a completed vocational training or a vocational baccalaureate.

ISCED 5 level ISCED 5 Level provides vocational training in knowledge, skills and competences. As a rule, they are practice-oriented, profession-specific and prepare the participants for entering the labour market. In order to complete ISCED 5, you must have successfully completed ISCED 3 or ISCED 4 with admission to higher education. Those who are on ISCED 5 level are usually between 18 and 21 years old. ISCED 6 level provides advanced academic and/or vocational knowledge. Often there is a Bachelor's degree at the end of this level. Similar to the ISCED 5 level are those who are on the ISCED 6 level usually between 18 and 21 years old.

List of Abbreviations

AHV – Alters- und Hinterbliebenenversicherung (same as OASI) / Old-age and survivors insurance

AHVG - Alters- und Hinterbliebenenversicherung Gesetz / Old Age and Survivors Insurance Act

ALV – Arbeitslosenversicherung / Unemployment Insurance

ALVG – Arbeitslosenversicherung Gesetz / Unemployment Insurance Law

BPVG - Betriebliches Personalvorsorge Gesetz / Company Pension Law

BV – Bundesverfassung der Schweizerischen Eidgenossenschaft / Federal Constitution of the Swiss Confederation

CHF – Swiss Franc

DC – Defined Contribution

DI – Invalidity Insurance

EheG – Ehegesetz / Marriage Act

FAK – Family Allowance

GWR – Gebäude- und Wohnregister / Building and residential registers

ISCED - International Standard Classification of Education

OASI – Old Age and Survivors' Insurance

MIGAPE - Mind the Gap in Pensions

MiLiPE – Microsimulation Model of the Liechtenstein Pension System

MSM – Microsimulation Model

PAYG – pay-as-you-go

PT – Part-Time

SB – Supplementary Benefits

SRA – Statutory Retirement Age

UI – Unemployment Insurnace

ZPR – Zentral Pensionsregister / Central Pension Register

List of Graphs

List of Figures

List of Tables