Annuities in Switzerland

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1   Introduction

Switzerland's pension system has attracted considerable attention, mainly due to its reliance on a three-legged-stool structure. A relatively small (and for European standards, recent) pay-as-you-go system is complemented by a strong and mature fully funded occupational pension scheme. Although the latter was mandated only 20 years ago, employer based pensions have a long history, which is still reflected in the large segmentation of the second pillar. Tax-favored savings instruments constitute the third pillar.

The second pillar in Switzerland has several characteristics that are somewhat peculiar. It is an occupational scheme, mandated by law, but organized by the employer. Consequently the accumulation of retirement assets and their withdrawals as annuities (or, more recently, as capital) are organized by the same pension provider. The law specifies minimum requirements (which are often not minimal indeed) along several dimensions. While a regulation of the contribution rates and certain restrictions on pay-out options are not uncommon in an international context, the law also mandates the minimum interest rate for old age credits and the conversion factor at which the accumulated pension capital has to be translated into a life-long annuity. If the latter two requirement do not reflect market conditions and survival rates, they potentially threaten the sustainability of the scheme. As will be shown in the chapter on Money's Worth Ratios, conversion factors are way too high given the mortality structure of the population.

The pension funds also have to meet certain requirements on the degree of funding, their investment structure, as well as on transparency issues. There is little regulation (and even less reliable representative data) on the asset and liability management of the different pension funds. Despite the strong (and not always sound) regulation, the majority of pension funds are surprisingly healthy.

The annuity market in Switzerland is not really a market. Given that the level of annuitization within the first and second pillar of old age provision is very high, there is little scope for additional market priced annuities. The vast majority of a large volume of annuities are thus not priced in the market.

The law requires the same conversion factor for men and women, single and married individuals at least within the mandated part of the second pillar. Married people thus benefit from a free component in the implicitly joint- and survivor annuities. The uniform conversion factor leads to very high differences in MWRs between different

groups of the population. On average a married men gets approximately 25% more in pecuniary terms than a single man - additional and generous benefits for minor children not counted. The difference is mainly due to the present value of survivor benefits, to a lesser extent to differential mortality.

Taking the first and second pillar together, an individual with an uninterrupted work career (which is not unusual for Switzerland) is well prepared for retirement. At an intermediate wage and an average annual wage growth of 2 percent, the specified minimal criteria in the Occupational Benefit Plan (BVG 1985[1]) guarantee for a second pillar replacement rate of 50% based on the final insured salary and more than seventy percent on the average wage - gross. If this person has two minor children at retirement, for example, he gets an additional 35 to 40%. Taking into account that the individual is also covered by the first pillar (full replacement of the coordination offset that is not covered by the OBP), and that taxes are progressive, the net replacement rate can be well above 100%. It is thus not surprising that the elderly Swiss do well on average and that poverty is very rare. Moreover, the tendency to retire early might also reflect the generosity of the system at all income levels.

For future generations, however, the picture looks less bright. In addition to unfavorable demographics threatening the financial viability of the first pillar, the current minimal requirements specified in the occupational pension law will not be sustainable given the dramatic increase in longevity and the fall in market returns (that are likely to be exacerbated by demographic change). Unless the requirements are adjusted to updated mortality tables and market conditions, pension funds and insurance companies will face considerable financial difficulties. Already today the large insurance companies, which are crucial in the well-functioning of the second pillar system have lost interest in providing services within the mandatory part of the system.

1.1 The Purpose and the Structure of the Report

The main goal of this report is to analyze the Swiss occupational pension scheme. We will show that, unlike Chile, the offered retirement products do not show much affinity to market products. Nonetheless, the Swiss experience is useful for the design of occupational pension schemes and their regulation. The report examines the financial health of the system, the value of pension benefits for insured workers, and the evolution of the regulatory framework in the last 10 years.

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[1]BVG = "Berufliches Vorsorge-Gesetz" (Occupational Benefit Plan) in German, LPP = "Loi sur la Prévoyance Professionnelle" in French.

The main caveat of our analysis is the difficulty in obtaining relevant information along several important dimensions such as the asset and liability management of pension funds. Due to a high segmentation of the second pillar (several thousand individual funds), it is very difficult to obtain a good overview of the (financial) situation of the occupational pension scheme, as well as of the value the present and future annuitants get out of the system.

1.2 Empirical Background: Demographics

As most industrialized countries, Switzerland experienced a baby boom and a subsequent decline in birth rates to very low levels[2]. It also witnessed a high level of immigration leading to a 20% share of foreigners in the resident population. This latter fact and a continuing inflow of foreign individuals make demographic projections more difficult[3].

Figure 1 depicts the size of the population and its growth rate since 1970. High immigration and a net birth surplus until the mid 70s was followed by a negative migration balance as a consequence of the oil shock recession (see also Figure 2). Immigration has accounted for approximately 80% of the population growth rate in recent years. Long term projections on population growth and the age structure of the economy are thus difficult to make, especially as migration is also related to the Swiss business cycle.

Figures 3 and 4 depict the current age distribution for Switzerland. As in many other countries, Switzerland has experienced a strong decline in the number (and fraction) of children and a dramatic increase in the number of retired individuals. The inversion of the age pyramid is likely to persist unless the current low fertility rate substantially increases.

A dramatic increase in life expectancy over the last decades has exacerbated the impact of lower fertility rates for the viability of the social security system (see Figure 5). As a consequenc,e there has been a considerable shift in the relative size of different age groups as shown in Figure 6. The old-age dependency ratio (defined as the number of people over 65 divided by those aged 20–64) is anticipated to increase from 25% today

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[2]c.f. also PERSPEKTIVSTABES DER BUNDESVERWALTUNG (1996)

[3]A cross–country comparison of actual rates, its projections and the impact of these demographic changes on public finances is done in DANG ET AL. (2001). WILDASIN (2003) discusses the interactions between fertility, migration, public pension systems, and other aspects of fiscal policy with particular reference to the countries of Western Europe.

Figure 1: Population and its Growth Rate
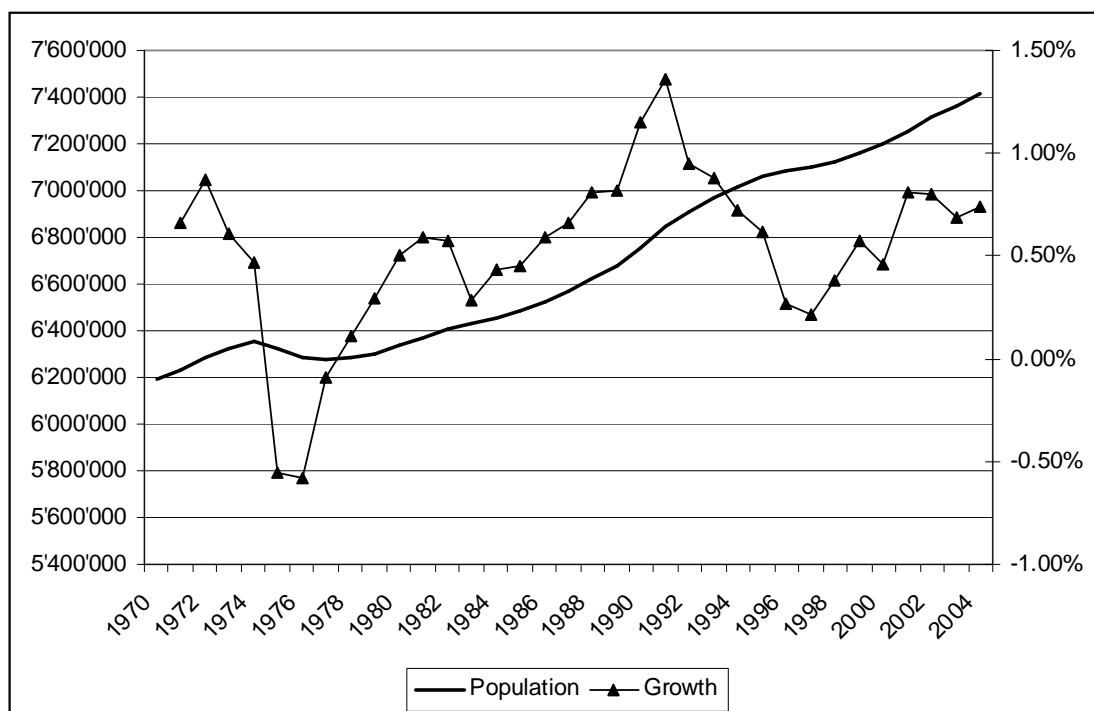
to almost 45% in the year 2035. Domographics will also affect the age composition of the electorate. The age of the median voter, for example, will increase to approximately 52 until 2025. The factual veto right of the population will put tight limits on politically feasible reform of the pension system.

Figure 2: Birth Surplus and Migration
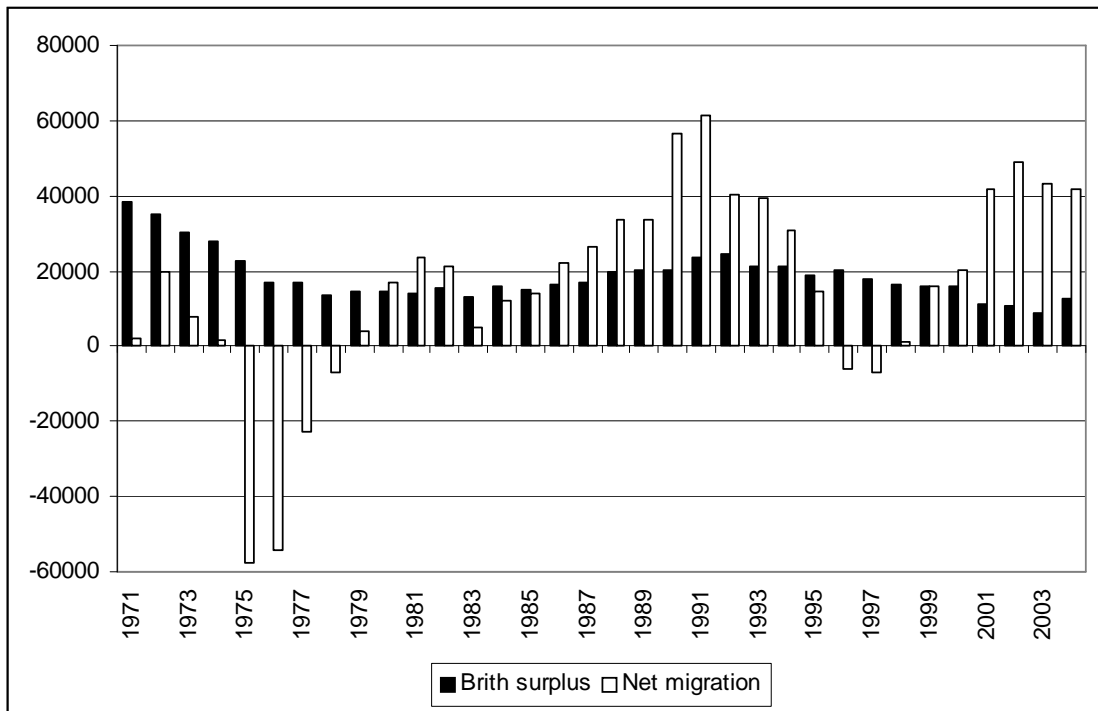
Figure 3: Age Structure
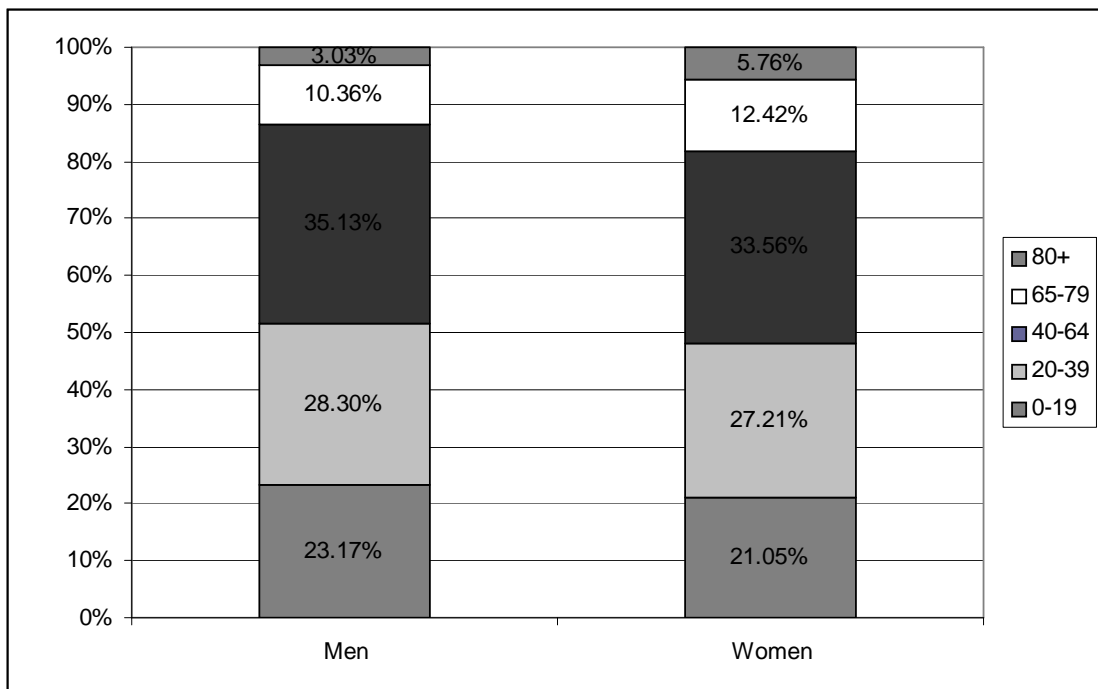
Figure 4: Age–Pyramid
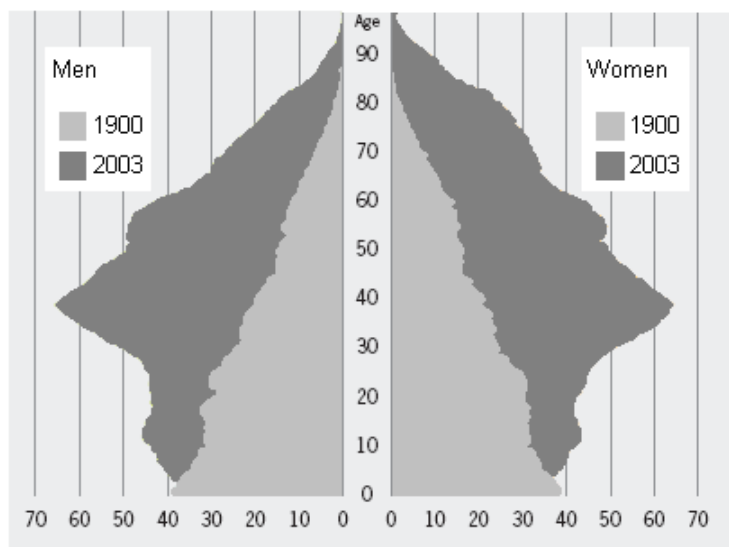
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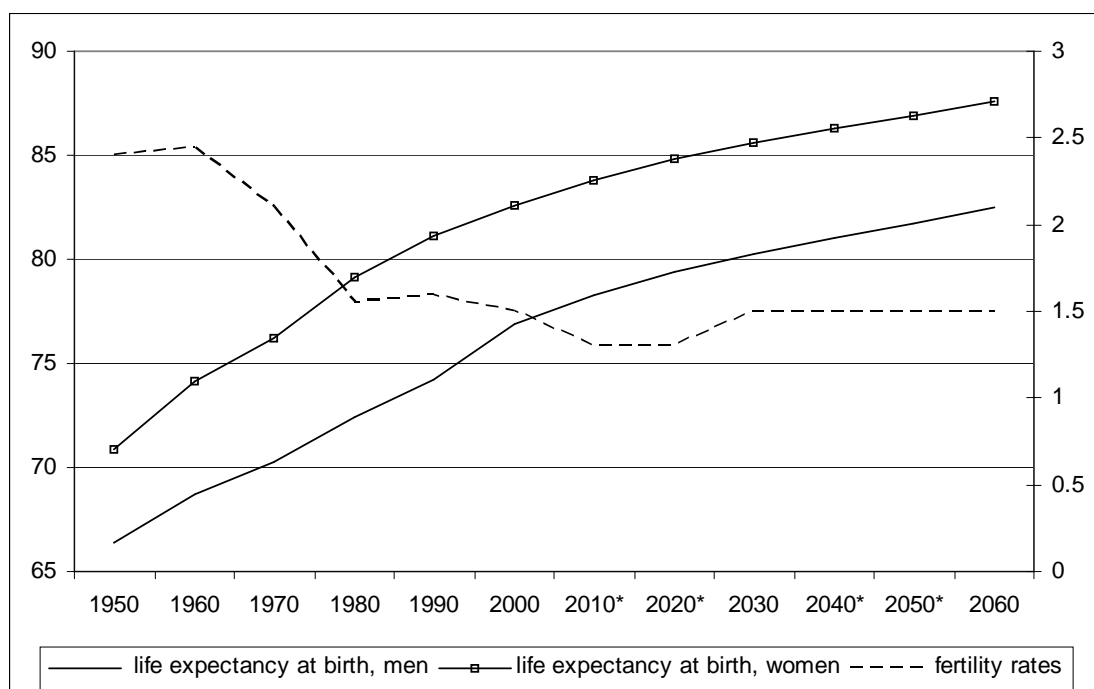
Figure 6: Scenario

Source: Bundesamt für Statistik (2005), p. 100
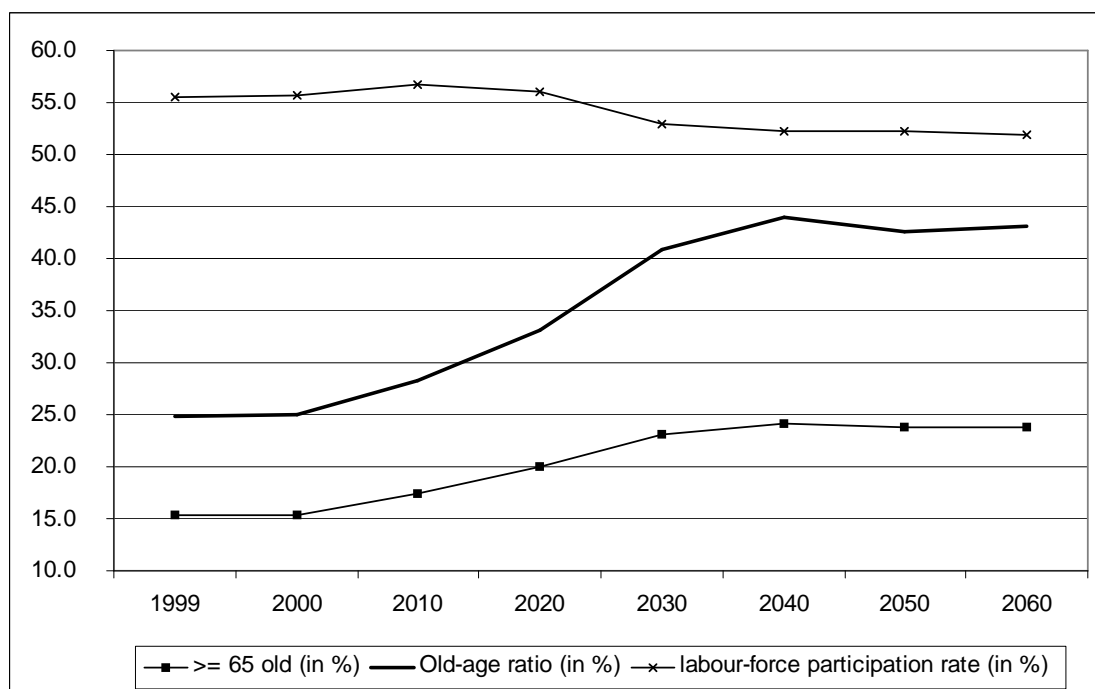
2   The Swiss Pension System

Switzerland has been the first OECD country that has mandated an occupational pension scheme as the second pillar to complement a pay-as-you-go (PAYG) system[4]. The reliance on a total three–pillar approach of old-age insurance is unique and has therefore triggered considerable interest[5]. This section provides a short overview of the system, with an emphasis on the second pillar.

2.1   The first pillar

2.1.1   Overview

The first pillar, the so called AHV [6], is predominantly a pay-as-you-go (PAYG) system. It was introduced after a very successful political referendum in 1948.[7] It aims at providing a basic subsistence level of income to all retired residents in Switzerland. Its structure has changed considerably in 10 so–called revisions during the last 50 years. However, after a large increase in the size of the program in the late 60's and early 70's, the payroll tax rate has remained unchanged, and the ratio between average pension benefits and average per capita wages has remained almost constant.

The main features of the first pillar can be described as follows: Although there is a small trust fund, the public pension system is a pay–as–you–go system, in which the current young have to finance the pensions of the current old. The system is financed mainly with a proportional payroll tax on all labor income (i.e., without a cap), and an ear–marked fraction of the value added tax on consumption. By law, 20% of total expenditures have to be financed out of general federal government revenues. Pension benefits are paid out after the legal retirement age, regardless of whether the agent leaves the workforce or not.

There is a limited tax–benefit linkage in Switzerland, but the benefit scheme is relatively flat in reality. More important for the determination of future benefits is the

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[4]BOHN (1999) discusses the risk sharing properties of alternative policies in a neoclassical growth model with overlapping generations and demographic uncertainty.

[5]c.f. also BÜTLER (2003) and also BAUMANN ET AL.

[6]AHV = Alters– und Hinterbliebenen–Versicherung (old age insurance)

[7]Changes to the law are subject to an optional referendum in Switzerland. This means that 50'000 voters (approximately 1% of the electorate) can ask for a public vote about the issue. There is also the instrument of a public initiative to actively postulate a change to the constitution. An initiative has to be supported by 100'000 voters.

number of contribution years including those granted for child care.[8] As in most other countries, the first pillar offers some explicit and implicit redistribution within and between generations and insurance against various contingencies.[9] Apart from the regular pension benefits, AHV also provides means–tested supplemental benefits. The combination of a relatively flat benefit structure and supplementary benefits have led to a low poverty rate among the elderly in Switzerland,[10] although there are still gaps for low–income earners.

For a very long time, the first pillar has been viewed as very stable, efficient (at reducing poverty in old age) and cheap (due to very low administration costs. Approximately 1/3% of benefits). But as most PAYG systems in Europe, the Swiss first pillar is plagued by unfavorable demographics due to increases in longevity and low fertility rates which have led to a strong increase in the old–age dependency ratio.[11] Leaving the current levels of contributions and benefits unchanged the present value of future contributions falls short of the present value of future claims by about a third. There are virtually no reserves — the AHV trust–fund makes up for less than one year's worth of benefits — to cushion the anticipated population aging. There is no consensus in the current political debate as to how to fix the financing problem. It is important to note that policy makers face strong political constraints for potential reforms. Any change of the law can be (and usually is) challenged by an optional referendum. The public thus possesses veto power for all reforms of the current social security system. This is crucial as the median voter, who is approximately 48 today, is anticipated to have an age of 53 by the year 2020.

The retirement age observed in reality is below the statutory retirement age albeit to a somewhat lesser degree than in other European countries. According to a recent SAKE/ESPA study,[12] the majority of Swiss men (53%) and 44% of Swiss women retire before the legal retirement age of 65 for men or 62 for women. The outcome is striking

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[8] The linkage between pre–retirement earnings and the benefit level has become considerably weaker in the last two decades. A large majority of (potential) beneficiaries with a full contribution period are entitled to maximum benefits, so that earnings history only matters for people with low average wages and/or contribution gaps. In 1998, for example, an average married couple received more than 92% of maximum benefits.

[9] See BÜTLER (2002) for more details.

[10] The last comprehensive poverty study in Switzerland dates back to 1992 (LEU ET AL. (1997)). It reports a poverty rate of 5.6% for the whole population, and of only 3.6% for people beyond the legal retirement age. Recent numbers suggest that the general picture has remained unchanged.

[11] Foreign immigrants, which make up approximately 20% of the work force, are net contributors at present. An increase in immigration is not really considered an option due to political resistance and the fact that the fertility rate of second generation immigrants is very close to the one of Swiss citizens.

[12] SAKE / ESPA is a longitudinal (rolling panel) study of the Swiss labor market, but also covers individuals beyond the retirement age.

given the fact that the first pillar has not offered early retirement options until a couple of years ago.

Many beneficiaries(predominantly middle and high income) have received generous early retirement packages from their occupational pension provider, often with additional benefits until age 65/62 to bridge the time to the legal retirement age. Figure 7 displays the distribution of retirement ages collected from 12 Swiss occupational pension funds. One clearly sees that over time the relative importance of the statutory retirement age has declined. For the period from 2000-2003 a triple–peak profile for men at ages 60, 62 and 65 and a double–peak profile for women at ages 60 and 62 is apparent. The peaks at 60 and 62 correspond to the lowest age for which early retirement packages are offered at relatively favorable conditions in occupational pension funds.

2.1.2   The structure of benefits in the First Pillar

The first pillar (AHV) distinguishes between "full" and "partial" pensions. In general, every retiree who has worked for at least one year is eligible for pension benefits. He gets a full–pension if he contributed over the entire mandatory period. This period lasts 45 years for men and 44 years for women, respectively. Non-working individuals, including students, are required to contribute at least 425 Swiss francs a year to insure a full contribution period unless their spouse contributes at least 850 Swiss francs a year.

As the first pillar aims at providing a basic subsistence level of income to all retired residents, the pension benefits are bounded above. In the case the retiree is eligible for a full pension, the insured minimum pension is 550 CHF per month at the level of the "Pension Index" at 100%[13]. This index accounts for increasing wages and prices and is computed as the arithmetic mean of the wage- and price-index[14]. As per 1.1.2005 the "Pension Index" reached 195.5 which yields a minimum pension of 1075 CHF.

The maximum first pillar benefit is equivalent to twice the minimum pension. Some special rules apply for couples and survivors: Married couples' entitlements are capped at 150% of a single benefit. This reduction takes into account that pre capita expenses are considerably lower in a two-people than in a single household. Married couples, on the other hand, benefit from AHV's survivor insurance (until now in favor of widows

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[13]cf. Art.34 AHVG; AHVG = Bundesgesetz über die Alters- und Hinterlassenenversicherung
[14]cf. Art.33ter Para.2 AHVG

Figure 7: *Distributions of age at retirement for men (left-hand side) and for women (right-hand side) derived from 12 Swiss pension funds.*
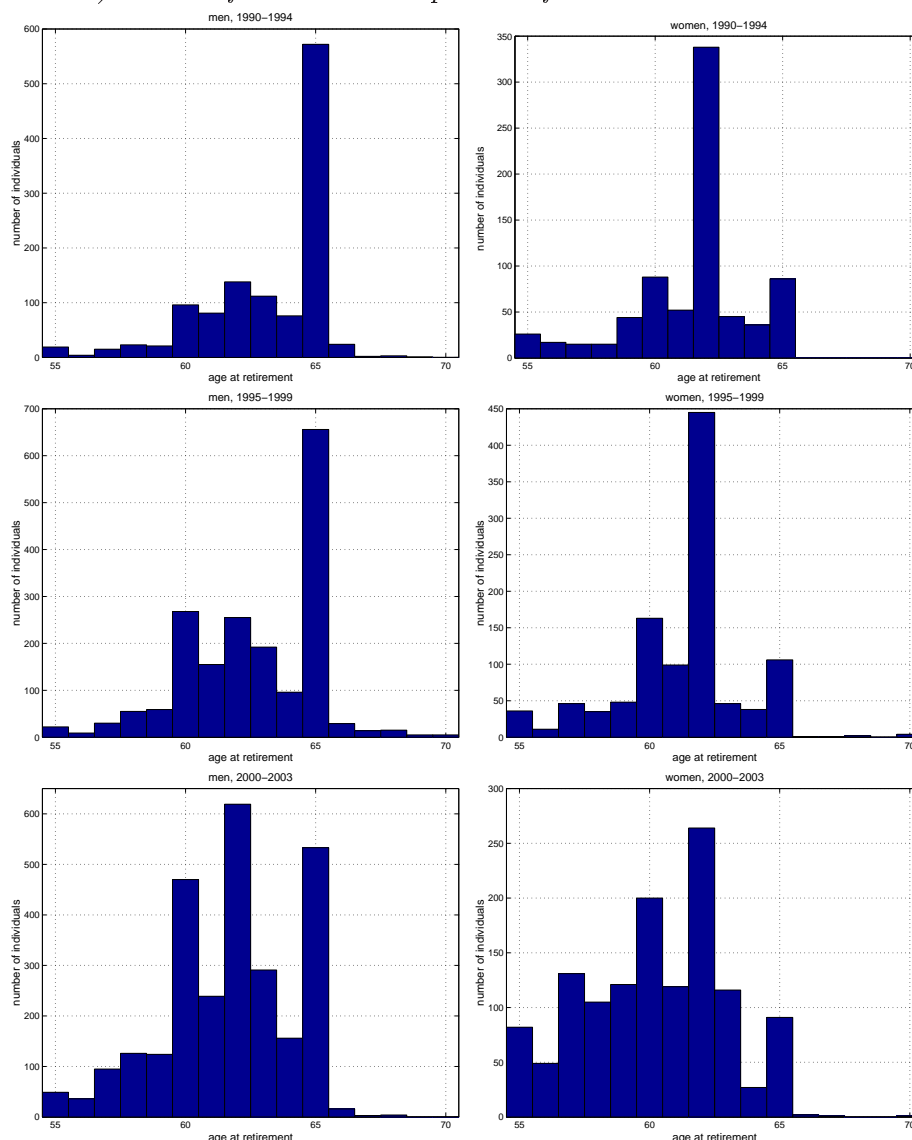
Source: BÜTLER ET AL. (2005), p. 43, Fig. 1

only) during the working period. The redistribution between single and married individuals is thus relatively small in this pillar. In case of death, the survivor can claim a 20% increase in his pension as long as he qualifies for an old-age pension, provided the existing pension benefit plus the supplement does not exceed the maximal first pillar benefit. If the retired individual has children (s)he can claim children benefits amounting to a maximum of 40% of the base AHV/AVS benefits per child. If both spouses are eligible for children benefits the sum cannot exceed 60% of the maximum first pillar pension (per child).

A partial pension is paid if the contribution has not covered the whole mandatory

period[15]. For each contribution year missing, AHV/AVS benefits are reduced by at least $\frac{1}{44}$.[16]. In any case, pensioners can claim supplemental, means tested benefits to cover their living costs if the combined first- and second pillar income is too low. In principle, these supplemental benefits amount to the difference between an individual's or couple's income and the recognizes expenditures. The latter include the rent (or mortgage payments), so-called "basic needs" (fixed sum per person) and health expenditures. Not all individuals who qualify for supplemental benefits claim them as they are still associated with a certain stigma, especially in rural regions. The take-up rate is approximately 50%.

Recent revisions of the first pillar[17] have led to a number of important structural changes, although the contribution rate and total expenditures have remained basically unchanged. First, family/household benefits have been replaced by individual benefits. Second, individuals with responsibilities for children up to 16 years or other dependants are now entitled to (child–)care credits. Third, contributions during marriage, including child–care credits, are split between the spouses. This change led to a substantial improvement for divorced women, but reduced the entitlements of couples with a non–working spouse and no children. Fourth, the legal retirement age for women was raised stepwise from 62 to 64 years, and most probably, it will be raised further to 65.

2.2 The second pillar: Occupational pension plans

The Swiss second pillar, organized as an occupational pension system has known a long history, but became mandatory only in 1985. As Figure 8 shows, a sizeable fraction of the working force had already been covered before such plans were mandated. Although Figure 8 overstates the true coverage rate due to double–counting of insured individuals, the numbers convey a relatively high coverage especially for male workers.

The second pillar's main goal is to maintain the pre–retirement living standard together with the benefits stemming from the first pillar. Apart from retirement income, the second pillar also provides insurance for disability and survivors of insured men (but not women) during the accumulation period.

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[15]cf. Art.29 AHVG

[16]cf. Art.38 AHVG

[17]BOHN (1997) discusses the impact of social security reforms in a PAYG system on two key macroeconomic questions: First, on the distributional question and second on the risk–sharing question. BÖRSCH-SUPAN ET AL. (2002) discuss the consequences of population aging and a fundamental pension reform (i.e., a shift towards a more pre-funding system) for capital markets in Germany. They predict rates of return on capital for different scenarios.

Figure 8: Workers Covered by an occupational Pension Plan since 1970
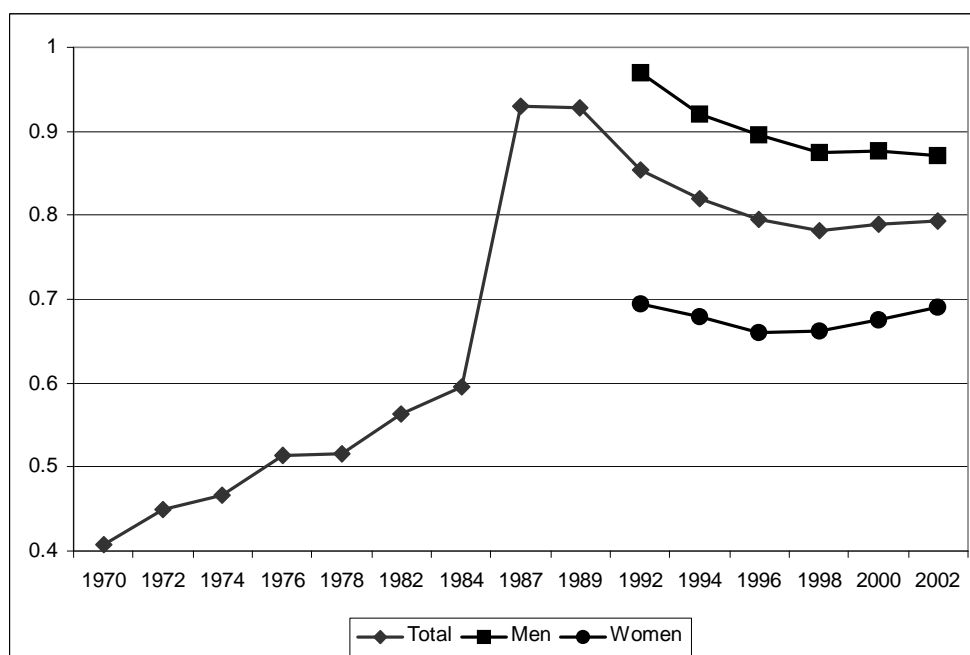
Source: Own Calculation

Occupational pension plans are organized, in general, by the employer. The employer can choose several forms of organization, the two polar cases being an autonomous pension fund, on the one hand, and a contract with an insurer, on the other hand. As a consequence of this (and also for historical reasons), the system is very segmented. In 2002, there were more than 8'000 funds, though this number has been decreasing rapidly (c.f. Section 3.1). When occupational pension plans were mandated, all schemes had to be DB (defined benefit scheme). By now, and after an early change in the law, more than 85% are DC (defined contribution scheme). Administration costs are low for international standards, approximately 8% of benefits, but high compared to the AHV.

The second pillar is designed to be integrated with the first pillar. As the latter provides a basic level of income, the BVG[18] only insures income above a certain threshold level. Before the 1. BVG revision, this so–called coordination offset was equal to a yearly maximum single AHV pension (in 2004: 25'320 CHF ≈ 16'000 EURO ≈ 19'500 USD). Now the coordination offset equals 22'575 CHF. As a direct consequence, employers and employee have to pay contributions on an additional part of income, i.e., the coordinated wage has increased[19]. There is, in principle, also a maximum level of

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[18]BVG = Bundesgesetz über die berufliche Alters-, Hinterlassenen- und Invalidenvorsorge

[19]c.f. Bibliographic information published by Die Deutsche Bibliothek (Issue 9 2004)

insured earning which is equal to 77'400 CHF[20]. Pension providers are free to offer insurance for income below or above of the two threshold levels. While most do for income greater than the maximum — many companies do not even have an upper level — very few do for income below the threshold level. This lower threshold explains the much lower coverage for female workers (Figure 8), who often work part–time and have lower average wages than men. Therefore, the minimum annual income after which an employee must be insured was also part of the 1. BVG revision. For the first time this amount (19'350 CHF) differs now from the coordination offset.

Contributions are a certain percentage of the coordinated (= insured) salary of which the employer has to pay at least half. The law also mandates minimum contribution rates, which increase considerably with age (from 7% at age 25 to 18% from age 55 on-wards)[21], but as long as average contribution rates are in line with the rates mentioned above, pension funds are free to deviate from the specified pattern. Many providers use uniform contribution rates for all ages, thus compensating lower rates at older workers by higher rates for younger workers. These so–called age retirement credits are ac-cumulated as retirement assets and bear an interest rate. The Swiss Federal Council determines the minimum rate of return. It remained at 4% for 17 years (from 1985 to the end of 2002). But due to the decrease in capital market returns, this rate has been reassessed so that now for the year 2005 it equals 2.5%. This minimum interest rate paid on the old-age insurance balances is one special feature of the Swiss system. Furthermore, it constitutes part of the regulation framework of the second pillar and is therefore discussed more in detail in section 6.1.

The accrued capital is fully portable (with minor deductions especially for short employ-ment spells) when the insured individual changes the employer. By law, an employee changing firms gets the accumulated total contributions accrued at the minimum in-terest rate. The law is silent as to how accumulated reserves have to be distributed. In practice this meant that job changers got less than their fair share during the high return episodes. This feature was considered an important obstacle to mobility on the Swiss labor market in the 1990s. At present, however, due to low market returns and wide–spread under-funding of pension providers the requirement of a minimum interest rate could potentially induce employees to flee an under-funded pension provider.

Contribution Rates and Benefits:

Contributions to the old–age credit balances depend on the salary and on the age of

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[20]c.f. EIDG. DEPARTEMENT DES INNERN (27.10.2004)
[21]c.f. Art. 16 BVG

the insured individuals. The mandated minimum contribution rates are defined by law[22]. They range from 7% at an age of 25 to 18% from the age of 55 onwards, as shown in Table 1. These figures merely define the minimal contributions. The details of the effective contribution structure are left to the individual pension funds. Pension providers are allowed to deviate from the minimal contribution rates, provided that they achieve a higher level of benefits than the one implied by the BVG rates. Many pension funds use uniform contribution rates such that the young pay relatively more than the old, compared to the "BVG–case".

Table 1: Contribution Rates under BVG

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

In addition to the contributions to the old–age credit balances, further contributions are needed to supplementary insurance or other services. These include:

- The mandatory insurance of the risks *death* and *invalidity*. In the case of death the surviving spouse is eligible for an annuity of 60% of the level the deceased worker would have received at retirement. Orphan's pension amount to 20%[23] of the latter. In the case of invalidity, the insured is eligible for an invalidity pension. To calculate the entitlement, the same conversion factor as for the calculation of the normal old–age provisions is used, but based on a projected old–age credit balance at the age of 65[24]. The costs of these services depend on the overall number of insured individuals of a pension fund and on its composition. On average, these costs amount to 3% of the insured wage[25].

- *Special measures*[26]: Such measures must be justified. They can finance contributions for individuals who did not have a second pillar in the period before the BVG came into force. Other reasons include the accumulation of reserves to adjust benefits to inflation or to reduce future risk premium. These premia amount to approximately 1% of the insured wage.

- *Guarantee Fond*: The contributions amount to 0.1% of the covered wages.

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[22]c.f. Art. 16 BVG

[23]c.f. for details to Art 18 – Art. 22 BVG

[24]c.f. Art 23 – Art. 26 BVG

[25]Source: www.vorsorgeforum.ch

[26]In German: Sondermassnahmen

For all these different contributions, the employer has to pay at least half of them. In reality, employers pay even more, on average, as Figure 10 demonstrates .

Conversion Factor:

As it will be further explained in section 2.3, pension benefits are proportional to the accumulated retirement assets[27]. The conversion factor, which is used to translate the accumulated capital into annuities, represents this linear relationship. Section 2.3 presents a detailed summary (c.f. Table 2) of the legal conversion factors for women and man as well as for both the mandatory part and the capital beyond the mandatory level. In 2005, the conversion factors for women and men are 7.20% and 7.15% respectively. This rate will be successively reduced to 6.80% in 2014.

It is important to mention that a pension fund can apply a lower rate than the legal conversion factor under certain conditions. To do that it has to use the ressources freed up by a lower conversion rate to improve the benefits for the coveres individuals. The law does not put restrictions on how these means should be distributed. In practice, many pension funds make use of this possibility, though no data exist on the importance of this measure. Most of the funds finance early retirement programs and inflation indexing. A deviation from the (too high) legal conversion factor has several advantages. It allows the fund to taylor the benefits to the needs of the beneficiaries, and gives more financial leeway to the fund. On the other hand, there is a risk that the supplemental benefits are distributed in an unequal way among different subgroups of the potential beneficiaries.

2.3   Retirement options in the second pillar

Upon retirement, the accumulated capital can be withdrawn either as a monthly life–long annuity or as a lump sum provided that the pension fund allows for this latter option:

Annuity: This is always a life–long income stream computed from the fraction of accumulated pension capital that is not withdrawn as a lump-sum (see below). There are no other forms of annuitization such as phased withdrawals or annuity certain.

Capital payment: Depending on the pension fund, a fraction of the capital can be withdrawn as a lump-sum. Until 2004, pension funds were not required to allow

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[27]c.f. Art. 14 BVG

this capital option. From 2005, retirees can withdraw up to 25% of the old-age capital (in the mandatory part) as a lump sum. To mitigate adverse selection effects due to short run deterioration of an individual's health status, pension funds can require the capital option to be announced up to 3 years prior to retirement (see also below).

2.3.1 Annuities in the second pillar

Old age pension benefits are strictly proportional to the accumulated retirement assets (retirement credits plus accrued interest). The accumulated capital K is translated into a yearly pension B using the conversion factor γ:

$$B = \gamma K.$$

This conversion also applies to DB plans indirectly; the fund has to make sure that enough capital is accumulated to cover the claims made based on previous income.

The conversion factor had been fixed at 7.2% until the end of 2004 for all retirees retiring at the statutory age regardless of marital status or gender (see below).[28] As a reaction to the increase in longevity and the fact that the credit balances have to be prorated over a longer horizon, the conversion rate will successively be reduced to its new statutory minimum, i.e., to 6.8% until 2014. See Table 2 for details.

The required conversion factor only applies to the mandatory part of the retirement credits. Pension funds are free to set a lower rate for old-age credits based on income exceeding this limit. Nonetheless, very few companies have made use of this option until now. This seems to be changing recently due to financial constraints. As previously mentioned, it is very important to know that pension providers can deviate from the legal conversion factor if they use the freed up resources to enhance the benefits in some way or another. An improvement of benefits may include indexing benefits to inflation or offer some early retirement options. The advantage of applying a lower conversion factor is an obvious increase in flexibility and financial leeway for the pension fund. The main disadvantage is that the excess resources may be redistributed in a non-transparent fashion with certain groups of pensioners benefiting more than others.

The large insurance companies that provide insurance predominantly for many small

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[28]This number was constructed using a discount rate of 4% (corresponding to the underlying technical interest rate, as well as the legal minimum interest rate requirement for 17 years) and mortality tables that were approximately correct for men at that time, but not for women (mainly due to a lower statutory retirement age).

Table 2: *Legal conversion factors for women and men (mandatory part). The last two columns give the lowest quoted rates for capital exceeding the mandatory level. Retirement ages (RA) are for women (RA men = 65), the numbers in parenthesis correspond to the legal, but not effective RA (women turning 64 in the years 2005 and 2006 would have retired before.*

Year	Birth Y. Women	RA Women	Women BVG	Men BVG	Women (lowest)	Men (lowest)
≤ 2000	≤ 1938	62	7.20%	7.20%		
2001	1939	62	7.20%	7.20%		
2002	1940	62	7.20%	7.20%		
2003	1941	62	7.20%	7.20%		
2004	1942	62	7.20%	7.20%	5.454% (62)	5.835%
2005		(64)	(7.20%)	7.15%	5.454% (62)	5.835%
				7.15%	5.718% (64)	5.835%
2006	1943	63 (64)	7.15%	7.10%		
2007	1943	64	7.20%	7.10%		
2008	1944	64	7.10%	7.05%		
2009	1945	64	7.00%	7.05%		
2010	1946	64	6.95%	7.00%		
2011	1947	64	6.90%	6.95%		
2012	1948	64	6.85%	6.90%		
2013	1949	64	6.80%	6.85%		
≥ 2014	≥ 1950	64	6.80%	6.80%		

Source: www.bsv.admin.ch and own research

and medium companies have recently reduced the conversion factor for non-mandatory retirement capital in a quite dramatic way to 5.4-5.8%. The fact that virtually all companies came up with an identical number for the reduced male conversion factor to the third number after the decimal point (= 5.835) caused quite some protest. Despite the fact that the insurance companies use identical mortality tables, the coincidence does not really hint at a high degree of competition among the insurance providers.

Benefits are *fixed nominal annuities* in principle, but the law states that pension providers have to adjust current old age benefits to inflation within the scope of their financial possibilities. Due to the financial strain on most funds, current benefits are typically not indexed to inflation anymore. This was very different in the 80s and 90s when inflation was not only indexed to inflation, but sometimes even to the growth rate of wages. These more generous benefits could be financed as the minimum interest rate that had to be granted on old-age credits was considerably below the market return.

2.3.2   Single life and joint annuities

The BVG/LPP mandates joint annuities; the conversion factor is the same for every-body irrespective of gender, family status or income. Children under age 18 (or under

age 25 if still dependent) of retired persons get an additional pension of 20% of the main claimant's benefit. When a retired individual dies, his widow (her widower) receives a benefit amounting to 60% of the previous pension, his/her dependent children a benefit of 20% each.

Until 2005, surviving husbands of deceased female retirees did not get a widower's pension. The change of this law had been undisputed mainly due to its low cost.

The uniform conversion factor (at least in the mandatory part) generates sizeable redistribution especially between married and non-married men as will be outlined in the section computing MWRs. The difference between women and men is relatively small due to the fact that the higher life expectancy of women is almost compensated by the much lower present value of survivor benefits.

2.3.3 Early retirement

Early retirement options are now offered by most companies. For many this is simply an actuarially fair reduction of the conversion factor in the case of early withdrawals. Others offer, more generous early retirement packages, including additional payments to make up for first pillar benefits up to the legal retirement age. Take up rates for early second pillar benefits are very high. On average, the observed retirement in occupational plans is substantially below the statutory age even in funds that do not subsidize early retirement explicitly.[29]

Unfortunately, due to the high number of pension funds and the lack of publicly available data on early retirement schemes and take-up rates, there are no representative studies to study the issue of early retirement in the second pillar. Consequently, one does not know how the early retirement options performs in terms of MWRs compared to the regular retirement age in general. Moreover, the fraction of funds offering more generous than actuarially fair early retirement options has considerably decreased in the last two years due to the financial constraints of most funds.

Bütler, Huguenin and Teppa (2005) try to shed some light on the determinants of the retirement decision other than the impact of social security incentives by analyzing individual data from a non-representative selection of Swiss pension funds. The used

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[29] The first pillar did not avail early retirement schemes until very recently. Since then the take-up rates of these early benefits have been small. Presumably this is due to the fact, that many second pillar pension plans allow an anticipation of benefits at actuarially fair rates (or better). This latter option is administratively more convenient for most beneficiaries.

unique dataset of individual retirement decisions was provided by a number of privately run pension funds, allowing to control for all company specific pension plan details.

Note that due to the fact that the second pillar has been mandatory in Switzerland since 1985 (and had been offered by a majority of companies even before that year), differences in accumulated capital at retirement within the same cohort closely mirror differences in lifetime income. Moreover, due to the maturing of the second pillar the average pension capital, und thus the effective replacement rate has been steadily increasing over the years and now reaches high replacement rates for all income groups. Unlike in other countries, the structure of the scheme leads to replacement rates that are similar for lower to upper middle class incomes.

Bütler, Huguenin and Teppa find that the incidence of early retirement has increased considerably over the last decade despite the fact that there were no institutional changes throughout that period. This relationship is also depicted in Figures 7 and 9. The increase in early retirement is more pronounced for men than for women, and was found to be especially strong in the last few years. It is relatively robust, but differs considerably across pension funds. Due to an increase in the effective replacement rate within Switzerland's second pillar, more people are now able to accumulate sufficient funds to pay for an early labor market exit than one or two decades ago. But even if one controls for this apparent time trend, wealthier men tend to leave the work force earlier. Low income workers, on the other hand, often work up to the legal retirement age even in pension funds in which early retirement packages are generous. In these cases the need to generate income seems to be the only explanation for working up to the statutory retirement year. For women, the effect of income on the likelihood to exit the labor force is also positive, but weaker than for men. Due to differences in mortality rates across income groups, richer individuals thus tend to enjoy a much longer retirement spell than poorer people.

As long as adjustment rates for early retirement are actuarially fair, the different take-up rates of early retirement options are unimportant for the pension fund and do not lead to adverse selection effects.

2.3.4 The capital option

Even before the change to the law, many private pension companies in Switzerland had offered a choice between a lump-sum capital payment upon retirement or a life-long annuity thereafter. The expected return of each of these two options for an individual

Figure 9: *Relative estimated hazard rates for year of retirement (base year 2003). Hazard rates smaller (larger) than one correspond to a lower (higher) probability to retire at each age. The upper and lower panels depict the relative hazards for women and men, respectively.*
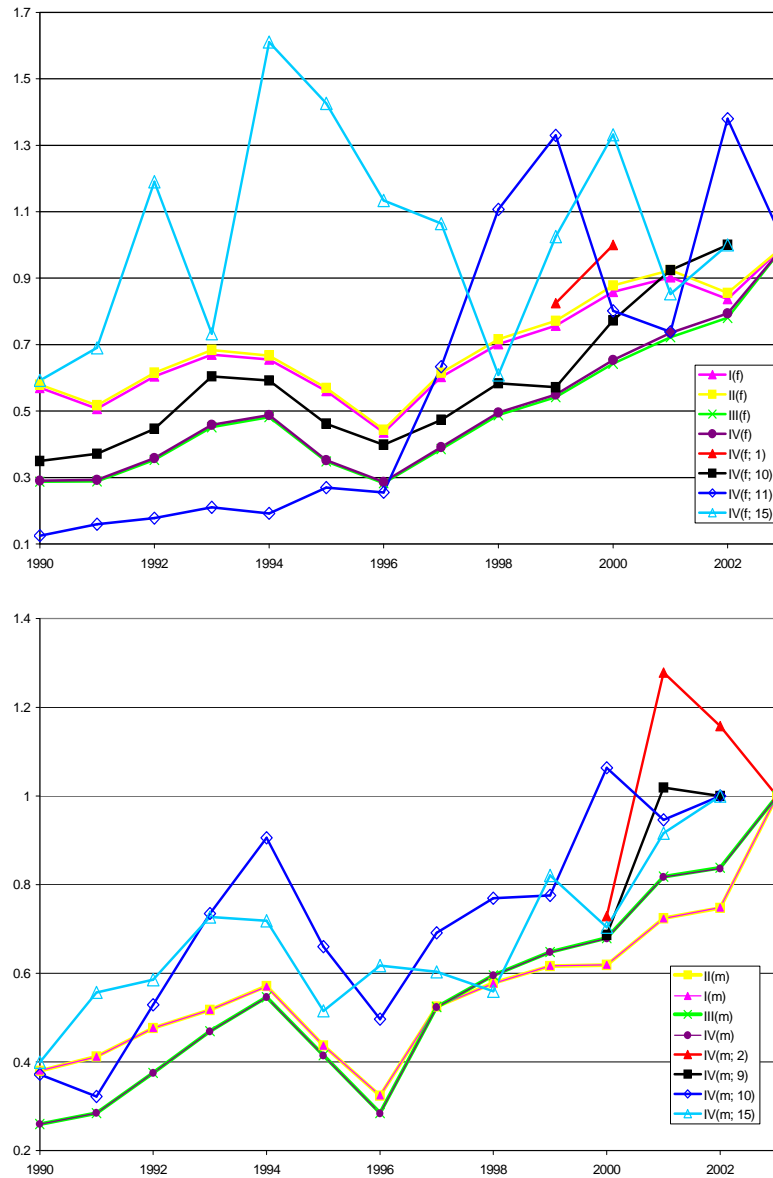
Source: BÜTLER ET AL. (2005), p. 47, Fig. 5

depends crucially on his/her expected life-time, his/her marital status, as well as the presence of children under 18 years old.

The possibility to withdraw a fraction (or all) of the accumulated capital as a lump sum entails two potential problems for the pension scheme:

1. The possibility that individuals withdrawing their capital as a lump sum end up having too little resources to live on in old age, once the capital has been depleted: As individuals can claim means tested additional benefits from the AHV/AVS in case of insufficient retirement income, the capital option constitutes a risk for the first pillar.

2. The problem of adverse selection if individuals with a low expected return from an annuity are more likely to withdraw their old-age capital as a lump sum, leaving the funds with the annuity obligations of the long-lived. The adverse selection problem affects the pension funds directly.

Unlike in Chile, there are no conditions on the level of the remaining annuity benefits (including survivor benefits) when the capital is withdrawn in a lump-sum manner. The pension funds themselves do not seem to put any restrictions in general, which is not surprising given the fact that the shortfall risk lies with the public pension scheme and not with the occupational pension provider. For withdrawals within the 25% percent limit as specified in the law, there is little concern to allow the lump-sum option. However, many pension funds, in particular those of small companies allow the entire capital to be withdrawn upon retirement. In these cases, there is a considerable risk to deplete the available resources too quickly, which poses an even greater risk for surviving spouses. While there are no representative studies that estimate the fraction of people choosing the lump sum, it is not uncommon that a large fraction of retirees in a given company withdraw the whole pension capital upon retirement.[30]

In reality, the second potential problem, the adverse selection, does not seem to pose a threat to the pension funds. This is pretty surprising given the fact that there are sizeable differences in MWRs across different subgroups of the population. One would, for example, expect single men to opt for the lump sum much more often than married men due to a lower expected annuity return caused by higher than average mortality rates and the absence of survivor benefits. In the data, the opposite seems to be the case, as is reported in Bütler & Teppa (2004). The most striking outcome is that single

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[30]When collecting the data for the paper "The Choice Between an Annuity and a Lump Sum" (Bütler & Teppa, 2004) a number of pension funds had to be excluded for the lack of sufficient variability with respect to the capital option. The pension fund managers reported that virtually all retirees would choose the lump sum.

men are more likely to choose the annuity than married men, although in many cases
they get a bad deal from an annuity. One can only speculate as to why this is the
case. The absence of family ties may make an insurance (and thus the annuity) more
valuable for single men than for married men. For women the picture is a bit different
(but adverse selection effects are also much smaller due to the smaller differences in
survival rates between different marital status). Married women are more likely to opt
for the capital option, presumably due to their being the second earner in the family
and an already high degree of annuitization stemming from the primary earner.

After controlling for the impact of marital status and gender, the probability of choosing
the lump sum as a function of accumulated capital shows a U-shape: The declining
part at low levels of capital can be interpreted as a consequence of differential mortality,
magnitude effects[31] and additional income support[32] The rising part at higher old age
capital stocks can be seen to reflect bequest motives[33], investment opportunities[34], and
a preferential tax treatment.[35].

2.3.5   Replacement rates

Most pension funds aim at a replacement rate of approximately 50% to 60% of the
insured income. Together with the income from the first pillar and the fact that
there are no social security deductions on pension benefits, the net replacement rate
before taxes amounts to at least 70-80% for workers with an uninterrupted working
history even for high income groups. Due to the fact that federal and cantonal taxes in
Switzerland are progressive, and due to the availability of additional children pension
benefits, the effective net replacement rate can be well above 100% as illustrated by
Table 3.

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[31]For small stakes agents generally prefer an early payment to a deferred one even if this choice
implies a high discount rate.

[32]An annuity, even small, may be detrimental to the eligibility for income support.

[33]The higher the annuity, the lower the marginal utility of consumption at the given level. People
might prefer to hold their pension wealth in the form of capital to be able to bequeath it to their
children (at least partially) Of course, agents can save for a bequest independently from the accumu-
lated capital at retirement, but there is the risk to die prematurely and thus leave a small amount of
money. The lump sum payment guarantees a certain level of bequest.

[34]An individual may choose the capital option if he thinks he can obtain a better return than the
one offered from the annuity scheme. Investment opportunities will most likely depend on the total
amount to be invested, but also on investment abilities. The higher average capital stock at retirement
may facilitate alternative investments especially if investment abilities are correlated with wealth.

[35]In Switzerland, there is clearly a tax advantage to withdraw the accumulated pension wealth in
the form of a lump sum. This effect is much stronger for high and very high levels of capital.

Before retirement									
Gross income		50			100			200	
Marital status	sing	marr	m+2	sing	marr	m+2	sing	marr	m+2
Net income	41	42	44	73	77	80	135	143	147
After retirement									
I = First pillar	20	30	36	25	38	46	25	38	46
II = Second pillar	12	12	17	37	37	52	87	87	122
Net (I + II - tax)	30	40	52	55	68	89	92	106	139
Replacement rates									
Gross	0.65	0.85	1.07	0.63	0.75	0.98	0.56	0.63	0.84
Net	0.75	0.95	1.18	0.75	0.88	1.11	0.71	0.78	0.98

Table 3: *Pension benefits as a function of pre-retirement income (in 1000 Swiss Francs) and marital status (sing = single, marr = married with adult children, m+2 = married with two children under 18/25). The computations are based on the following (very realistic) assumptions: The spouse does not have any second pillar income, but qualifies for the same first pillar pension as the main bread winner (mainly through child care credits and part-time income) in the married adult with children case. For the married with two minor children case, it is assumed that the spouse (for obvious reasons the wife) is too young to claim her own benefits. The pension fund replaces 50% of coordinated income (= income - 25'300) with no upper income limit. Children benefits are 40% (first pillar) and 20% (second pillar) of the main claimant's benefits each. The tax base is the city of Zürich.*

2.4 Provision of disability insurance in Pillars 1 and 2

Another feature of the Swiss Pension System is that both pillars have an embedded disability insurance. In the following paragraphs their structure and integration into the general framework of pillar 1 and 2 are briefly outlined.

As far as pillar 1 is concerned, disability insurance is completely incorporated. Thus old-age and disability insurance count together as one single social security system and are considered together as the governmental provision of social security[36]. Hence, covered and therefore also obligated to contribute to the so called invalidity-insurance, are all the people which are mandatory and voluntary affiliated to the old-age insurance[37]. The contribution is collected in form of a 1,4% payroll tax[38]. Covered types of disability include those afflicted since birth, or caused by illness and accident[39]. The pension claim depends on the degree of invalidity[40]. It expires with the eligibility for

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[36]cf. Art.63 Para.2 ATSG; ATSG = Bundesgesetz über den Allgemeinen Teil des Sozialversicherungsrechts
[37]cf. Art.1b IVG; IVG = Bundesgesetz über die Invalidenversicherung
[38]cf. Art.3 IVG
[39]cf. Art.4 IVG
[40]cf. Art.28 IVG

old-age insurance or by death[41].

Within the occupational old-age insurance framework (pillar 2), there is an entitlement for invalidity benefits according to the guidelines in the above paragraph.[42] The disability insurance is provided within the occupational pension scheme and parallels the occupational old-age insurance. Thus all employed workers are covered by law, whereas self-employed agents can be insured on a voluntary basis[43]. Insurance payments cover claims caused by industrial accidents, vocational diseases and non-occupational accidents[44]. The premiums for the first two claims bear the employer, the premiums for the latter case have to be paid by the employee in general[45].

In addition to the disability insurance, provided by the first and second pillar, each person who lives in Switzerland has to have a mandatory health insurance[46].

2.5   Early Retirement: Examples of Early Retirement Schemes

As of today, there are no rules on early retirement in the BVG. Within their financial limits pension funds are free to define specific schemes in their own pension fund rules. Early retirement conditions differ considerably across pension funds (some examples are listed below[48]), the underlying principle is the same.

Recall that pension benefits are defined by total *accumulated credit balances* at retirement and by the *conversion factor*. Due to a shorter period of contribution and interest payments the credit balances are smaller for an earlier exit out of the labor market. Pension funds also reduce the conversion factors to counteract the effects of the increased period of retirement over certain age spans.

Some pension funds offer a bridging pension until the statutory AHV retirement age is reached. This bridging pension is repayable, but is also often subsidized by the plan sponsor.

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[41]cf. Art.30 IVG

[42]cf. Art.23ff BVG

[43]cf. Art.1a and Art.4 UVG; UVG = Bundesgesetz über die Unfallversicherung

[44]cf. Art.6 UVG

[45]cf. Art.91 UVG

[46]cf. Art.1ff KVG; KVG = Bundesgesetz über die Krankenversicherung. This law acts subsidiary to the casualty- insurance mentioned above, i.e., it takes place completely outside the scope of the occupational coverage[47]

[48]Each pension fund is described in details in section 7.3.4

Examples of Pension Funds with a Defined Contribution Scheme:

PF City of Zürich: [49] At the pension fund of the City of Zürich the insured individuals are eligible for early retirement from age 58 onwards. The pension on early retirement is calculated on the basis of the savings at the time of retirement and the applicable conversion rate. The corresponding rates are listed in the table below (year 2005) and are valid for both women and men. Compared to the conversion factor of 7.15% as specified by law (c.f. Table 27), the PF uses lower rates even at the statutory retirement age of 65. This is compensated by subsidies for the AHV/AVS replacement benefits and inflation indexation.

Retirement Age	65	64	63	62	61	60	59	58
Conversion Factor (in %)	6.89	6.72	6.56	6.42	6.28	6.15	6.02	5.90

Source: PENSIONSKASSE STADT ZÜRICH (2004), p. 26, Tab. 3

The bridging pension may equal up to the maximal amount payable under the AHV/AVS. As a consequence, the accumulated old–age credit balance is reduced by the present value of the bridging pension less the part that is sponsored by the employer. The reduction can be compensated by a lump–sum payment.

ABB Pension Fund: [50] At ABB, members may at their request retire from the age of 58 years onwards, or may postpone retirement until age 70. The corresponding conversion rates are listed below (year 2005).

Retirement Age	65	64	63	62	61	60	59	58	57
Conversion Factor (in %)	7.10	7.10	7.10	7.10	6.82	6.58	6.36	6.14	5.97

Retirement Age	66	67	68	69	70
Conversion Factor (in %)	7.24	7.39	7.54	7.69	7.84

Source: ABB PENSION FUND (2005), p. 28

The bridging pension corresponds to the maximum AHV/AVS retirement pension and is fully repayable.

PF Oerlikon Contraves AG: [51] Employees of Oerlikon Contraves can chose the early retirement option at age 60. The corresponding conversion factors (year 2005) are:

Retirement Age	65	64	63	62	61	60
Conversion Factor (in %)	6.75	6.60	6.45	6.30	6.15	6.00

Source: PENSIONSKASSE DER OERLIKON CONTRAVES AG (2005), p. 7

The bridging pension equals the amount of the ordinary retirement pension

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[49] c.f. PENSIONSKASSE STADT ZÜRICH (2004)
[50] c.f. ABB PENSION FUND (2005)
[51] c.f. PENSIONSKASSE DER OERLIKON CONTRAVES AG (2005)

payable under the AHV/AVS. Consequently, the accumulated old–age credit balance is reduced by the present value of the bridging pension.

Example: A man retires at age 62, his old–age credit balance at age 62 equals to 650'000 CHF and he asks for a bridging pension of the maximum AHV/AVS retirement pension, i.e., 25'800 in 2005.

Reduction in the credit balance:	650'000 - 25'800*2.855 = 576'341
Reduced Pension:	576'341*0.063 = 36'310
Total Annuity Payment (from age 62 to 65)	36'310 + 25'800 = 62'110
Total Annuity Payment (at age 65)	36'310 + ordinary AHV/AVS pension

Examples of Pension Funds with a Defined Benefits Scheme:

PF SBB: [52] Early retirement at SBB is possible at age 58. The ordinary pension is proportional to the length of the contribution period. For each contributions year the pension increases by 1.5% of the insured wage, but it can not exceed 60% (=40*1.5%). Early retirement between 62 and 65 does not result in a reduction of the pension, if the number of contribution years is at least 40. In the case of retirement between 60 and 62 the pension is reduced by 0.2% per month and between 58 and 60 by 0.5% per month (given the 40 years of contribution). An overview is given in the following table.

Retirement Age	65	64	63	62	61	60	59	58
Pension in % of insured wage	100.0%	100.0%	100.0%	100.0%	97.6%	95.2%	89.2%	83.2%

Source: PENSIONSKASSE SBB (2004), p. 12

The bridging pension equals up to the maximal amount payable under the AHV/AVS. The repayment starts at the ordinary AHV/AVS age and is charged against the annuity payments. For the period of age 60 to age 65 the bridging pension is subsidized by the employer. This does not hold for the bridging pensions before age 60.

PF of Credit Suisse Group: [53] Individuals who work for Credit Suisse are eligible for early retirement at age 55. Pension payments that are drawn before attainment of the ordinary retirement age will be reduced for each month according to the following table:

Retirement Age	62-63	61-62	60-61	59-60	58-59	57-58	56-57	55-56
Monthly Reduction	0.250%	0.250%	0.250%	0.333%	0.417%	0.500%	0.583%	0.667%
Annual Reduction	3.0%	3.0%	3.0%	4.0%	5.0%	6.0%	7.0%	8.0%

Source: PENSION FUND OF CREDIT SUISSE GROUP (SCHWEIZ) (2005), p. 14

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[52]c.f. PENSIONSKASSE SBB (2004)

[53]c.f. PENSION FUND OF CREDIT SUISSE GROUP (SCHWEIZ) (2005)

Contrary, if the pension payments are postponed beyond the 65th birthday, the retirement pension will increase by 0.25% for each additional month at work. Early retirement *after* the age of 60 implies a bridging pension, which equals the amount of the retirement pension, but shall not exceed 50% of the maximum retirement benefits payable under the AHV/AVS. This bridging pension does not cause any reduction and can be considered as "for free". In addition, the insured can *purchase* an additional bridging pension. This purchased bridging pension causes a reduction of the retirement pension (according to the above table). The reduction, which can be compensated, equals to 5% of the additional bridging pension . However, the total amount of the bridging pension can not exceed the maximum retirement pension payable under the AHV/AVS.

PF City of Solothurn: [54] Employees of the City of Solothurn can retire 5 years before the ordinary retirement age. Their pension, which equals at most 60% of the last insured wage (i.e., with 40 years of contribution), is reduced according to the following table:

Retirement Age	65	64	63	62	61	60
Reduction per year	-	9%	8%	7%	6%	5%
%-Reduction of the annuity	0%	9%	17%	24%	30%	35%

Source: Pensionskasse der Stadt Solothurn (2005), p. 55

The bridging pension equals at the best, the maximal amount payable under the AHV/AVS. The corresponding reduction of the annuity payments amounts to 6.8% of the drawn bridging pension. In the case of late retirement the pension increases each month by 0.567%.

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[54]c.f. Pensionskasse der Stadt Solothurn (2005)

3 The Organization and Volume of Pillar II (BVG)

Each employer is responsible for the provision of an occupational pension plan. He can choose between many different organization structures, from setting up a completely autonomous and independent pension fund to outsourcing the scheme entirely to an insurance company. Independent pension funds and insurance companies are subject to different laws and thus different legal restrictions along several dimensions. These differences are bound to have an impact on the financial structure of the pension scheme.

This section outlines the different possible structures of pension funds, their characteristics, and their relative importance. The section suffers from data limitations due to the large segmentation of the second pillar and somewhat outdated standards on reporting and accounting. This will be especially important in the section on the volume of contributions and accumulated old-age capital. A large part of the chapter is dedicated to the incidence of underfunding within occupational pension plans that has become an important (policy) issue since the turn of the millenium.

3.1 Institutions and Organization

This section outlines the organization of pension funds, including their different legal forms. As mentioned in Section 2.2, the BVG insures income above the coordination offset and below a defined upper bound. Due to the fact that this income range is defined by law, it is called mandatory. In addition, pension providers can also offer insurance on a voluntary basis for income above and below the threshold levels: Most of them do it for income exceeding the upper level, but very few do provide coverage for lower income. Companies that only provide this supplementary service do not need to be registered, in contrast to those which cover the mandatory part as well. Table 4 presents the numbers of registered and non-registered pension funds (PF). In 2002, 30.1% of all pension funds were registered, i.e., they insured (at least) the mandatory part of the wage income according to Art. 48 BVG. This group of pension funds covers 95% of all insured individuals. The last column in Table 4 presents the percentage change between 2000 and 2002. Obviously, the number of insured agents increased by 3.5%, whereas the number of registered pension funds decreased almost by 5.8%.

A further classification of pension funds can be made according to its legal form. We can distinguish between pension funds under private and under public law. Details on this distinction are provided in Table 5. The most common form of pension funds

Table 4: Registrations of Pension Funds under BVG

	1994	1996	1998	2000	2002	Δ_{2002}^{2000}
Registered PF	3'323 25.86%	3'075 26.57%	2'823 27.12%	2'599 28.57%	2'449 30.11%	-5.77%
# Insurees	2'935'127 90.61%	2'911'694 92.51%	2'951'777 94.02%	3'039'550 94.22%	3'146'522 95.02%	3.52%
Non- Registered PF	9'528 74.14%	8'497 73.43%	7'586 72.88%	6'497 71.43%	5'685 69.89%	-12.50%
# Insurees	304'228 9.39%	235'810 7.49%	187'899 5.98%	186'454 5.78%	164'856 4.98%	-11.58%
Total PF	12'851	11'572	10'409	9'096	8'134	-10.58%
Total insurees	3'239'355	3'147'504	3'139'676	3'226'004	3'311'378	2.65%

Source:
1: Bundesamt für Statistik (2003), p.39
2: Bundesamt für Statistik (2004), p.29, T6

under private law are foundations. In the year 2000, they comprised 99.61% of all pension funds under private law.

Table 5: Legal Form of Pension Funds under BVG

	1994	1996	1998	2000	2002	Δ_{2002}^{2000}
under private law: Pension Funds	12'675 98.63%	11'404 98.55%	10'253 98.50%	8'949 98.38%	7'999 98.34%	-10.62%
# Insurees	2'682'504 82.81%	2'586'737 82.18%	2'580'594 82.19%	2'703'339 83.80%	2'806'141 84.74%	3.80%
under public law: Pension Funds	176 1.37%	168 1.45%	156 1.50%	147 1.62%	135 1.66%	-8.16%
# Insurees	556'851 17.19%	560'767 17.82%	559'082 17.81%	522'665 16.20%	505'237 15.26%	-3.33%
Total PF	12'851	11'572	10'409	9'096	8'134	-10.58%
Total insurees	3'239'355	3'147'504	3'139'676	3'226'004	3'311'378	2.65%

Source:
1: Bundesamt für Statistik (2003), p.40
2: Bundesamt für Statistik (2004), p.29, T6

Another classification of pension funds is based on their administrational form, represented by two main classes: A pension fund manages either the credit balances of one employer or of a group of several employers. Table 6 presents the corresponding figures. Although pension funds with only one employer attached are more numer-

ous, 92.1% of all insured individuals belong the an institution with many affiliated employers. Therefore, Table 7 presents this latter category in more details. The institution with the largest number of insurees is the "Collective–Institution"[55]. This administrative form allows a pooling of individual independent employers. It is often an insurance company which administrates such associations. (Section 3.3 discusses in some more detail the role and the business of those big players.) Note that within a "collective–institution" each employer constitutes his own pension fund.

Table 6: Administrative Forms of Pension Funds under BVG

Administrative Form	2000		2002		Δ_{2002}^{2000}
Institutions for one employer	1'942	56.82%	1'707	53.85%	-12.10%
# Insurees	289'807	8.98%	262'607	7.93%	-9.39%
Institutions for several employers	1'476	43.18%	1'463	46.15%	-0.88%
# Insurees	2'936'197	91.02%	3'048'771	92.07%	3.83%
Total institutions	3'418	100.00%	3'170	100.00%	-7.26%
Total insurees	3'226'004	100.00%	3'311'378	100.00%	2.65%

Source:
1: BUNDESAMT FÜR STATISTIK (2004), p.34, T9
2: BUNDESAMT FÜR STATISTIK (2002), p.29, T8

The last classification of pension funds depends on the degree of risk coverage. This characteristic defines the risk exposure of the pension scheme with respect to, firstly, *longevity* and, secondly, premature death or invalidity. Depending on the way a pension fund bears these risks, the following legal forms can be distinguished:

1. *Autonomous pension funds without reinsurance policy:* The pension fund bears all the risks.

2. *Autonomous pension funds with reinsurance policy:* Some of the risks (i.e. potential maximum losses) are handed over to a reinsurance company.

3. *Semi-autonomous pension funds* including two cases: First, a pension fund hands over only the risk of death or invalidity to an insurance company and consequently still bears the risk of longevity. Second, the pension fund buys the old-age pensions from the insurer too. Nevertheless, the pension fund still manages the accumulation of retirement capital.

4. *Non-autonomous pension fund*[56]*:* All the risks are covered by an insurance company.

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[55]"Collective–Institution"= Sammeleinrichtung (dt.), institution collective (fr.)
[56]Non-autonomous pension fund = Kollektive Pensionskasse (german) ... (french)

Table 7: Administrative Forms^a of Pension Funds with many affiliated employers

	1996	1998	2000	2002
Collective-Institution	139	127	127	126
# Insurees	1'076'008	1'130'615	1'143'622	1'152'448
# attached employer	173'093	175'179	184'111	183'002
Common-Institution	142	135	128	130
# Insurees	569'514	539'783	571'264	615'849
# attached employer	93'839	100'833	104'925	111'948
Mixed Form	125	120	118	115
# Insurees	530'601	538'294	528'507	576'975
# attached employer	5'701	5'705	5'728	5'326
Institutions of firms, holdings or parent companies	1'278	763	773	804
# Insurees	655'227	583'560	648'376	659'576
# attached employer	6'620	4'583	4'631	4'862
Institutions of another pooling reason	na	408	330	288
# Insurees	na	50'031	44'428	43'923
# attached employer	na	1'486	1'238	1'078

Source:
1: Bundesamt für Statistik (2003), p.43
2: Bundesamt für Statistik (2004), p.30, T7

^{a}For a detailed explanation confer to Bundesamt für Statistik (2003) p.42 sqq.

5. *Savings association:* By construction, this form bears no actuarial risks, because only old–age savings are gathered.

Table 8 presents an overview of the above classification of pension funds. As it has already been shown in Tables 4 to 7, the total number of pension funds has been declining steadily 1994 (last column). The autonomous pension funds with reinsurance contract constitute the only exception. Autonomous pension funds without a reinsurance contract and the non-autonomous pension funds still insures the largest number of individuals. A pension fund of the former category has 2500 insurees on average. This high number allows them to bear the risk on their own. In comparison, autonomous pension funds with reinsurance count less than 800 insurees on average.

Table 9 combines the two characteristics "Administrative Form" and "Degree of Risk Coverage" for the most recently available data. As Table 8 shows, the autonomous and the collective institutions cover the largest number of individuals. Within the group of autonomous institutions, the *mixed forms* (544'841) and the *institutions of firms, holdings or parent companies* have the largest number of covered individuals

Table 8: Risk Coverage of Pension Funds under BVG

Characteristics	1994	1996	1998	2000	2002	Δ^{1994}_{2002}
autonomous						
# Pension Funds	663	609	525	482	457	-31.07%
# Insurees	1'196'376	1'132'233	1'097'533	1'126'747	1'143'142	-4.45%
autonomous						
(with reinsurance)						
# Pension Funds	488	536	574	583	583	19.47%
# Insurees	242'167	316'061	353'012	397'894	450'479	86.02%
semi-autonomous						
# Pension Funds	2'120	1'911	1'673	1'514	1'404	-33.77%
# Insurees	592'556	501'637	481'315	509'006	504'291	-14.90%
non-autonomous						
# Pension Funds	1'300	1'076	890	715	620	-52.31%
# Insurees	1'186'639	1'163'804	1'197'556	1'181'370	1'205'320	1.57%
savings association						
# Pension Funds	156	153	144	124	106	-32.05%
# Insurees	21'617	33'769	10'260	10'987	8'146	-62.32%
Total						
# Pension Funds	12'851	11'572	10'409	9'096	8'134	-36.71%
# Insurees	3'239'355	3'147'504	3'139'676	3'226'004	3'311'378	2.22%

Source: BUNDESAMT FÜR STATISTIK (2004), p.32, T8

(401'738). Concerning the absolute number of institutions within the group of non-autonomous institutions, the *institutions for one employer* are very prevalent (145 out of 457), however, since this administrational form only insures a modest number of individuals, its importance is limited compared with the 903'320 insured individuals in the *collective–institutions*. The latter group also constitutes the largest pool of policy holders.

The dominant form of pension funds is registered and subject to private law. It manages funds in a centralized way for more than one employer. The degree of risk coverage , on the one hand, displays a wide range of options.

3.2 Contributions and Old–Age Capital

Important Remark: Due to data limitation this section only contains information on contributions to the second pillar and the accumulated old-age capital of active contributors *within the mandatory part* of the system *after 1985.* The

Table 9: Administrative Form and Risk Coverage in 2002

Pension Funds	auto-nomous	autonomous (+ reinsurance)	semi-autonomous	non-autonomous	savings associations	Total
Collective-Institution	4	9	75	38	0	126
# Insurees	4'344	19'974	224'810	903'320	0	1'152'448
Common-Institution	18	43	33	36	0	130
# Insurees	90'395	200'778	135'257	189'419	0	615'849
Mixed Form	77	28	4	6	0	115
# Insurees	544'841	29'006	492	2'636	0	576'975
Inst. of firms, holdings or parent companies	187	220	288	92	17	804
# Insurees	401'738	121'603	66'604	66'198	3'433	659'576
Institutions of another pooling reason	26	47	153	51	11	288
# Insurees	9'238	13'646	13'820	7'003	216	43'923
Inst. for one employer	145	236	851	397	78	1'707
# Insurees	92'586	65'472	63'308	36'744	4'497	262'607
Total	457	583	1'404	620	106	3'170
# Insurees	1'143'142	450'479	504'291	1'205'320	8'146	3'311'378

Source: BUNDESAMT FÜR STATISTIK (2004), p.34, T9

tables below neglect all contributions to occupational pension plans before the latter were mandated in 1985, and — equally important — contributions to the second pillar for income exceeding the mandatory threshold level. The reported numbers only cover approximately one third of the total volume of contributions and capital[57].

A more complete picture of the relevant figures will only be available in 2006 after the implementation of new reporting and accounting standards.

Table 10 shows the total premia collected by different types of pension funds[58]. In 2002, the total amount paid by employers and employees was almost 30 billions CHF. Thereof almost 50% went to *autonomous pension funds* and over 25% to *non-autonomous pension funds*. The remaining contributions were evenly distributed among *autonomous pension fund with reinsurance* and *semi-autonomous pension funds*. 95% of the contributions received by pension funds under public law were allocated to *autonomous pension funds*. *Autonomous pension funds* under public law thus provide approximately half of the contributions collected by this kind of pension fund, i.e., 7 billions

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[57]In 2002, fixed and non-fixed capital amounted to 383'795 billions CHF. This amount comprises present values of current annuities, contributions for income exceeding the mandatory threshold, all accruals for the risks of longevity, disability and death, and some contributions that are dated before 1985.

[58]Note that entry- and one-off deposits as well as buyings related to a change of job are not considered.

out of 14 billions CHF. In 2000, the total value of contributions accounted for 27 billions CHF, which was roughly 10% less than in the subsequent year. Contributions managed by life insurance companies can be approximated[59] by the contributions of the *non-autonomous pension funds*, i.e., 26% of overall contributions[60].

Figure 10 depicts the fraction of old age credits paid by insurees and employers balances. In 2002, employers belonging to an *autonomous pension funds* contributed the largest fraction on average, i.e., 63% of the total premiums paid. On the other hand, employers affiliated to *non-autonomous pension funds* contributed 55% on average which is still above the legal minimum of 50%.

Table 10: Total Contributions payed in 2002 and 2000

Risk Coverage (in thd CHF)	Total			
	2002		2000	
autonomous	14'163'598	47.56%	13'170'093	48.58%
under private law	7'387'195	32.59%	6'470'732	31.95%
under public law	6'776'403	95.21%	6'699'361	97.68%
autonomous (with reinsurance)	3'838'737	12.89%	3'034'603	11.19%
under private law	3'518'011	15.52%	2'895'056	14.30%
under public law	320'726	4.51%	139'547	2.03%
semi-autonomous	3'565'048	11.97%	3'322'021	12.25%
under private law	3'559'082	15.70%	3'314'023	16.36%
under public law	5'966	0.08%	7'998	0.12%
non-autonomous	7'767'860	26.08%	6'947'604	25.63%
under private law	7'754'117	34.21%	6'936'022	34.25%
under public law	13'743	0.19%	11'582	0.17%
savings association	45'653	0.15%	79'131	0.29%
under private law	45'459	0.20%	78'925	0.39%
under public law	194	0.00%	206	0.00%
other funds	400'944	1.35%	556'245	2.05%
under private law	400'899	1.77%	556'211	2.75%
under public law	45	0.00%	34	0.00%

Source:
BUNDESAMT FÜR STATISTIK (2004), p. 50, Tab. A.02
BUNDESAMT FÜR STATISTIK (2002), p. 44, Tab. A.02

Table 11 shows the cumulative old–age credit balances of each type of pension funds.

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[59]It is an approximation since the *semi-autonomous pension funds* hand over indirectly part of their premiums to an insurance company as well, namely in form of insurance–premiums that they have to pay.

[60]Note: This premiums have to be considered as one position in total premiums earned by life insurance companies; c.f. Section 3.3.

Figure 10: Contributions of Insuree and Employer in 2002

In 2002, the total amount was 123 billions CHF. 97 billions CHF can be traced back to pension funds under private law. Consequently, the remaining 26 billions CHF stem from pension funds under public law. In 2000, total old–age credit balances amounted to 106 billions CHF. The allocation of this volume of stocks to the various types of pension funds is akin to the distribution of the premiums. Hence, the majority of the old–age credit balances, i.e., 44% in 2002, are registered from *autonomous pension funds, non–autonomous pension funds* make up for another 31%.

3.3   Insurance Companies

Life insurance companies play an important role in the field of occupational pension plans in Switzerland. As stated in Section 3.1, pension funds often hand over risks to insurance companies. Hence, life insurances act either as reinsurance companies that cover potential maximum losses of autonomous pension funds, or they insure the risks of death or invalidity (and additionally the risk of longevity as well), or they simply take over all the risks. In addition, life insurances also operate as hosts for pension funds that manage old–age credit balances of a group of united employers, e.g. of the "Collective–Institutions". Recall from Table 9 that "Collective–Institutions" are often

Table 11: Old–Age Credit Balances in 2002 and 2000

PF Risk Coverage (in thd CHF)	Old-Age Credit Balances Insurees 2002		2000		Delta
autonomous	53'723'840	43.66%	48'387'307	45.46%	11.03%
under private law	29'344'348	30.21%	24'925'563	30.29%	17.73%
under public law	24'379'492	94.16%	23'461'744	97.15%	3.91%
autonomous (with reinsurance)	16'089'460	13.08%	12'701'138	11.93%	26.68%
under private law	14'670'795	15.10%	12'107'564	14.71%	21.17%
under public law	1'418'665	5.48%	593'574	2.46%	139.00%
semi-autonomous	15'622'849	12.70%	14'012'968	13.17%	11.49%
under private law	15'596'928	16.06%	13'980'532	16.99%	11.56%
under public law	25'921	0.10%	32'436	0.13%	-20.09%
non-autonomous	37'601'796	30.56%	31'332'531	29.44%	20.01%
under private law	37'533'703	38.64%	31'270'112	38.00%	20.03%
under public law	68'093	0.26%	62'419	0.26%	9.09%
Total	123'037'945	100%	106'433'944	100%	15.60%
under private law	97'145'774	100%	82'283'771	100%	18.06%
under public law	25'892'171	100%	24'150'173	100%	7.21%

Source:
BUNDESAMT FÜR STATISTIK (2004), p. 66, Tab. B.09.1
BUNDESAMT FÜR STATISTIK (2002), p. 60, Tab. B.09.1

organized in the form of a non-autonomous pension fund, i.e., they hand over all their risks. Nevertheless, there are some "Collective–Institutions" that manage their risks (at least in part) themselves. Hence, in these cases, the insurance company merely operates as an administrator. Table 12 displays the contributions and the balances related to capital–insurances and annuities of all life insurance companies. Note that these figures comprise everything that is related to occupational old–age provision[61]. In 2003, the gross premiums earned by all insurance companies, which are active in the field of old-age provision, amount to almost 23 billions CHF. Compared to 2002, they decreased by 1.5%. However, in the previous years the premiums rose steadily, but each year by a lower percentage. In 2003, the balances of capital–insurances[62] and annuities[63] were 386 billions and 8 billions CHF respectively.

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[61]NOTE: A direct consequence of the fact that these numbers are collected on an aggregated basis is that they cannot be compared in a meaningful way to the aggregated "individual" data that was used in the other sections.

[62]Included in this position are among other things, all the old–age credit balances of the active insurees.

[63]Included in this position are e.g. all the current and deferred annuities of the retirees.

Table 12: Collective–Insurances of Insurance Companies

Year	Premiums in M. CHF	Growth	Balances Capital–Insurance in M. CHF	Growth	Balances Annuities in M. CHF	Growth
1996	14'823		270'224		6'574	
1997	16'665	12.43%	290'268	7.42%	6'847	4.15%
1998	18'274	9.65%	307'347	5.88%	6'919	1.05%
1999	19'782	8.25%	321'920	4.74%	7'601	9.86%
2000	21'171	7.02%	348'178	8.16%	7'327	-3.60%
2001	22'207	4.89%	369'402	6.10%	7'876	7.49%
2002	23'271	4.79%	382'648	3.59%	8'245	4.69%
2003	22'908	-1.56%	386'397	0.98%	8'188	-0.69%

Source: BUNDESAMT FÜR PRIVATVERSICHERUNGEN (2003), p. 48 and p. 68 sqq.

3.4 Investments

Table 13 shows the evolution of investments and some other key figures. Note that these numbers are aggregated values of all the existing forms of pension funds. The total amount of investments increased between 1996 and 2000. Thereafter, it decreased by over 10% to 437'080 millions CHF in 2002, mainly due to the general decline of the financial market returns. Thus, investments in both Swiss and foreign shares representing almost one fourth of total investment, decreased by more than 33%. Hence, it is not surprising that net investment income dropped by almost 22% during that period.

Table 13: Investments, Premiums and Provisions

in M. CHF	1996	1998	Delta (%)	2000	Delta (%)	2002	Delta (%)
Liquid assets and short–term Inv.	33'045	39'614	19.88%	36'051	-8.99%	44'821	24.33%
Inv. in employer	44'085	46'918	6.43%	30'448	-35.10%	11'735	-61.46%
Bonds	108'084	131'720	21.87%	152'936	16.11%	155'193	1.48%
Mortgages	26'552	26'338	-0.81%	24'731	-6.10%	22'486	-9.08%
Shares	66'201	108'212	63.46%	160'947	48.73%	107'412	-33.26%
Real estate	54'347	56'346	3.68%	61'242	8.69%	64'610	5.50%
Others	12'195	15'921	30.55%	20'639	29.63%	30'823	49.34%
Total	**344'509**	**425'069**	**23.38%**	**486'994**	**14.57%**	**437'080**	**-10.25%**
Net Inv. Income	14'092	14'478	**2.74%**	15'234	**5.22%**	11'947	**-21.58%**
Employee's Contributions	9'139	9'440	3.29%	10'398	10.15%	11'835	13.82%
Employer's Contributions	16'959	19'219	13.33%	17'813	-7.32%	19'495	9.44%
Total Contributions	**26'098**	**28'659**	**9.81%**	**28'211**	**-1.56%**	**31'330**	**11.06%**
Annuity provisions	12'508	14'450	15.53%	16'326	12.98%	18'173	11.31%
Capital provisions	2'837	2'988	5.32%	3'910	30.86%	3'525	-9.85%
Total Provisions	**15'345**	**17'438**	**13.64%**	**20'236**	**16.05%**	**21'698**	**7.22%**

Source: BUNDESAMT FÜR STATISTIK (2003)

Figure 11 depicts the average allocation of the investments made by pension funds. Three trends (or consequences of the decline in financial market returns) are apparent and worth mentioning. First, the relative investment in securities that are issued by the

employer (i.e., shares or other receivables) decreased sharply. Second, the proportion of bonds held by pension funds increased after 2000. Third, the relative amount invested in shares fell below 25% in 2002.

Figure 11: Investment positions held by Pension Funds
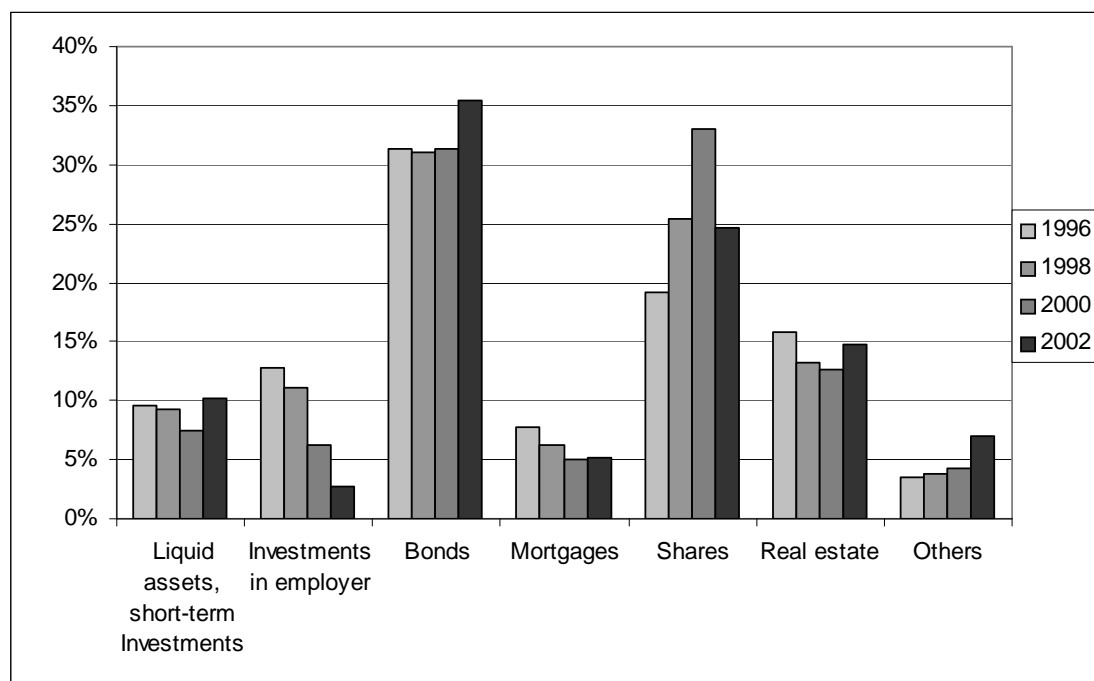
Source: BUNDESAMT FÜR STATISTIK (2003)

Figure 12 shows the relative investments of pension funds with different degrees of risk coverage in 2002. In addition, Table 14 presents the total investment and the average investment per insuree for different forms of pension funds. It is not surprising that the *autonomous pension funds* have the largest balances. First, they insure many individuals, and second, they bear all the risks themselves. As a direct consequence, they have a huge stock of capital, both in total and per insuree. Apparently, the amount of capital per insuree decreases with the degree a pension fund hands over its risks to an insurance company. Hence, *non–autonomous pension funds* have just a tiny stock of capital left. This can be traced back to the fact that their risks are exclusively managed by an insurance company. De facto, they hand over directly most of their premiums, i.e., they merely act as intermediary between the insurees and the insurance company. However, Figure 12 reveals a negative relationship between the relative amount of shares in the portfolio of a pension fund and its degree of risk coverage. The same holds true for the relative amount invested in real estates. The opposite effect is apparent for the balances of liquid assets and short–term investments.

Finally, Figure 13 depicts the relationship between the amount invested in different as-

Figure 12: Relative Investments and Degree of Risk Coverage in 2002
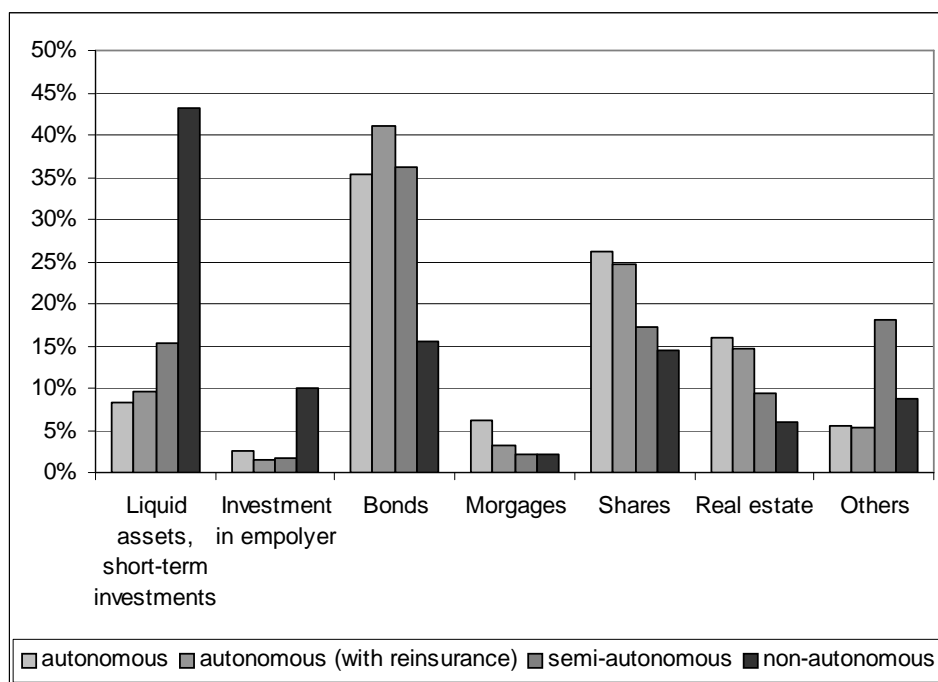
Source: Bundesamt für Statistik (2004), p. 53 sqq., Tab. A.05

Table 14: Investments of Pension Funds with different degrees of Risk Coverage

in CHF (2002)	Total Inv.	# Insurees	Inv./Insuree
autonomous	298'588'000'000	1'143'142	261'199
autonomous (with reinsurance)	63'340'000'000	450'479	140'606
semi-autonomous	39'769'000'000	504'291	78'861
non-autonomous	10'885'000'000	1'205'320	9'031

Data–Source: Bundesamt für Statistik (2004)
Source: Own calculation

sets for pension funds under private and under public law. This figure reveals that there is no apparent difference between the investment strategy of pension funds managed under private and those managed under public law.

3.5 Financial Situation of Pension Funds

Extensive discussions about the financial situation of pension funds have been recurrent in recent years. The reason is threefold: Firstly, the decline in the financial market returns reduced the value of investments in securities. Secondly, pension funds did not have enough reserves to balance out those value fluctuations. Thirdly, the accumulated increase in life expectancy could not be compensated anymore by market returns

Figure 13: Relative Investments of Pension Funds under private and under public Law
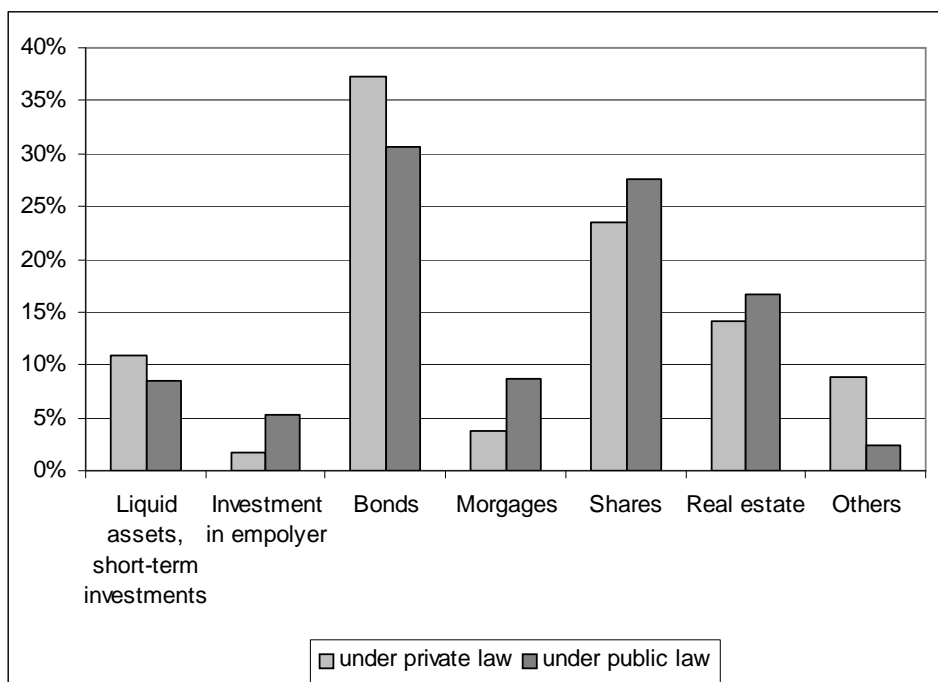
Source: BUNDESAMT FÜR STATISTIK (2004), p. 53 sqq., Tab. A.05

exceeding the minimum interest rate specified in the law. In 2002, nearly 20% of all pension funds (without Collective-Institutions) were underfunded. In 2003, this figure decreased to 12%.

3.5.1 Underfunding of Pension Funds

The financial situation of pension funds is reviewed annually according to Art. 44a BVV 2. The responsible agency is the "Bundesamt für Sozialversicherung" (BSV). Since the review is based on balance sheet data, the reference points are 31.12.2003 and 31.12.2002, respectively[64]. The first overview of the extent of underfunding of pension funds in recent years is given in Table 15. Note that the "collective-institutions" were excluded from the analysis. In 2003, 11.9% of all pension funds reported an underfunding. In 2002, this number had been considerable higher, amounting to 20.00%. This improvement can partly be explained by a rebound on the financial markets, starting in April 2003. Another reason for this amelioration are selective actions that have been taken to correct the funding gap. A striking difference is revealed by a com-

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[64]Since not all pension funds handed in their documents on time the data represent 83.8% of all pension funds in 2003, and 81.1% of the pension funds in 2002.

parison between the figures for the registered and the non-registered pension funds[65]. The reason is that unregistered funds do not have to satisfy the minimum requirement, set by the law. As these unregistered pension funds are affected by funding problems only to a small degree, the subsequent analysis ignores them.

The group of registered pension funds is split into two subgroups. The larger part consists of all *pension funds under private law* and of those pension funds under *public law without a public warranty*. In 2003, 16.4% of second subgroup was underfunded. In 2002, this figure was 28.7%. The worst situation in terms of underfunding, however, concerns pension funds under *public law with a public warranty*. This is not surprising given the fact that they are subject to moral hazard due to the warranty. These pension funds have a reinsurance that covers potential financing gaps. Thus, they have less incentives to prevent a funding deficit. In 2003, more than half of pension funds with a public warranty had an underfunding.

Table 15: Extent of Underfunding[a]

Pension Funds	2003		2002	
	with underfunding	in %	with underfunding	in %
Registered PF:				
PF without public warranty	339	16.40%	604	28.70%
PF with public warranty	45	54.90%	38[b]	49.4%
Total registered	384	17.80%	642	29.40%
Not registered PF:				
PF without public warranty	47	3.20%	80	5.60%
PF with public warranty	0	n.a.	0	n.a.
Total not registered	47	3.20%	80	5.60%
Total PF with underfunding	431	11.90%	722	20.00%

Source:
1: Bundesamt für Sozialversicherung (2004), p.4, T2
2: Bundesamt für Sozialversicherung (2003), p.4, T2

[a]without "Collective-Institutions"

[b]This figure can not be compared with the one in 2003. This is due to the fact that in 2002 not all pension funds under public law with a funding gap reported their figures.

Table 15 provides an idea of how many pension funds have a potential solvency problem. In 2003, the total amount of the funding gap comprising all the pension funds was 25'376 million CHF (16720 Euro 21884 dollar). This corresponds to a funding gap of almost 20% of the total assets of underfunded pension funds or 6.3% of the total assets for all pension funds. The number of underfunded pension funds decreased from 2002 to 2003 and so did its money value (in absolute terms). The corresponding numbers are reported in Table 16.

[65]The total percentage of underfunded pension funds in the former category equals to 17.8%, which is almost 6 times as much as the value of the latter category.

Table 16: Money Value of Shortage[a]

Pension Funds	2003			2002		
	under-funding m CHF	% of total assets of PF with DC[b]	% of tot. assets of all PF	under-funding m CHF	% of total assets of PF with DC	% of tot. assets of all PF
Registered PF:						
PF, no public warranty	8'960	12.00%	2.80%	13'278	11.90%	4.40%
PF with public warranty	16'343	31.00%	23.30%	29'253	40.30%	36.10%
Total registered	25'303	19.80%	6.50%	42'531	23.00%	11.10%
Not registered PF:						
PF, no public warranty	73	4.50%	0.50%	178	8.20%	0.30%
PF with public warranty	n.a.	n.a.	n.a	n.a.	n.a.	n.a
Total not registered	73	4.50%	0.50%	178	8.20%	0.30%
Total all PF	25'376	19.60%	6.30%	42'709	22.90%	9.90%

Source:
1: Bundesamt für Sozialversicherung (2004), p.5, T3
2: Bundesamt für Sozialversicherung (2003), p.6, T3

[a]without "Collective-Institutions"

[b]DC = deficient cover

Table 17 depicts the financial situation of pension funds form the perspective of policy holders. In 2003, the fraction of insurees belonging to a registered pension fund with a funding deficit amounted to more than 30%. Even though the situation has greatly improved since 2002, it remains somewhat critical.

Table 17: The Situation for the policy holders[a]

Pension Funds	2003		2002	
	# of insurees	% of total insurees in all PF	# of insurees	% of total insurees in all PF
Registered PF	658'524	31.80%	951'993	48.90%
Not registered PF	3'884	4.30%	10'550	9.20%
Total PF	662'408	30.70%	962'543	46.70%

Source:
1: Bundesamt für Sozialversicherung (2004), p.6, T4
2: Bundesamt für Sozialversicherung (2003), p.8, T5

[a]without "Collective-Institutions"

Panel A of Table 18 shows the evolution of pension funds with underfunding in recent years. Under private law, the number fell form 583 to 331 cases. A stronger improvement was experienced by pension funds under public law, but without a public warranty. The percentage decreased from 84% to 34.8%. The situation of pension funds under public law with a public warranty, however, is entirely different. The

number of underfunded funds within this group increased from 38 cases in 2002 to 45 cases in 2003, i.e., about 18.5%.

Panel B presents the corresponding values for the money amount of the funding deficit. Even though the number of pension funds under private law with a funding gap improved, the percentage of the funding shortage with respect to the total assets of these pension funds remained the same. This implies that the relative decrease of the total assets of these funds (-32%), declined as much as the funding gap declined (-34%). An opposite change is apparent for the pension funds under public law with a public warranty. Despite the fact that the number of underfunded pension funds has increased, the relative deficit with respect to total assets has decreased. Nevertheless, 31% is still a huge lack of financial resources.

Table 18: Underfunding and Legal From[a]

	Panel A				Panel B			
	PF with DC		in % of total PF		underfunding (m CHF)		% of total assets of PF with DC	
	2003	2002	2003	2002	2003	2002	2003	2002
PF under private law	331	583	16.02%	28.02%	7'406	11'213	11.63%	11.89%
PF under public law (with no public warranty)	8	21	34.80%	84.00%	1'554	2'065	13.80%	11.70%
PF under public law (with public warranty)	45	38	54.90%	49.40%	16'343	29'253	31.00%	40.30%
Total	384	642	17.80%	29.40%	25'303	42'531	19.80%	23.00%

Source:
1: Bundesamt für Sozialversicherung (2004), p.7, T6
2: Bundesamt für Sozialversicherung (2003), p.9, T7

[a]without "Collective-Institutions"

Table 19 presents the financial situation of pension funds distinguished by their administrative form. Recall that a pension fund can either manage the old–age credit balances of one employer or of a group of employers. In 2002, pension funds of only one employer were less affected by a funding shortage in their balances than the pension funds for a group of employers. This is true for the absolute number of affected pension funds (Panel A), as well as for the corresponding money value of the funding deficit (Panel B). In 2003, the situation changed. Although pension funds of both administrative forms could reduce the number of underfunded cases (Panel A), the evolution of the amount of the underfunding went in opposite directions (c.f. Panel B).

Table 20 classifies the pension funds with a deficient cover according to their degree of risk coverage. Although the first three classes of pension funds (the autonomous, the

Table 19: Underfunding and Administrative From[a]

	Panel A				Panel B			
	PF with DC		in % of total PF		underfunding (m CHF)		% of total assets of PF with DC	
	2003	2002	2003	2002	2003	2002	2003	2002
PF for one employer	325	571	16.30%	27.90%	13'451	19'723	21.70%	18.50%
PF for several employers	55	66	36.40%	51.20%	10'708	21'233	17.90%	29.20%
others	4	5	33.30%	45.50%	1'144	1'575	16.50%	28.90%
Total	384	642	17.80%	29.40%	25'303	42'531	19.80%	23.00%

Source:
1: BUNDESAMT FÜR SOZIALVERSICHERUNG (2004), p.8, T7
2: BUNDESAMT FÜR SOZIALVERSICHERUNG (2003), p.10, T8

[a]without "Collective-Institutions"

autonomous with reinsurance and the semi-autonomous pension funds) are all quite numerous within the group of underfunded cases, the money amount of the funding gap is concentrated. In 2003 (and 2002), approximately 95% of the total 25'303 (resp. 42'531) millions CHF were allocated to the autonomous pension funds. It is worth noting that according to the law, non-autonomous pension funds should not have any underfunding. The reason is that insurance companies (to which pension funds hand over their risks) are basically not allowed to have any funding shortage in their balances, not even in the short run.

3.5.2 Funding Ratios of underfunded Pension Funds

The aim of this subsection is to get an idea of the number of pension funds suffering serious funding problems. For this reason, data on pension funds are analyzed, distinguishing between pensions funds with and without public warranty as well as between "collective-institutions" and the rest of administrational forms.

Table 21 displays pension funds according to their funding ratios[66]. A funding ratio is defined as the ratio of net wealth (assets minus liabilities) to actuarial total pension capital. It provides information about the financial ability to pay debt when it matures. In other words, it is a measure of solvency. In contrast, liquidity refers to the feasibility with which an asset can be converted into a fungible medium. This is also important for pension funds as according to the law, the pension capital is fully portable.

[66]Funding Ratio= Deckungsgrad (german)

Table 20: Underfunding and Degree of Risk Coverage[a]

	PF with DC		underfunding (m CHF and in %)				% of total assets of PF with DC	
	2003	2002	2003		2002		2003	2002
autonomous PF	95	158	24'108	95.28%	40'091	94.26%	22.40%	26.20%
autonomous PF (with reinsurance)	102	193	823	3.25%	1'596	3.75%	6.10%	8.10%
semi-autonomous PF	167	256	346	1.37%	762	1.79%	5.74%	6.93%
non-autonomous PF	12	19	8	0.03%	20	0.05%	3.70%	7.20%
savings associations	8	16	18	0.07%	62	0.15%	3.10%	6.90%
Total	384	642	25'303	100%	42'531	100%	19.80%	23.00%

Source:
1: Bundesamt für Sozialversicherung (2004), p.8, T8
2: Bundesamt für Sozialversicherung (2003), p.10, T9

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[a] without "Collective-Institutions"

Panel A refers to pension funds without a public warranty. In 2003, 57 pension funds (15%) had a serious liquidity problem. The money value of their underfunding was 5'222 millions CHF, which is equivalent to 21% of their total assets. Nevertheless, the majority had a funding gap of less than 10%. These 329 cases were responsible for a fudging deficit of 3'811 millions CHF, i.e., 42% of the total 9'033 millions CHF. Despite the fact that the number of affected pension funds has decreased since 2002, the relative underfunding with respect to total assets has remained constant at around 21% (for pension funds with a liquidity ratio of less then 90%).

The situation of pension funds with a public warranty is even more critical (Panel B). In 2003, most of them (65%) had a funding gap of more than 10%. This part was responsible for a deficit of 15'779 millions CHF. In relative terms, this equals to 95% of the overall gap. The percentage of the funding gap with respect to total assets is also alarming. Even though the situation has improved, the lack of financial resources of almost 40% of their total assets is still sizeable.

Table 22 presents the situation of "collective–institutions". Recall that a "collective–institution" is an aggregate of many independent employers, in which each employer is shown separately. In 2003, 7'832 employers that were attached to a "collective–institution" had an underfunded old-age credit balance. In this group, nearly 5% of the accounts had a serious funding problem. In terms of money, their underfunding was equal to 113 millions CHF, which is almost 41% of the overall deficit and equivalent to

Table 21: Funding Ratios[a]

Panel A: PF without a public warranty										
	PF with DC (Numbers and in %)				underfunding (m CHF and in %)				% of total assets of PF with DC	
Funding Ratio (%)	2003		2002		2003		2002		2003	2002
95 − 99.9	221	57.25%	272	39.77%	666	7.37%	1'175	8.73%	2.80%	3.30%
90− 94.9	108	27.98%	227	33.19%	3'145	34.82%	3'524	26.19%	11.20%	9.90%
< 90	57	14.77%	185	27.05%	5'222	57.81%	8'757	65.08%	21.00%	20.60%
Total	386	100%	684	100%	9'033	100%	13456	100%	11.80%	11.80%

Panel B: PF with a public warranty										
	PF with DC (Numbers and in %)				underfunding (m CHF and in %)				% of total assets of PF with DC	
Funding Ratio (%)	2003		2002		2003		2002		2003	2002
95 − 99.9	10	22.22%	4	10.53%	263	1.61%	167	0.57%	3.20%	11.30%
90− 94.9	6	13.33%	8	21.05%	301	1.84%	489	1.67%	9.20%	7.30%
< 90	29	64.44%	26	68.42%	15'779	96.55%	28'597	97.76%	38.40%	44.40%
Total	45	100%	38	100%	16'343	100%	29253	100%	31.00%	40.30%

Source:
1: Bundesamt für Sozialversicherung (2004), p.10 sqq., T10 and T11
2: Bundesamt für Sozialversicherung (2003), p.12 sqq., T11 and T12

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[a]without "Collective-Institutions"

roughly 31% of their total assets. 100'262 people were threatened by a possible problem of solvency[67]. In 2002, the number of underfunded old-age credit accounts was higher, amounting to 9'477. Less favorable was also the fraction of the cases with a funding ratio of less than 95%. This group (4'199 employer–accounts) was responsible for 80% of the total funding deficit of 640 millions CHF.

3.5.3 Causes for the Underfunding

Due to the fall in financial market returns and their direct impact on the value of the portfolios of pension funds, one would conclude younger pension funds to be more affected by a funding deficit than more mature ones, who are more likely to have accumulated enough reserves. However, as Table 23 reveals more than 85% of the underfunded pension funds were older than 5 years.

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[67]Recall from Table 9 that the total of insured individuals within the group of "collective–institutions" was almost 1.2 millions, hence the fraction of affected individuals is small. In 2002, slightly above 13% of the insured were affiliated to an underfunded "collective–institution". The fraction of affected employer–accounts was 5.2% in 2002 (9'477 out of 183'002 c.f. Table 7).

Table 22: Funding Ratios for Employer–Accounts in "Collective–Institutions"

Liquidity Ratio (%)	Accounts in "Collective-Institutions" and with DC (Numbers and in %)				# of policy holders	
	2003		2002		2003	2002
95 – 99.9	7051	90.03%	5278	55.69%	75'388	75'229
90– 94.9	409	5.22%	4199	44.31%	12'322	75'949
< 90	372	4.75%			12'552	
Total	7832	100%	9477	100%	100'262	151'178

Liquidity Ratio (%)	underfunding (m CHF and in %)				% of total assets of PF with DC	
	2003		2002		2003	2002
95 – 99.9	96	34.53%	127	19.84%	2.07%	2.56%
90– 94.9	69	24.82%	513	80.16%	15.16%	11.86%
< 90	113	40.65%			30.71%	
Total	278	100%	640	100%	5.09%	6.89%

Source:
1: BUNDESAMT FÜR SOZIALVERSICHERUNG (2004), p.17 sqq., T21 and T22
2: BUNDESAMT FÜR SOZIALVERSICHERUNG (2003), p.19 sqq., T22 and T23

Table 23: Underfunding and the Age of Pension Funds[a]

Age of the PF	PF with DC (Numbers and in %) 2003		underfunding (m CHF and in %) 2003		% of total assets of PF with DC 2003
< 3Y	17	3.94%	1'958	7.72%	13.70%
3 – 5 Y	47	10.90%	2'741	10.80%	13.70%
> 5Y	367	85.15%	20'677	81.48%	21.80%
Total	431	100%	25'376	100%	19.60%

Source: BUNDESAMT FÜR SOZIALVERSICHERUNG (2004), p.9, T9

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[a]without "Collective-Institutions"

Table 24 summarizes the main reasons that were responsible for the funding deficits[68]. Obviously, losses on securities were the main trigger, amounting to nearly 60% of the gap. In 2003 and for pension funds except "collective–institutions" (Panel A), an insufficient actuarial funding caused a funding shortage in 22% of the cases. In 2002, insufficient returns on investments were also often the reason for such a situation.

In addition to the main causes mentioned above, there are other reasons for a funding deficit. Some of them are listed below[69]:

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[68]Note that theses reasons have been self-reported by the pension funds.
[69](self-reported)

Table 24: Causes for an Underfunding (self-reported)

Cause	Panel A PF (in %)		Panel B Collective–Inst. (in %)	
	2003	2002	2003	2002
Losses on Securities	59%	50%	59%	46%
insufficient returns on investments	4%	30%	22%	20%
insufficient actuarial funding	22%	9%	4%	5%
Losses on other investments	9%	4%	4%	26%
Others	6%	8%	11%	3%
Total	100%	100%	100%	100%

Source:
1: Bundesamt für Sozialversicherung (2004), p.20, T25 and T26
2: Bundesamt für Sozialversicherung (2003), p.22 sqq., T26 and T27

- A higher than anticipated incidence in disability for autonomous pension funds

- The increase in the fraction of retirees

- Too high interest payments on old age credits

- New accounting standards

- Reorganizations of pension funds

- Partial liquidations

- The young age of pension funds without sufficient reserves

- Problems with the management

- Voluntary pension benefits exceeding the minimal requirements

Particularly with regard to more mature pension funds:

- Shares were bought when prices were high.

- Some pension funds had an investment strategy that was too conservative, i.e., they held to many obligations, whose returns were below the minimum interest rate requirement under the BVG.

- Some pension funds offered higher benefits to their insured individuals, e.g. they payed an interest rate on the old-age credit balances higher than the minimum interest rate, or offered higher benefits. Thus they were not able to accumulate reserves.

- Pension funds under public law and without public warranty that had been privatized recently did not have enough time to accumulate sufficient reserves.

- Moral Hazard for pension funds under public law with public warranty.

The same causes as above also apply to "collective–institutions" (c.f. Panel B). Nevertheless, this administrational form needs a closer examination. Table 9 shows that 113 "collective–institutions" out of 126 ($\approx 90\%$) hand over their risks (at least part of it) which are inherent in the old age provision business to a (life-)insurance company. As mentioned before, insurance companies are basically not allowed to have any funding shortage in their balances. Thus, how can the figures in Table 22 be explained? For the few "collective–institutions" that handle their risks autonomously, the same reasons as above apply. However, for the *semi–* and *non–autonomous institutions*, three more reasons have to be considered:

1. Since *semi–autonomous institutions* manage at least the accumulation of retirement capital themselves, they are subject to market risks.

2. In the case of *non–autonomous institutions*, all risks are covered by an insurer. Nevertheless, some non–autonomous "collective–institutions" may offer "separate investment accounts" to their affiliated employers. As a direct consequence of these "separate investment accounts", employers bear part of the investment risks.

3. The insurance company refuses to guarantee the minimum interest requirement.

3.5.4 Measures to correct the Funding Gap

This subsection discusses some measures that can be taken in order to remedy the financial situation of pension funds. The most important actions are presented in Table 25[70]. Once again, "collective–institutions" are treated separately (Panel B), i.e., these pension funds are excluded from the enquiry in Panel A.

In 2003, the most popular measures were additional contributions of employers (26%), cutbacks of benefits (20%) and reductions in the interest rate paid on accumulated old-

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[70]Note that these measures have been reported by the pension funds.

age credit balances (16%)[71]. All of these measures are easier if percentage of retirees is low. If retirees constitute a large fraction within the group of insured individuals, the recapitalization is more difficult. In such a case, either a cutback of current benefits is possible, or the pension fund relies on an increase in financial market returns. As Table 25 indicates, the former action was quite rare (7% in 2003). In 2002, the most common instrument to correct the underfunding was the reduction in interest rates (36%)[72]. Consequently, it was either reduced (22%) or even set to zero (14%). Another frequent measure were additional contributions of employees. The last common action refers to the investment strategy. In 7% of all the actions, the strategy was adjusted and in 10% it was maintained. The reason for the latter decision on the investment strategy is the belief that in the long run the underfunding will be compensated by the performance of the portfolio. Since all of these measures are not mutually exclusive, there are several additional actions. Some of them are listed in Table 25. Further measures are comprised in the category *others*. Worth to mention are the following ones[73]:

- Adjustment of the risk premia

- Covering of the underfunding by the employer / Covering of administrative costs by the employer / Covering partly the provisions, surrender of interest payments

- Changing the regulation / provisions

- Reducing the interest rate only for insured income above the coordination offset.

- Cancelation of special schemes such as the availability of old age capital for the purchase of real estate.

- Suspension of any previously agreed adjustment of the old-age credit balances to nominal price increases

- Public Warranty

- Dissolution of reserves

- Changing to a defined contribution (DC) system

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[71]Example: A pension fund lowers the interest rate on accumulated old-age credit balances by 0.5% for one year. The implied costs for contributors can be expressed as a fraction of the coordinated salaryor of the accumulated old age savings at retirement (= reduction in future benefits):

Age	30	40	50	60
As a fraction of salary (in %)	0.2	0.7	1.6	2.9
Reduction in projected pensions (in %)	0.006	0.17	0.3	0.45

[72]Note that for the year 2002, all the values in the second column are calculated without *Others*.

[73]self-reported; for more details c.f. BUNDESAMT FÜR SOZIALVERSICHERUNG (2003), p.25, T25

- Appreciation of real estate

- Changing the degree of risk coverage, i.e., handing over more risks to an insurance company

Panel B in Table 25 shows the measures taken by "collective–institutions". The most frequent measures in 2003 were the maintenance of the previous investment strategy (16%) and / or the improvement of the present risk management (16%). The actions listed above in the first place, i.e., cutting back the performance and lowering the interest rate were only of minor importance. While pension funds (except for "collective–institutions") used capital contributions of employers (16%) as their primary instrument, the "collective–institutions" did not use this method.

Table 25: Measures to correct the Underfunding (self-reported)

Measure	*Panel A* Pension Funds			*Panel B* "Collective–Institutions"
	2003	2002		2003
Capital Contributions of employers	16%	2%	4%	1%
Use of contribution reserves of employers or means of welfare funds	10%	4%	7%	6%
	26%			7%
Cutbacks of reversional performances, i.e., a reduction in the conversion factor	13%	4%	7%	9%
Cutbacks of current performance	7%	0%	0%	2%
	20%			11%
Interest rate is/was lowered below the minimum interest rate requirement	3%	2%	4%	2%
Interest rate is/was lowered	13%	10%	18%	8%
	16%			10%
Additional contributions / reductions in benefits (employees)	1%	12%	21%	9%
Investment strategy is/was maintained (i.e. over–performance in the long run)	2%	5%	10%	16%
Investment strategy is/was adjusted	7%	4%	7%	2%
Zero return	3%	8%	14%	3%
Reduction in administrational costs, i.e., an increase in efficiency	5%	2%	3%	5%
Improvement of risk management (Optimization of cover and reserves)	1%	2%	4%	16%
Installment plan (repayment agreement)	3%	0%	0%	2%
Others	18%	46%	X	18%
Total	100%	100%	100%	100%

Source:
1: BUNDESAMT FÜR SOZIALVERSICHERUNG (2004), p.21 sqq., T27 and T28
2: BUNDESAMT FÜR SOZIALVERSICHERUNG (2003), p.24, T28

To sum up, there is a broad range of measures that have been taken in order to remedy

the financial situation of pension funds. However, demanding additional contributions of employers, lowering the interest rate and cutting back the performance were the most frequent measures. The "Collective–institutions" on the other hand, focussed more on their investment strategies and on the improvement of their risk management.

4   Money's Worth Ratios in Switzerland

The vast majority of annuities are not priced in Switzerland[74]. Their values are determined by the regulation on the one hand, discount rates and mortality rates on the other hand. As outlined before, the law specifies the conversion factor at which the accumulated pension capital of the second pillar's mandatory part has to be converted into a life long annuity. For the capital exceeding the mandatory part, pension funds are free to set the rate at which the capital is converted. Until very recently, however, most pension funds did not distinguish between the two components of the accumulated old age capital. As a consequence of the fall in market returns and the difficulty to meet the prescribed funding standards, more and more funds are reducing the conversion factor in the non-mandatory part. However, there is little publicly available information as for the pricing of this part. We report some calculations using the recently published rates of some large insurance companies.

The money's worth ratio also depends on discount rates and the underlying mortality rates. While the latter, discussed in more details in section 4.1 below, does not differ from other countries, the correct specification of discount rates is more controversial. Annuities are *not* fully indexed to inflation. Pension funds are required to adjust the benefits to increases in the price level if the financial situation of the pension fund allows it— which is virtually never the case under the current situation. However, in the 80's and 90's with much higher levels of inflation and low required returns on accumulated pension capital, adjustment of benefits to inflation was almost standard. Section 4.2 offers a more detailed discussion of this issue for the computation of MWRs.

When reporting MWR one has to keep in mind that they do not constitute more than a benchmark in a setting in which annuities are not really priced. Nevertheless the exercise can deliver a reasonable approximation of the return to accumulated pension capital for insured individuals in the mandatory part.

4.1   Mortality rates

Mortality rates are used from two sources, the Federal Insurance Fund FIF and the Swiss Federal Statistical Office (SFSO).

1. *The Federal Insurance Fund (FIF)*

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[74]Brown et al. (2001) discuss the history of annuity markets in the United States and their role in an individual accounts retirement program, new evidence on MWR's, the cost of annuitizing retirement payouts and some tax issues.

Every ten years, the Federal Insurance Fund FIF provides detailed data on the evolution of mortality rates and other risks (invalidity, widowhood) based on the pool of insured individuals on pension funds under the control of the FIF. These are used by the vast majority of pension funds, including the large insurance companies.[75]

2. *Swiss Federal Statistical Office (SFSO)*

We also use the mortality tables computed by the SFSO in ten years intervals. The advantage of the SFSO data is that it is computed from a much larger base than the FIF rates. As a consequence, improvement rates computed from this source are more reliable and less variable. SFSO mortality tables are also available by marital status (see below).

Survival Functions Women

Figure 14: *Survival rates as a function of marital status for women (year 1990, data source SFSO). The dashed line corresponds to pooled annuitant survival rates provided by the FIF (1990).*

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[75] In German: "Eidgenössische Versicherungskasse (EVK)", in French: "Caisse fédérale d'assurance (CFA)". Until recently the Federal Insurance Fund (FIF) also managed the Federal Pension Fund (FPF). Furthermore it implemented the new Federal Pension Fund PUBLICA. The latter was legally established in spring 2001 and began operating in June 2003.
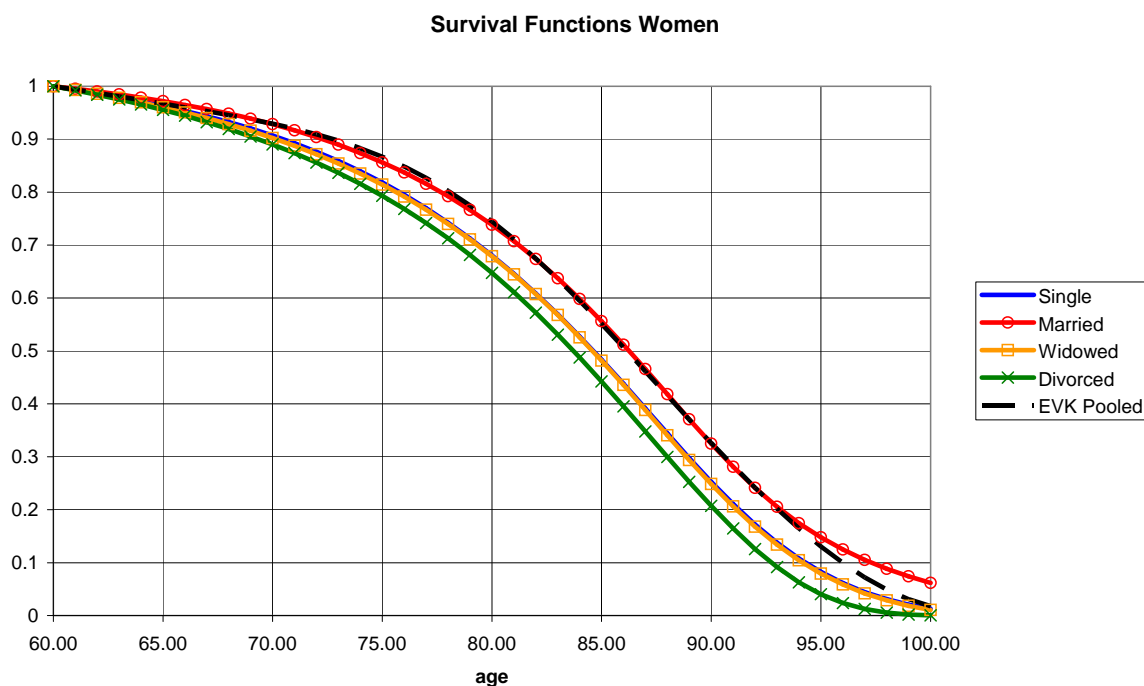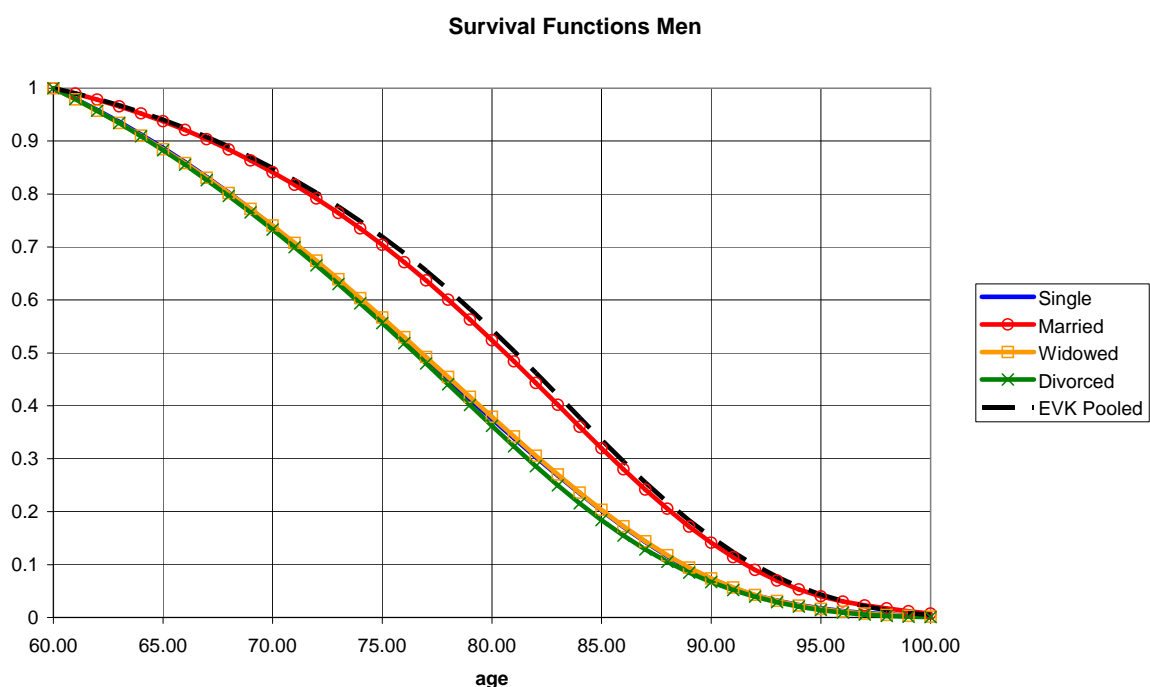
Figure 15: *Survival rates as a function of marital status for men (year 1990, data source SFSO). The dashed line corresponds to pooled annuitant survival rates provided by the FIF (1990),*

4.1.1   Mortality improvement rates

As already mentioned, improvement rates can be computed from both sources (both of which are available at 10 years intervals). As can be seen from Figure 16, the improvements are similar, although the FIF data exhibits greater variability with age, most probably due to the relatively small number of annuitants on which the mortality rate estimates are based. For the computation of MWRs the difference does not seem to be quantitatively important, however. The reported numbers in this chapter are derived with population improvement rates.

It is important to mention that most pension funds do not update the mortality rates on a yearly base. They compute the liabilities based on the published FIF mortality rates and increase these by 0.4% to 0.5% on a yearly basis until the new FIF mortality rates are available, i.e., every 10 years. The 0.4% per year delivers an increase in MWRs over 10 years that coincides almost exactly to the rise in MWRs using the SFSO or FIF improvement rates for all groups of annuitants. It thus constitutes a good approximation for the anticipated increase in longevity. The 0.5% is a more prudent estimate.

Improvement Rates per Age
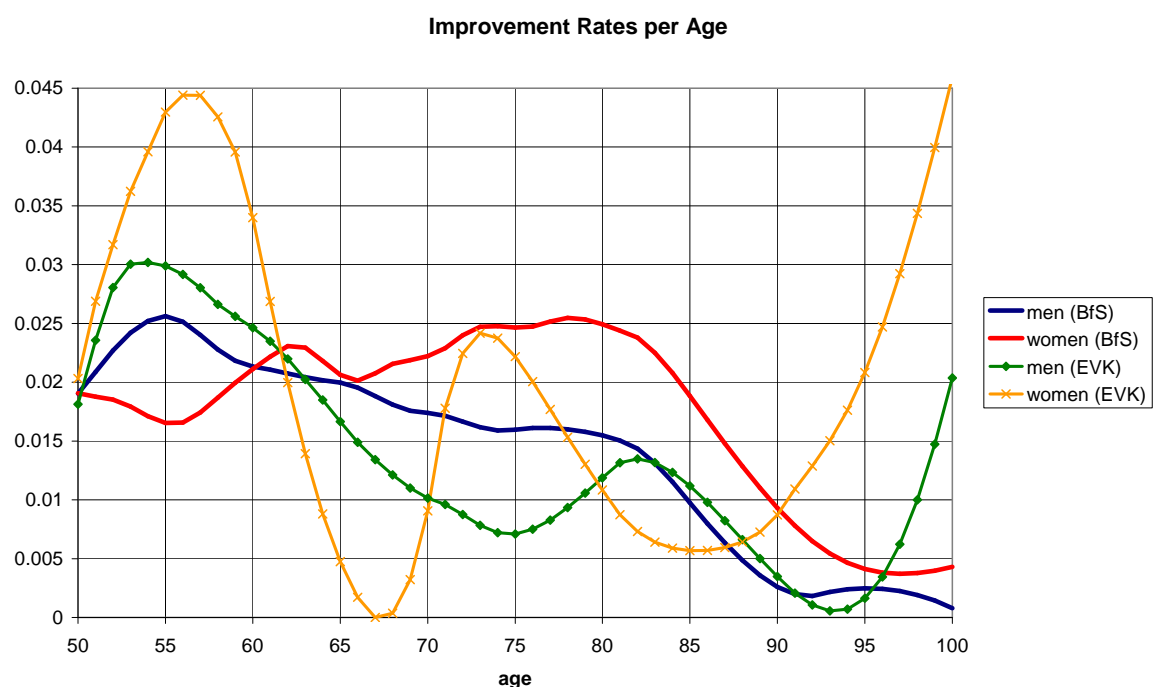
Figure 16: *Improvement rates per year computed from pooled mortality rates. SFSO = between 1980 and 1990, FIF = between 1990 and 2000.*

4.2   Yield curves and discount rates

Our *nominal yield curves* are sourced from the central bank and are depicted in Figure 17 for end of June since 2000. The low level of interest rates reflect three particularities of the Swiss economy:

1. The traditionally low average inflation rates in Switzerland. Inflation has been even lower than usual in the last few years. As the yield curves suggest, inflation expectations are equally low.

2. A low real interest rate compared to neighboring countries. The Swiss real interest rates have been approximately one to two percent lower, on average, than in Germany.[76]

3. The extended period of sluggish growth since the early 90s. Switzerland has experienced very low growth rates in recent years.

Real yield curves cannot be computed due to the nonexistence of inflation indexed bonds in Switzerland. The lack of the latter financial instrument reflects the high stability of monetary policy in Switzerland and thus the low demand for an inflation

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[76]See, for example, Kugler & Weder (2003).

hedge. While this shortcoming does not pose a problem for recent estimates of MWRs, it makes it difficult to value the annuities in the past, when second pillar benefits were factually indexed to inflation.

The choice of the discount rate in Switzerland is somewhat tricky due to the specificities mentioned above. As a further difficulty, the official technical interest rate at which future liabilities have to be discounted still amounts to 4% and has thus been considerably above the market risk free interest rate. However, the use of the nominal yield curve is not free of problems either. Firstly, due to the interest rate differential with neighboring countries, a higher return on assets can be achieved at relatively low costs. The exchange between the Euro zone and Switzerland has been very stable for a long time, including the pre-Euro time. A well diversified portfolio of bonds can thus generate a considerably higher return at almost no additional risk. Secondly, it ignores one of the main objectives of the Swiss pension system to keep benefits relatively stable over time for different cohorts of pensioners. To get a more precise picture one would have to average out MWRs over a longer spell. Thirdly, the use of the nominal yield curve ignores the possibility that annuities may be partially adjusted to inflation if the latter reaches a sufficiently high level.

To add some robustness to our computations, we report all MWRs for a constant nominal interest rate of 3.5% which corresponds to the factually used technical interest rate in many pension funds and also most likely to its new official specification. To illustrate the impact of different interest rate profiles, we report all MWRs since 2000 also as a function of the nominal yield curve, and the corresponding rate of the 5-year bond.

4.3   Money's Worth Ratios in the Swiss System

Recall that occupational pension benefits are strictly proportional to the accumulated retirement assets (retirement credits plus accrued interest). The accumulated capital K is translated into a yearly pension B using the conversion factor γ:[77]

$$B = \gamma K.$$

The BVG/LPP mandates joint annuities for men, but not for women. The conversion factor is the same for everybody irrespective of gender, family status or income.

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[77]This conversion also applies to defined benefit plans; the fund has to make sure that enough capital is accumulated to cover the claims made based on previous income.

Yield Curves Nominal
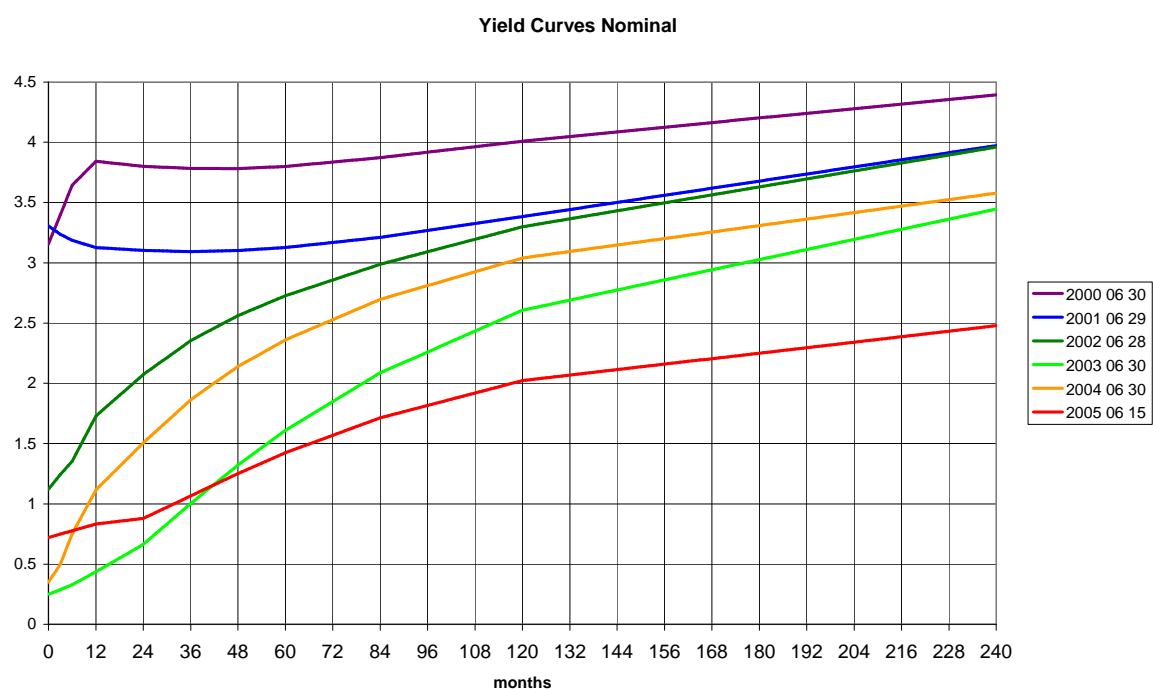
Figure 17: *Nominal yield curves since 2000 (June 30 of each year, June 15 in 2005). Data source: Swiss National Bank. The corresponding inflation rates are 1.84 (2000), 1.58 (2001), 0.33 (2002), 0.55 (2003), 1.12 (2004), and 1.08 (2005)*

Children under age 18 (or under age 25 if still dependent) of retired persons get an additional pension of 20% of the main claimant's benefit. When a retired individual, his/her surviving spouse receives a benefit amounting to 60% of the previous pension, his dependent children a benefit of 20% each. These survivor benefits are not means tested.

The conversion factor has become *the key parameter* of the Swiss occupational pension system. Contracts for annuities in the non-mandatory part have started to be specified in terms of applicable conversion factors (which, in this case, can be different for men and women).

Recall that a pension fund can deviate from the legal conversion factor even in the mandatory part if it uses the freed resources to improve the benefits for the covered individuals. Due to the high segmentation of the fund, it is very difficult to get reliable information on how this affects the implied conversion factor for different groups of insured individuals.

4.3.1 Computations of Money's Worth Ratios

To compute the MWRs in the Swiss second pillar, let us introduce the following notation: M is the main claimant, i.e., the person who has accumulated the claim to the pension system, and S is his/her spouse. The pensioner's spouse S is d years older than the main claimant. M retires at age J with an accumulated capital stock of K.[78] Upon retirement, the accumulated capital is either withdrawn as a lump sum or translated into a life–long annuity using the age–dependent conversion factor γ, defined as

$$\gamma = \frac{B}{K} \tag{1}$$

In case M dies and is survived by his/her spouse S, the latter gets a survivor benefit, which is a certain fraction λ of the main benefit B. For single, divorced or widowed agents, the analysis is similar, though much simpler, as joint survival probabilities do not have to be taken into account.

When computing the MWR, we have to know the conditional probability of survival to age j for both spouses. Survival probabilities are allowed to depend on marital status, and the joint probability of survival is a function of the age difference d between the spouses. The discount rate is denoted ρ. The present value of all future benefits from retirement age on can be written as

$$\mathrm{PV} = \frac{1}{\Psi_J^M} \sum_{t=J}^{\infty} \left(\frac{1}{1+\rho} \right)^{t-J} B \times \left\{ \begin{array}{l} (\Pr[M \text{ alive, } S \text{ alive}](t) \\ + \; (\Pr[M \text{ alive, } S \text{ dead}](t) \\ + \; (\Pr[M \text{ dead, } S \text{ alive}](t) \times \lambda \end{array} \right. \tag{2}$$

where Ψ_J^M is the probability of the main claimant being alive at age J. Combining (2) with (1), we can then compute the MWR for a married individual without children:

$$\mathrm{MWR} = \frac{\mathrm{PV}}{K} = \frac{\gamma}{\Psi_J^M} \sum_{t=J}^{\infty} \left(\frac{1}{1+\rho} \right)^{t-J} \left\{ \begin{array}{l} (\Pr[M \text{ alive, } S \text{ alive}](t) \\ + \; (\Pr[M \text{ alive, } S \text{ dead}](t) \\ + \; (\Pr[M \text{ dead, } S \text{ alive}](t) \times \lambda \end{array} \right. \tag{3}$$

The derivation for non-constant discount rate is similar, though slightly less elegant. In the presence of minor children the benefit level has to be increase by the corresponding numbers until the children reach the age of 18 (or 25 if still in school or unable to

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[78] In a defined benefit system, this is the implicitly defined capital stock that corresponds to the annuity. Note that many funds allow a partial withdrawal of capital even in a defined benefit system.

work).

Note that the pension funds use mortality rates that are pooled over all marital status, but of course use different tables for men and women. While the differences for female retirees are small (see Figure 14), there are sizeable differences in longevity across marital status for men (see Figure 15). Being without partner in old age (regardless of this being caused by widowhood, divorce or never married) constitutes a major threat to a man's well-being and survival prospects in old age. Abstracting from survivor benefits, differential mortality accounts for a difference of at least 10% in the MWR between married and non-married men. See also the discussion below in section 4.3.4.

A MWR exceeding one (or one minus a certain amount to cover administration costs) is not sustainable for the pension provider. A value of 1.2, for example means that the conversion factor is at least 20% too high, given the used mortality tables and the underlying interest rate. As a consequence, the used conversion factor is too high by the same percentage. If the 1.2 was computed using a conversion factor of 7.2%, an actuarially fair conversion rate would be 6%, abstracting from administration costs.

4.3.2   Money's Worth Ratios since 2000

Table 26 reports the MWRs for retirees in the second pillar since 2000. As it is obvious from the Table, the numbers differ substantially from one year to another when using the nominal yield curve to discount future benefits. The most striking feature, however, is the average magnitude of MWRs. It is not surprising that many pension funds (especially the majority that still uses the legal conversion rate) have faced some difficulty in meeting the financial obligations. One the other hand, as is outlined above, discounting future income streams with the nominal Swiss bond yield overstates the true cost of an annuity to a certain extent.

The uniform conversion factor also leads to dramatically different outcomes for different subgroups of the population. In particular, female retirees fare substantially better due to the lower statutory retirement age. As the next section will show, this advantage will partially disappear with the recent reform of the second pillar. It is important to note that the reported numbers also overstate the difference in MWRs as many companies have used reserves to finance an equally early retirement for men also. In some cases, the advantage was even reversed, as male annuitants not only had access to full benefits at age 62, but also were granted a subsidy out of the fund to replace benefits from the first pillar.

Another striking feature is the difference between single and married men. Due to the uniform conversion rate, married men get a higher payoff generated by the present value of anticipated survivor benefits. The reported difference *underestimates* the true magnitude of the advantage for married men for two reasons: Firstly, the computations ignore mortality differences between married and non-married individuals. As Figure 15 shows, married man have a considerably longer expected life-span than single men (see also below). Secondly, married men can claim additional benefits for minor children (or children still in education) when reaching retirement.[79]

4.3.3   The recent reform

Table 27 reports the MWR based on the slowly decreasing conversion factors and the increase in the female retirement year over the next ten years, based on a flat discount rate of 3.5%. The overall picture is that despite the relatively high chosen discount rate, MWRs stay very high. The reduction in the conversion factor comes too late and is not large enough. As can be seen from the two columns "single male" and "joint", the reduction is barely able to compensate the expected increase in longevity over the next ten year. It is too small to offset the increase in life expectancy since 1985.

On the other hand, the relative advantage of women compared to married men is disappearing with the higher female retirement age. Note again that the MWR computation based on pooled survival rates underestimates the MWR of joint annuities to a certain degree (especially also considering the fact that many married men can claim additional benefits for minor children at no costs). The MWRs for married female retirees are not reported here, due to data limitation. However, the increase in the MWR as a consequence of expected survivor benefits for insured women is relatively small. Preliminary calculations show, that the joint annuity MWR for married women is approximately 3 to 4%. This number looks even smaller when considering the fact, that married women have a much lower average capital stock at retirement than other women (approximately half).

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[79]Retired men with young children get a considerably higher income than younger families as children benefits do not exist for working individuals. Although no official statistics exist, evidence from a number of pension funds show that young children are predominantly registered for high income individuals. Together with differential mortality based on economic well-being, these additional benefits for children increase the true MWR for the latter substantially above the values reported in our tables.

Year	annuitant	SNB Yield Curve	5-year-bond rate	MWR	fixed 3.5%
2000	female single	1.069	3.80%	1.117	1.155
	male single	0.890		0.917	0.943
	male married	1.025		1.068	1.103
2001	female single	1.134	3.13%	1.211	1.160
	male single	0.937		0.981	0.947
	male married	1.086		1.154	1.108
2002	female single	1.151	2.73%	1.275	1.165
	male single	0.953		1.023	0.951
	male married	1.102		1.212	1.112
2003	female single	1.242	1.61%	1.475	1.170
	male single	1.020		1.152	0.955
	male married	1.187		1.393	1.116
2004	female single	1.206	2.36%	1.346	1.175
	male single	0.991		1.071	0.959
	male married	1.152		1.276	1.120
2005*	male single	1.099	1.42%	1.186	0.963
	male married	1.302		1.440	1.124
2005	female single (62), 5.454%	1.039	1.42%	1.076	0.893
	male single, 5.835%	0.891		0.961	0.780
	male married, 5.835%	1.055		1.167	0.911

Table 26: *MWR calculations for pooled gender survival tables as a function of the underlying risk free rate profile since 2000. For all computations, the common conversion factor is 7.2%, the female retirement age is 62, and the age difference of married spouses at retirement is 3.7 years. The last three lines (2005*, in blue) depict the MWRs using the lowest quoted conversion rates to be applied on the non-mandatory capital stock. The computations are based on a constant nominal interest rate of 3.5%. Joint annuities are for men only Mortality rates are updated by improvement rates from SFSO. * = no females to retire at statutory retirement age.*

Year	sex	R.A.	C.F.	single female		single male		joint (F=61.3)	
				FIF	(SFSO)	FIF	(SFSO)	FIF	(SFSO)
2004	F	62	0.0720	1.175	(1.191)				
	M	65	0.0720			0.959	(0.904)	1.120	(1.104)
2005*	M	65	0.0715			0.952	(0.902)	1.117	(1.110)
2006	F	63	0.0715	1.148	(1.153)				
	M	65	0.0710			0.953	(0.899)	1.113	(1.096)
2007**	F	64	0.0720	1.133	(1.144)				
	M	65	0.0710			0.957	(0.904)	1.117	(1.100)
2008	F	64	0.0710	1.122	(1.132)				
	M	65	0.0705			0.954	(0.901)	1.113	(1.097)
2009	F	64	0.0700	1.111	(1.120)				
	M	65	0.0705			0.958	(0.905)	1.117	(1.100)
2010	F	64	0.0695	1.107	(1.116)				
	M	65	0.0700			0.955	(0.903)	1.112	(1.096)
2011	F	64	0.0690	1.103	(1.112)				
	M	65	0.0695			0.952	(0.900)	1.108	(1.092)
2012	F	64	0.0685	1.099	(1.108)				
	M	65	0.0690			0.948	(0.898)	1.104	(1.088)
2013	F	64	0.0680	1.095	(1.104)				
	M	65	0.0685			0.945	(0.895)	1.099	(1.084)
2014	F	64	0.0680	1.098	(1.108)				
	M	65	0.0680			0.941	(0.892)	1.095	(1.079)

Table 27: *MWRs for the conversion rates specified in the law. The computations are based on a constant nominal interest rate of 3.5%. Joint annuities are for men only (number in paranthesis = age of spouse at retirement of main claimant). * = MWR for female is not reported as there are no women to reach the statutory retirement age. ** = women born in 1943 can choose to retire at 63 (at a slightly reduced conversion factor) or at age 64. Mortality rates taken from FIS and SFSO (in parenthesis), they are updated by improvement rates from SFSO.*

4.3.4   Mortality Tables by Marital Status

As Figures 14 and 15 demonstrate, survival rates differ considerably across marital status, especially for men. MWRs computed from pooled mortality tables thus considerably overestimate the MWR for single, divorced and widowed men (having lower than average life-expectancy).[80] For married men, pooled data is likely to underestimate the MWR. Such considerations are especially important in the Swiss context with a uniform conversion factor for all individuals. The fact that single men have a lower life expectancy than married men reinforces their disadvantage of not having a second claimant in case of death.

A second component that has been ignored so far is the age difference between the retired spouse. A survivor benefit of 60% is of more value for a main claimant with a much younger spouse than for somebody with an older spouse. Although benefits can be reduced for spouses more than 10 years younger than the main beneficiary, few do and if so, in a very moderate fashion. That the age difference matters is illustrated in Figure 18 below. If the wife is 10 years younger, the implied MWR is approximately 7% higher than in the case of an equal age for both spouses. The age difference channel increases the relative advantage of beneficiaries with children as young children in retirement usually mean a much younger wife. For obvious reasons, this does not apply for female beneficiaries.

Unfortunately mortality tables by marital status do not exist for the annuitant population, but only for the general population. Nonetheless, the numbers computed for the year 2004 are impressive as Table 28 shows. While there is little difference to the previously discussed pooled tables in MWRs for women and married men, single men fare considerably worse when taking into account mortality differences. The Table also illustrates that the availability of a survivor pension increases the MWR by approximately 20% for married men, but only 3% for married women. However, more than 10% of the difference in MWRs between married and non-married men can be explained by differential mortality. This effect can also be observed for women, albeit to a much lesser degree.

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[80]For men, mortality differences are negligible between divorced, single and widowed individuals. The new law allows survival benefits also for cohabiting couples (same or opposite sex), this amendment is likely to increase the MWR for single men to a limited degree.
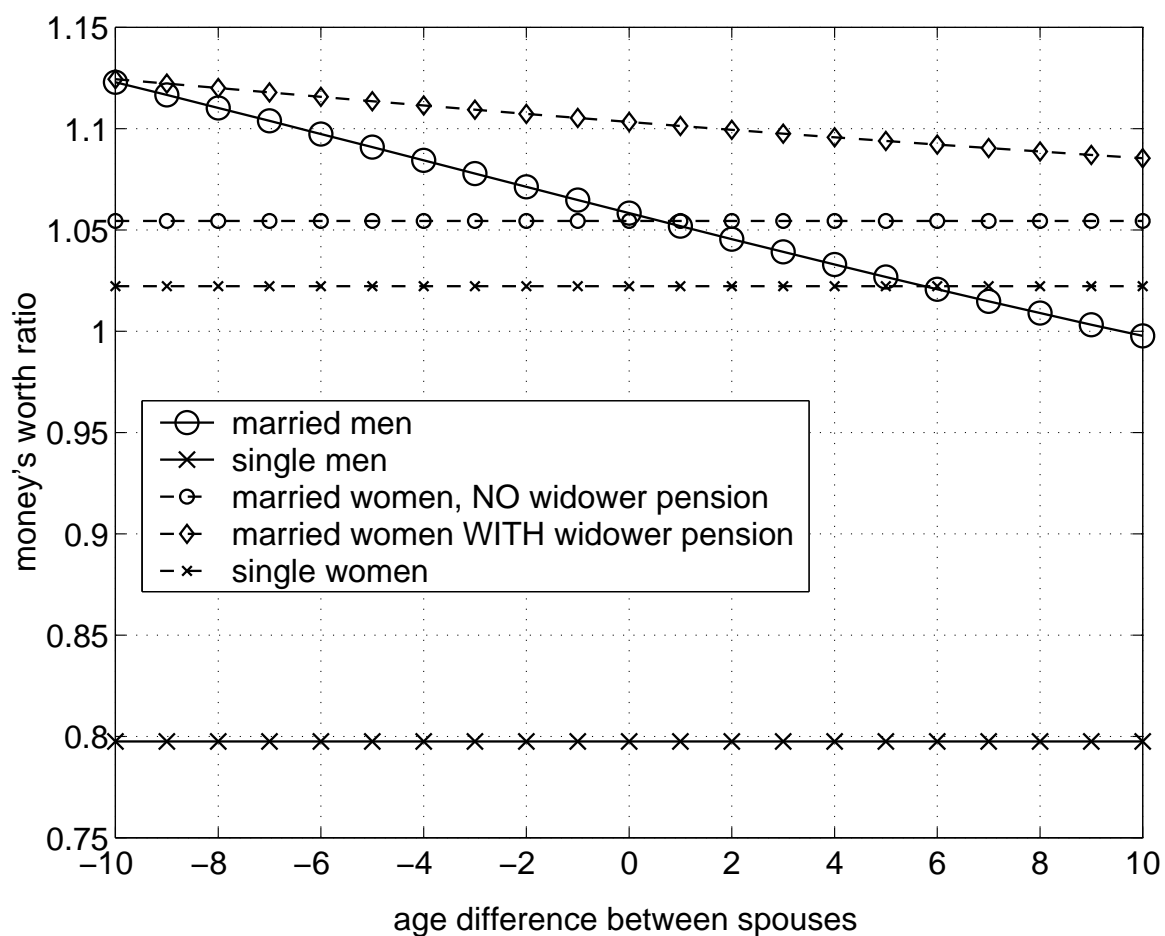
Figure 18: *Money's worth ratios as a function of gender and the age difference between spouses (horizontal axis; negative numbers mean than that spouse is younger). The figure is drawn for a retirement age of 62, a discount rate of 4% and a constant annuity.*

Year	gender	R.A.	C.F.	FIF	SFSO pooled	SFSO marital
2004						
	female pooled	62	0.0720	1.175	1.191	
	female married	62 (65.7)	0.0720			1.210
	female married	62 (—)[a]	0.0720			1.171
	female single	62	0.0720			1.143
	female divorced	62	0.0720			1.108
	female widowed	62	0.0720			1.139
	male married	65 (61.3)	0.0720	1.120	1.104	1.093
	male married	65 (55)	0.0720			1.148
	male married	65 (—)[b]	0.0720			0.896
	male single	65	0.0720	0.959	0.904	0.805
	male divorced	62	0.0720			0.796
	male widowed	62	0.0720			0.809

Table 28: *MWRs for pooled and specific survival rates as a function of marital status. The computations are based on a constant nominal interest rate of 3.5%. The number in parenthesis corresponds to the age of the main claimant's spouse at retirement, and $\lambda = 0.6$. Mortality rates are updated by improvement rates from SFSO.*

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[a]Without Survivor benefits
[b]Without Survivor benefits

4.4   Discussion

MWRs in the Swiss second pillar are still very large, exceeding one for women and married men even at a relatively high discount rate of 3.5%. Not surprisingly there is thus considerable pressure of pension funds and insurance companies to lower the conversion factor even for the mandatory part of the second pillar. As the computations show, the newly used conversion factors used by the insurance companies for the capital exceeding the mandatory level brings the number more closely to values compatible with financially healthy institutions.

However, there are also certain caveats in our computations: The reported MWR correspond to the official picture as stated in the law. But under certain circumstances, the conversion factor requirement can be relaxed when the pension fund uses the newly available resources to increase the benefits of its retirees. Some pension funds also compute the level of pension payment based on conversion factors that are more in line with reality, financing the gap between the official and the internal factor with additional levies on employees and employer. Needless to say, it is very difficult to obtain confirmed information on this practices given the high segmentation of the system.

As the MWRs demonstrate, uniform conversion factors redistribute resources on a remarkable scale. The main loosers from this are single men, the main beneficiaries married men with a younger spouse and young children late in life. As the latter groups is more affluent on average, the implied shift in resources is probably not socially desirable. Due to the increase in the female retirement age, women have "lost" their advantage in the scheme.

A stable conversion factor has its merits. Large swings in benefits, caused by fluctuations in the market interest rate, can be avoided. This does not only increase the intergenerational equity, but also limits the spill-overs to the first pillar (via means-tested benefits). But to keep the system financially stable, the conversion factor needs to account for increases in longevity and changes in medium-run market conditions. Insurance companies, which are crucial to the well-functioning of the system, are now starting to loose interest in participating in the annuity market, given that the obligations within the mandatory part are difficult to meet at present.

Future reforms of the BVG/LPP should aim at indexing the conversion rate to demographic parameters and long run market conditions (discounting). By this, it would contribute to the financial stability of the system and shield it more from political pressure. It also has to be discussed, whether a uniform conversion factor (and the implied redistribution) should be maintained. Contrary to conventional wisdom, women would not loose from such a change. But the occupational scheme would become more flexible an better equipped to changes in living patterns and labor market participation.

5   Pillar III

5.1   Introduction

The third pillar in the Swiss old-age insurance system comprises additional savings directed at providing income in old age. Its main goal is to fill potential gaps in the provision of old-age income. In view of the high replacement rates offered by the first and second pillar for individuals with an uninterrupted work history, the additional insurance is primarily important for the self-employed (who are not covered by the first pillar) and people with contribution gaps (foreign workers, career breaks, etc). Up to a certain amount (i.e., contributions within the limits of the so-called pillar 3a), third pillar savings are fully tax deductible. Thus, pillar 3a has also become a popular instrument to save taxes.

It is very difficult to get reliable data on the volume of the third pillar as related retirement savings are provided not only by insurance companies, but also by most banks and other financial intermediaries. This caveat is probably of lesser importance for the scope of this report as only a tiny fraction of the accumulated third pillar capital is annuitized.

The low level of annuitization is not surprising given the predominance of annuities in the first and second pillars. Individuals with a higher demand for an annuity are much more likely to explore the option to increase the tax-favored contributions to the more generous second pillar.[81] Moreover, very few of the third pillar annuity contracts are standard annuity contracts that would allow a comparison of returns across companies and over time.

5.2   Overview

The privately organized third pillar is characterized by broad scope of design. Thus, it is not only focused on providing old-age insurance. Other solutions provided within the third pillar are *Securities in case of death*, *Saving* and *Securities in case of occupational disability*. Consequently, products offered by life insurance companies or banks, differ in terms and characteristics. An overview with respect to the different characteristics

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[81]The law limits additional tax-exempt contributions to the second pillar. However these restrictions hardly bind for individuals that would otherwise contribute to the third pillar. Shortages of retirement capital due to divorce, career interruptions and migration in and out of Switzerland can be fully replaced.

of insurance and bank products is given in Table 29. Precautionary capital is either classified as conditional (called 3a) or unconditional (called 3b). The key distinguishing features of each form are listed in Table 30.[82] The most important characteristic of pillar 3a is that its contributions are tax deductible within the limits specified in the law.

Table 29: Differences of Insurance and Bank Products

Characteristics	Insurance Company	Bank
Conditional (Pillar 3a)	Saving Risk-Coverage	only Saving
Unconditional (Pillar 3b)	Saving Risk-Coverage	Saving Investment

The basic third pillar instruments offered by life insurance companies are listed below. Only products that contribute in some aspects to old-age insurance are mentioned. Thus the detailed terms are negotiated bilaterally.

- *Private Annuity*: A private annuity provides a lifelong annuity. Some features can be added to the standard case. Hence, it is possible to include the spouse as beneficiary or to agree that the outstanding balance is repaid to the spouse in case the main beneficiary dies.

- *Mixed Life–Assurance*: This contract provides insurance in case of death. Otherwise it constitutes a saving account. Both in the event of death and in the event of living the beneficiary is entitled to a provision.

- *Unit-linked life insurance*: In addition to the mixed Life–Assurance, there is an explicit participation in the development of financial markets. The corresponding funds are chosen according to the risk profile and the investment horizon of the insurance holder.

- *Saving Accounts*

All products can be financed either by regular premiums/contributions (i.e., annually or monthly) or by a lump–sum transfer. Apart from their main purpose as a specific investment instrument (mainly 3b products), third pillar assets are also widely accepted as a collateral for credits.

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[82]The term "conditional" originates from the fact that this capital is exclusively used in the form of old-age provisions.

Table 30: Differences of conditional and unconditional precautionary capital

Differences	3a	3b
Individuals	Employed and aged below the AHV-age and having a Swiss Tax-Domicile	all
Products	limited	unlimited
Maturity	Limited to AHV-age, but it cannot be paid out earlier than 5 years before the AHV-age	no limitations
Contributions	Limited to the maximum amount that is tax deductible: with a 2nd pillar: 6192 CHF without a 2nd pillar: 30'960 or 20% of the totally earned income	no limitations
Beneficiary in case of death	specified by law	free
Repurchase	under certain conditions	possible
Pledging	possible for the use of own real estate	possible for every reason
Tax deductible contributions	Premiums can be fully deducted from taxable income	Lump–sum deduction possible
Taxation during the contract period	none	Repurchase Value and Profit Shares
Taxation at the redemption	Taxation as income applying a reduced rate	No taxation of insurances that are based on premiums

Source: ALLIANZ SUISSE

5.3 Volume of the third pillar (Life Insurance Companies)

Table 31 displays the evolution of capital accumulated in the third pillar by insurance companies. In 2003, 244 billions CHF were invested in the form of a capital insurance, i.e., a product that yields a capital payment (CP) at a later date (around the statutory retirement age). Thereof, 35% is conditional precautionary capital. The remaining 65% are invested in pillar 3b and are therefore unconstraint in their purpose. The investment in products that yield an annuity (A) amounts to only 2 billions CHF. Compared to the amount of capital assurance products, the total of 2 billions does not even account for 1% of this amount. Both types of products have shifted from pillar 3b to pillar 3a over the last years (see Figure 19). As mentioned above, the low degree of annuitization in the third pillar reflects the fact that annuities are the dominant pay-out option of the first two pillars.

Table 31: Evolution of Capital invested in the third Pillar

Balances	1996		1997		1998		1999	
	in M. CHF	in %	in M. CHF	in %	in M. CHF	in %	in M. CHF	in %
Capital-Payments								
Pillar 3a (CP)	52'680	29.89%	60'829	32.07%	64'503	31.27%	72'694	31.05%
Pillar 3b (CP)	123'549	70.11%	128'858	67.93%	141'806	68.73%	161'459	68.95%
Total (CP)	176'229	100%	189'687	100%	206'309	100%	234'153	100%
Annuities								
Pillar 3a (A)	109	9.40%	135	10.49%	200	14.01%	229	13.78%
Pillar 3b (A)	1'050	90.60%	1'152	89.51%	1'228	85.99%	1'433	86.22%
Total (A)	1'159	100%	1'287	100%	1'428	100%	1'662	100%
	2000		2001		2002		**2003**	
	in M. CHF	in %	in M. CHF	in %	in M. CHF	in %	**in M. CHF**	**in %**
Capital-Payments								
Pillar 3a (CP)	77'954	32.84%	77'489	31.99%	79'448	32.50%	**85'429**	**35.08%**
Pillar 3b (CP)	159'388	67.16%	164'772	68.01%	164'970	67.50%	**158'100**	**64.92%**
Total (CP)	237'342	100%	242'261	100%	244'418	100%	**243'529**	**100%**
Annuities								
Pillar 3a (A)	240	13.70%	217	11.79%	212	11.16%	**210**	**10.79%**
Pillar 3b (A)	1'512	86.30%	1'624	88.21%	1'687	88.84%	**1'737**	**89.21%**
Total (A)	1'752	100%	1'841	100%	1'899	100%	**1'947**	**100%**

Source: BUNDESAMT FÜR PRIVATVERSICHERUNGEN (2003), p. 66 sqq.

Figure 19: Growth of different segments of the third Pillar
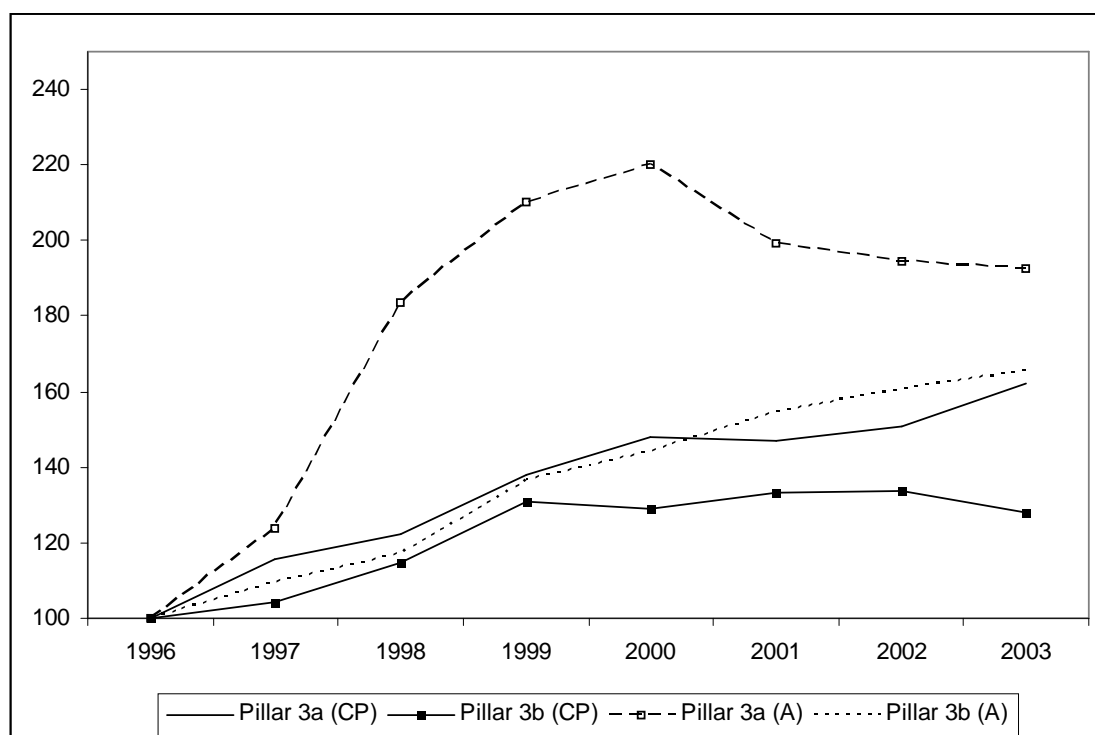
Data Source: BUNDESAMT FÜR PRIVATVERSICHERUNGEN (2003)

75% of the accumulated pillar 3a capital in insurance companies is invested in one of the top five players, i.e., to *Basler Life, Generali Person, Rentenanstalt (Swiss Life), Winterthur Life* and *Zürich Life*. Within this group, *Rentenanstalt (Swiss Life)* is the leader, with a share of almost 22% of the total capital. The remaining 25% are distributed among many different insurance companies. Note that even some foreign

companies, such as *Império*, are active in the private part of the Swiss pension system market. The situation with respect to pillar 3b is similar. The same few companies cover the majority of the invested capital. Nevertheless, with *Patria* and *Providentia* there are two additional players in that market that have no weight in the market of pillar 3a.

5.4   Volume of the third pillar (Banks)

Table 32 presents the conditional precautionary capital (i.e., pillar 3a with capital payments[83]) managed by banks. In 2004, the total amount reached almost 24 billions CHF. This corresponds to an increase of 46%, compared to the 16.4 billions CHF in 2000. As can be seen, prior to this date the investment remained almost constant around 17 billions CHF (c.f. also Figure 20). In 1997, the money allocated to banks represented 29% of the amount at life insurance companies (IC). In the succeeding years, this fraction decreased steadily to 21%. However since 2001, the importance of banks in the 3a business has been increasing again (c.f. also Table 31). This interplay between banks and insurance companies also appears through different growth patterns in Figure 20.

Table 32: 3a Capital managed by Banks

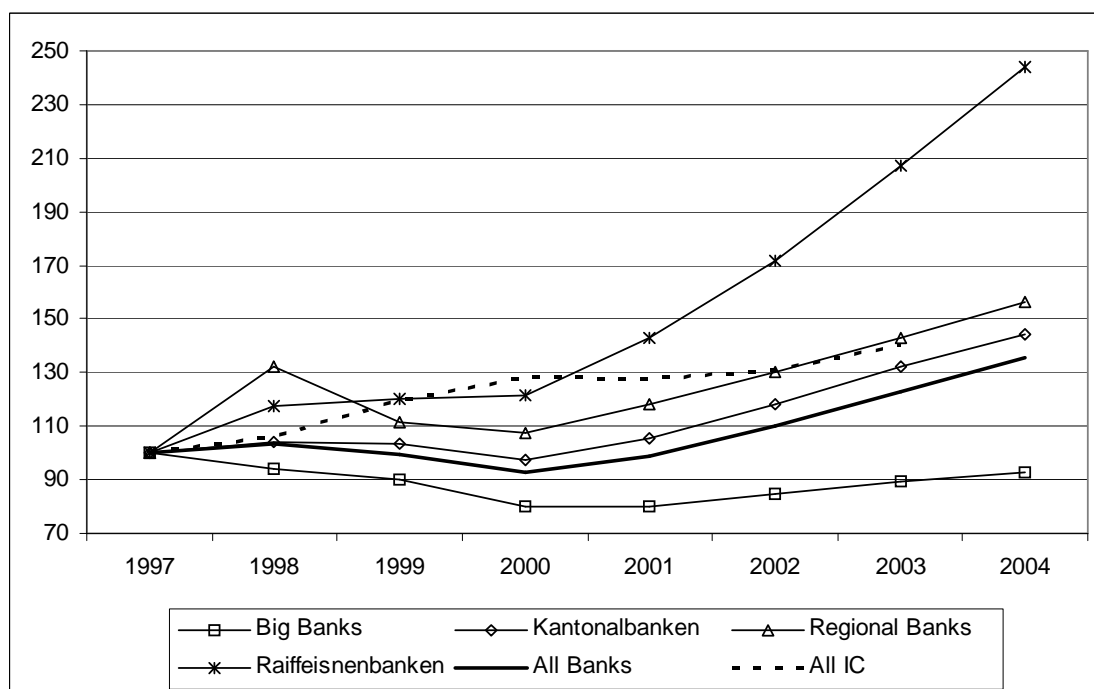| Total 3a (m CHF)	Big Banks	Kantonalbanken	Regional Banks	Raiffeisenbanken	Other Banks	All Banks
# of banks	3	24	83	1	227	338
Year–end values						
1997	7'929	5'614	1'812	1'460	866	17'681
1997 in %	45%	32%	10%	8%	5%	100%
1998	7'452	5'836	2'402	1'715	834	18'239
1999	7'122	5'822	2'018	1'758	836	17'556
2000	6'321	5'475	1'946	1'777	877	16'396
2001	6'323	5'916	2'137	2'082	1'041	17'499
2002	6'692	6'638	2'360	2'506	1'239	19'435
2003	7'108	7'422	2'595	3'026	1'553	21'703
2004	7'357	8'116	2'830	3'563	2'110	23'976
2004 in %	31%	34%	12%	15%	9%	100%
Total increase	-7.21%	44.56%	56.16%	144.06%	143.64%	35.60%

Source: Schweizerische Nationalbank (2005), p. A72 sqq.

Table 32 also presents the allocation of the 3a–capital relative to the different types of banks in Switzerland. In 2003, the big banks (UBS, Credit Suisse and Credit Suisse First Boston) and the different "Kantonalbanken[84]" could control each one third of the total 3a–capital. The "Raiffeisenbanken" with 15% market share and the different regional banks with 12% market share are the other important players in this business.

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[83]Some banks also offer annuities, but on behalf of life insurance companies. Thus, these annuities appear in the balances of the insurance company.

[84]In Switzerland, each canton (except Solothurn) has his own Kantonalbank (cantonal bank). They are administrated under public law and enjoy therefore public warranty.

Figure 20: Growth of the 3a capital at different Banks

The remaining fraction of 9% is allocated to all other banks (as e.g. commercial banks, private banks, and foreign banks) operating in Switzerland. In 1997, the market of conditional precautionary capital was more concentrated, i.e., the big banks controlled 45% of the market and the "Kantonalbanken" 32%. In the meantime, the "Kantonalbanken" could preserve their market share and thus, their 3a capital increased by 45%. On the other side, the big banks have lost some of their market share. This fact is explained by a decrease of 7% in the capital managed by these banks. The "winner" over the last 7 years were the "Raiffeisenbanken". They increased their 3a–capital stock by 144% and they almost doubled their market share. The fact that the last three annual growth rates were over 10% mirrors the increasing awareness of the importance of retirement arrangement beyond the first and second pillar. Hence, this market is not yet saturated.

5.5 Summary

The third pillar is supposed to finance potential gaps in old–age insurance, especially for self-employed individuals and those with interrupted work histories. However, its alternative use as a tax-favored investment device has become equally important for well-insured middle and high income individuals. The products offered by life insurance

companies and banks range from saving accounts to products that cover also some specific risks. In 2003, the capital invested in lump-sum contracts offered by insurance companies, which constitutes the most important savings instrument, amounted to 244 billions CHF. Annuity contracts are very rare. The bulk of the invested third pillar capital is found in few leading life insurance companies. The capital invested in conditionalized savings accounts (i.e., pillar 3a) at banks represented 24 billions CHF in 2004. Two thirds are managed by the big banks and the "Kantonalbanken".

6   Regulation

The Swiss second pillar is strictly regulated in both the accumulation and the decu-
mulation phase. Minimum rate requirements (section 6.1), contribution rates and the
structure of survivor benefits (as outlined in chapter 2) specify the conditions for the
annuitant. The Occupational Pension Law (BVG/LPP) and its amendments also limit
possible asset structures (section 6.2) and specify capital requirements for the pension
funds (section 6.3). New standards of transparency in the realm of occupational old–age
provision are imposed (section 6.4). Other regulative aspects concern the organization,
the administration and the supervision of pension funds (section 6.5).

All the requirements mentioned in this section constitute the regulation package to
protect the insured workers and pensioners. The regulation measures can broadly be
classified as specifying *output* and *input* rules. Output conditions specify the result of
prudent provision and management. They should be able to be met under prevailing
market conditions. Examples are the minimum interest rule, capital requirements and
conversion factors. On the other hand, input rules directly regulate the instruments
with which the scheme should reach certain outcomes, Examples are the specification
of contribution rates and the regulation of possible investments. The drawback of
this latter approach is that the required supervision is time-consuming and that the
regulation may act to much as a straightjacket.

6.1   Minimum Interest Rate Requirement under BVG

The accumulated old–age balances in the second pillar yield a guaranteed interest rate.
This minimum rate of return is periodically reassessed by the Swiss Federal Council.
Table 33 shows the evolution of the minimum interest rate (MIR). Evidently, the
interest rate remained constant at 4% for 17 years, until the end of 2002. Due to the
deterioration in capital market returns, the previous rate was no longer sustainable
and was therefore adjusted by the Swiss Federal Council. Currently, the rate is fixed
at 2.5%.

Table 33: Evolution BVG minimum interest rate

|	1985 - 2002	2003	2004	2005
Min. interest rate	4%	3.25%	2.25%	2.5%

The minimal interest rate is supposed to reflect market conditions from a relatively risk–
averse perspective. If the minimum requirement is set too high, portfolio managers have

to take excessive risks, for higher expected returns are only attainable with a riskier portfolio. In order to avoid such an undesirable behavior and to protect the insured persons effectively, the MIR should be linked in some way to the risk–free rate of return on financial assets.

To illustrate the evolution of market interest rates with respect to the minimum interest rate, Figure 21 depicts the MIR along with two different securities with a time horizon of 10 years. The first asset is a Swiss government bond with a maturity of ten years. The second asset yielding fixed returns is an interest rate swap instrument over 10 years. The paths of both yields behave similarly, achieving more or less the same returns[85]. Until 1996, the yields on fixed income investments with a maturity of 10 years were much higher than the minimum interest rate under the BVG. Thereafter, it was the other way round until the minimum interest rate requirement was adjusted downwards.

Figure 21: Market Rates and Minimal Interest Rate Requirement
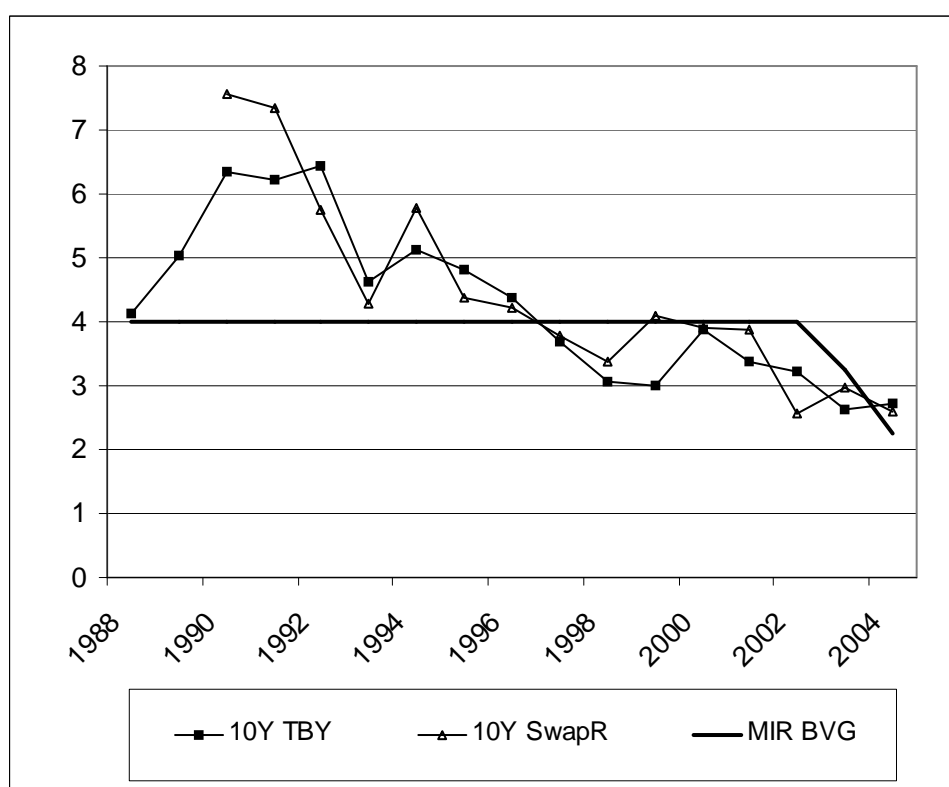
Data Source:
SNB for the yields on 10 years zero coupon treasury bonds for Switzerland (10Y TBY)
Credit Suisse[a] for the 10 years Swap Rates on CHF (10Y SwapR)

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[a]Special thanks to Benjamin Heck (CS) for providing us with this data.

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[85]The correlation of the two time series is .92

6.1.1 Comparison of Returns on Investment

Since balanced portfolios of pension funds take advantage of potentially higher returns in stock markets, this section also takes risky assets into account. In 2002, for instance, the fraction invested in shares was approximately 25% (c.f. Figure 11) [86]. Figure 22 depicts the annual returns of the Swiss Performance Index (SPI), the Morgan Stanley Capital International Index (MSCI) for Switzerland, a bond index from Pictet[87] and the MIR. Due to the fact that riskier assets are associated with higher volatilities, the returns of the SPI and the MSCI index fluctuate within a wider band than the bond index. Figure 11 presents the average distribution of assets held in the portfolios of pension funds for different years. Consequently, the effective individual return development of pension funds lies somewhere between the return of the risky and the risk–free indexes.

Figure 22: Market Returns on risky and risk free Assets
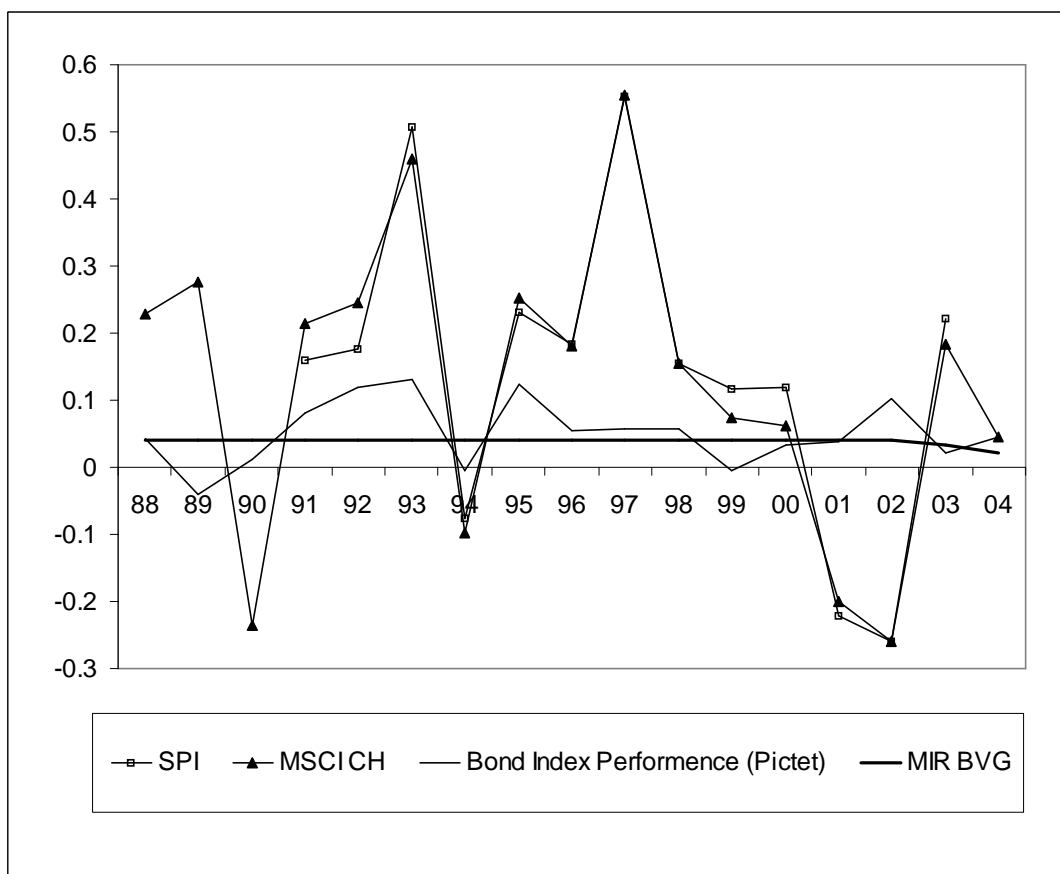
Data Source: SNB, MSCI, SWX and Pictet

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[86] Section 6.2 deals with the restrictions on investments in risky assets.

[87] Bonds: Pictet Sub-index "Domestic Bond Index" with coupon interest payments incorporated; the index is based on a sufficiently representative random sample covering 5 different classes of bond issuer according to their market capitalization.

Figure 23 presents the spectrum of possible returns, for which the upper bound in set by the MSCI index and the lower by the Pictet Bond index. Accumulated returns on a "fictive portfolio" and on the "average empirical portfolio" are also shown. The fictive portfolio comprises of 30% Swiss shares (represented by the MSCI Index), 20% of foreign shares (MSCI World), and 50% of bonds. This portfolio thus contains the maximal fraction of shares permitted by the BVG law. The average empirical portfolio consists of the average reported fraction of shares held in an average portfolio of a pension fund. The remaining fraction is invested in bonds. Obviously, the yields on portfolios of pension funds outperform the MIR yields on average. The corresponding ratios are presented in Table 34. The reported ratio represents the relative gain of a portfolio (y) to an investment strategy with a fixed yield of 4% and an investment period from 1987 to 2004. With this setting, the empirical portfolio reached 142% compared to an investment strategy with a fixed yield of 4%. Moreover, by investing the maximum fraction in shares at all times, even 184% could have been achieved. However, it is important to note that MIR does not necessarily represent the effectively credited return on the old-age balances, as it is primarily a minimum requirement. Nonetheless, most pension funds used this rate to calculate the returns on the old–age capital. Excess returns are then used to accumulate fluctuation reserves, to finance early retirement programs, and to increase benefits.

Table 34: Ratio of Investment Portfolios to MIR

		Ratio (x/y)	annual
y	MIR BVG	100%	
x	Bond Index Performence (Pictet)	121%	1.12%
x	emp PF R	142%	2.07%
x	fic. PF R	184%	3.66%
x	MSCI CH	279%	6.23%

Source: SNB, MSCI and Pictet

6.1.2 How is/should the Minimum Interest Rates be determined?

As of today, the Swiss Federal Council sets the Minimum Interest Rate. This procedure has several disadvantages as to the adequacy of this requirement. Firstly, the implied discretion may lead (and has lead) to considerable pressure on the Swiss Federal Council from insurance companies / pension funds and contributing workers. The last 20 years have shown that there is a striking asymmetry as to the specification of the rate. High risk-free nominal interest rates have not pushed up the MIR despite the fact that for some time the MIR was even considerably below the inflation rate. The fall in market returns however was accompanied by strong pressure on the Federal Council

Figure 23: Cumulated Returns^a (i.e. cumulated returns)
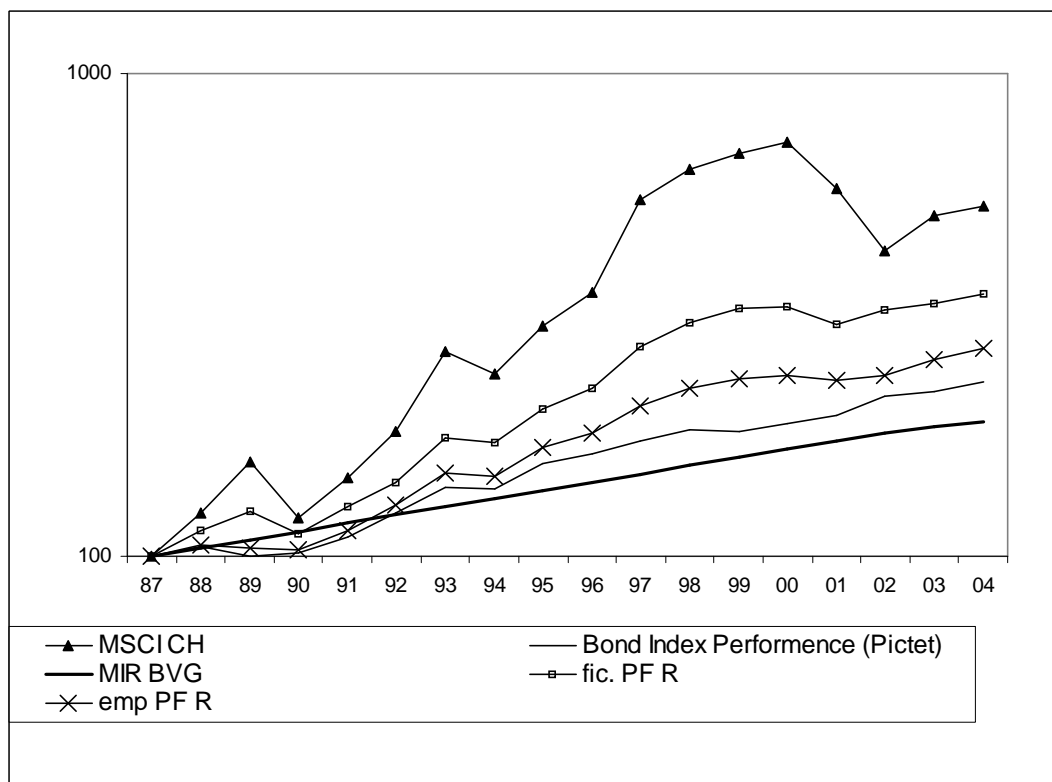
Data Source: SNB, MSCI and Pictet

^{a}in logs

by insurance companies. This asymmetry can be well explained by interest group arguments. Secondly, it is unclear on what criteria the decision is based. It is thus difficult for pension funds to assess future liabilities.

Ideally, a simple transparent rule should be used to set the MIR, isolating the requirement from political pressure and making the choice more transparent. Under certain equally well specified conditions it should be able for pension funds to relax the minimum interest rate rule.

6.2   Investment Regulations of Pension Funds

Investments made by pension funds are regulated both with respect to the type of securities permitted to invest in, and with respect to the relative amount of money that can be invested in these securities[88]. Assets can be classified as follows:

[88]c.f. Art.53et sqq. BVV

- Cash

- Accounts receivables related to cash.

- Real Estate and properties

- Investments in real estate companies

- Shares, participation and profit certificates

The quantitative investment rules include limitations on instruments and issuer. An overview is given in Table 35. There are restrictions on each class of assets (upper Panel in Table 35) as well as restrictions on the distribution of the overall capital invested (lower Panel in Table 35). These limitations on investments are not very restrictive, so that they hardly seem to be binding in practice (c.f. Table 11 and Table 12).

Table 35: Investments Restrictions of Pension Funds

Quantitative Restrictions on single Asset Classes[a]		Restrictions on Issuers	
100%	Accounts receivables related to Swiss issuers	15%	except for issuers as the Government, Cantons, Banks or Insurance Comp.
75%	Real Securities		
50%	Real estate (Swiss) and investments in real estate companies (with at least 50% invested in Switzerland)		
30%	Swiss shares	10%	per company
30%	Accounts receivables related to foreign issuers	5%	per issuer
20%	Currencies and convertible currency receivables	5%	per debtor
25%	Foreign shares	5%	per company
5%	Foreign real estate and investments in real estate companies (with at least 50% invested abroad)		
Quantitative Restrictions on the total of invested capital[b]			
100%	Cash and accounts receivables that are related to cash		
70%	Real estate, Shares and other Securities		
50%	Swiss and foreign shares		
30%	Accounts receivables related to foreign issuers and currencies and convertible currency receivables		
30%	Currencies and convertible currency receivables and foreign shares		

[a]c.f. Art. 54 BVV
[b]c.f. Art. 55 BVV

There are also rules on collective investments, on the use of derivatives and, finally, on the investment in securities issued by the sponsor of the plan[89]. All assets on a fixed cash amount are valued at their face value at most. On the other hand, real estate,

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[89]c.f. Art. 56- Art. 58 BVV

properties, shares and participation certificates are valued at their market value as a maximum. None of these rules depend on the form of pension funds and are therefore equally and legally binding for all types of funds.

6.3   Capital Regulation of Pension Funds

In accordance with the provisions of the Pension Law (BVG), the Swiss Federal Council is obliged to define minimum capital requirements for pension funds. This rule concerns especially accruals for actuarial risks, other accruals and reserves needed to balance out value fluctuations of assets[90]. Because these rules were enacted only in January 2005, there are no detailed implementation regulations yet. This is due to the fact that it has not been possible yet to find the appropriate minimum requirements fair to all the different forms of pension funds. Since pension funds (except for those affiliated with an insurance company) are allowed to have a temporary under-funding (c.f. Section 3.5), the missing implementation regulations are not crucially important in the short run. On the other hand, life insurance companies, which are not allowed to have any under-funding, are subject to more complex capital requirement rules. This is because of their obligation to balance out any financial shortage. They also bear all their risks, i.e., insurance and investment related risk.

The capital regulations of life insurance companies comprise general rules, which are legally binding for all life insurance companies, and specific rules for those which act in the realm of old–age provisions. The specific rules are listed in Section 6.4. The main feature of the so–called transparency standards is that life insurance companies must build up a separate *Security Fund* for their liabilities related to old–age provisions (see below). Another important feature is the asset segregation rule, which requests the separation of assets belonging to the pension funds from other assets. The general capital rules, on the other hand, are as follows:

- The *Minimum Initial Capital* is specified at a range from 5 to 10 millions CHF, depending on the anticipated business volume[91].

- The *Solvency Margin* defines the own capital that a life insurance company must hold. Its level depends on the size of the business of the insurer. Furthermore, one third of the solvency margin or at least 4.8 millions CHF must be paid into a *Guarantee Fund*[92].

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[90]c.f. Art. 65b BVG
[91]c.f. Art. 4 LeVG and Art. 2 LeVV
[92]c.f. Art. 5 LeVG and Art. 3–9 LeVV

- To finance an extraordinary expansion of the business, the insurance company is obliged to invest up to 50% of the minimum initial capital in a *Organization Fund*[93].

- Concerning the implementation and supervision of rules, insurance companies have to legally bind certain assets to ensure the security of policyholders' claims. The amount that has to be invested in this so–called *Security Fund* is mainly determined by the legally required capital, i.e., the actuarial reserves. The correct calculation and actual cover are regularly checked by the supervisory authority. In case of underfunding, the insurance company is obliged to correct this shortage within one month. If the insurance company goes bankrupt, however, the insured workers and retirees have a privileged claim on the value of the security fund[94].

Table 36 presents the consolidated balance sheet of the Swiss life insurance sector in 2003. The overall assets and liabilities amounted to more than 311 billions CHF, equivalent to over 72% of the Swiss GDP[95]. However, 281 billions correspond to the total technical reserves. Table 37 gives an interesting overview on the total provisions for the insurer's own account[96] and the percentage attributed to old–age provisions. In 2003, the total provisions for own account amounted to 229 billions CHF, of which 54% where related to old–age provisions. It is manifest that this share was increasing steadily between 1998 and 2003. In addition, Table 37 presents the total amount invested in security funds. The debit amount is the minimum value that is legally required. As the last column in Table 37 indicates, the actual amount invested in security funds always exceeded the required one, though at a diminishing rate between 1997 and 2001. The fraction of the overfunding has remained more or less constant ever since. Note that assets invested in the security fund are subject to special investment regulations. Since the respective valuation rules are stricter than those applicable to the remaining assets in the balance sheet, the debit amount is lower than the provisions for own account.

6.4 Transparency in the occupational old–age provision

Until a short while ago, little emphasis was placed on transparency. Pension providers merely had to inform the insured worker about their anticipated benefits in old age or in case of disability, but they did not have to disclose information about their own financial

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[93]c.f. Art. 6 LeVG and Art. 10 LeVV

[94]c.f. Art. 13-48 LeVV

[95]In 2003, the Gross Domestic Product (GDP) at current prices was 430.46 billions CHF.

[96]In German: Versicherungstechnische Rückstellungen für eigene Rechnung

Table 36: Consolidated Balance Sheet of the Life Insurance Sector in 2003

Assets		Liabilities	
Properties, Real Estate	28'540	Shares and Guarantee-Capital	1'423
Shares in affiliated		Statutory Return–Reserves	601
companies, Own Shares	16'452		
Shares, Shares in		Other Reserves	2'263
Investment Funds	22'607		
Fixed-Interest Securities	140'031	Unearned Premiums, Actuarial Reserves	252'325
Bonded Loans	19'731	Credited annual Profit Shares	6'160
Mortgages	26'400	Accruals for claims	2'037
Policy Loans, Receivables		Accruals for Profit Shares	4'083
of Insurance Business	9'288		
Fixed Deposits and other Securities	19'983	Reserves related to unit-linked	
		Life Insurances	11'950
Deposited Reserves	406	Other Accruals	4'294
Investment related to		Deposits Retained	3'219
unit-linked Life Insurances	12'601		
Other Income	1'697	Accounts payable related	
		to Insurance Business	10'480
Other Assets	13'403	Other Liabilities	12'304
Total	311'139	Total	311'139

Source: Bundesamt für Privatversicherungen (2003), p.84 sqq.

Table 37: Provisions for own Account and the Security Fund

in M. CHF	Provisions for own account			Security Fund		
	Total	Old-Age Provision	in %	Debit Amount	Actual Amount	in %
1997	167'445	87'821	52.45%	161'463	181'691	112.53%
1998	188'609	96'577	51.20%	182'793	200'300	109.58%
1999	204'593	104'811	51.23%	195'361	211'483	108.25%
2000	217'396	114'078	52.47%	209'024	218'520	104.54%
2001	224'799	119'345	53.09%	215'365	221'897	103.03%
2002	228'150	122'307	53.61%	218'376	225'191	103.12%
2003	229'099	123'709	54.00%	221'033	228'860	103.54%

Source: Bundesamt für Privatversicherungen (2003), p.64 sqq.

situation. This lack of transparency led to two important problems. First, the insurance companies is insufficiently supervised and may decide on investment/contribution strategies that are detrimental to the interest of the insured employees. Second, individuals who are not aware of potential financial shortfalls in their fund may discover these only at a time when there is too little time left to make up for the losses.

When pension funds act according to the "principle of prudence "[97], the above two aspects mentioned are of lesser relevance. From the eighties to the mid–nineties, pen-

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[97]in German: "Vorsichtsprinzip"

sion funds invested only a minor proportion of their capital in shares (c.f. Figure 24). Hence, their risk exposure was moderate. However, as financial market returns began to increase, the proportion of shares in the portfolios of pension funds increased as well. Consequently, performances and gains on their portfolios rose. Many pension funds were able to reduce contributions of the employees and/or employers and to augment their reserves.

Due to a change in accounting principles (i.e., the change to IAS[98]) the reserves were consolidated with shareholders´ equity. It was not uncommon that old–age credit balances were used by pension funds to reach their own strategic goals. As a consequence, the investment decisions were often made with less and less precaution. When the returns on financial securities evolved positively, there was no claim for broader provision of information. However, this changed as soon as the first funds experienced an under-funding, resulting in a public demand for transparency on balances. This pressure was particularly strong for life insurance companies, as in the case of autonomous pension funds no third–party interests are involved. The latter are expected to act exclusively in the interest of its insured individuals. In the case of life insurance companies there are some third–party interests. Obviously, people wondered whether the excess returns earned with old-age capital were returned to the insured individuals or not. In April 2004, new standards of transparency were enacted, which are legally binding for all the players in the field of old–age provision.

The main additions to the law refer to life insurance companies and are contained in Art. 6a LeVG[99], Art. 68 para. 3 and 4 LeVG, Art. 68a LeVG and Art. 49 sqq. LeVV[100]. The new transparency standards for life insurance companies comprise mainly three regulations:

1. Life insurance companies must build up a separate *Security Fund* for their liabilities related to the old–age provision.

2. The old–age provision business must be reported in a separate annual report.

3. Rules regulating the distribution of profit sharing were created. Moreover, a *Legal Quote* is introduced. According to this rule at least 90% of the yields must flow back to the insured individuals.
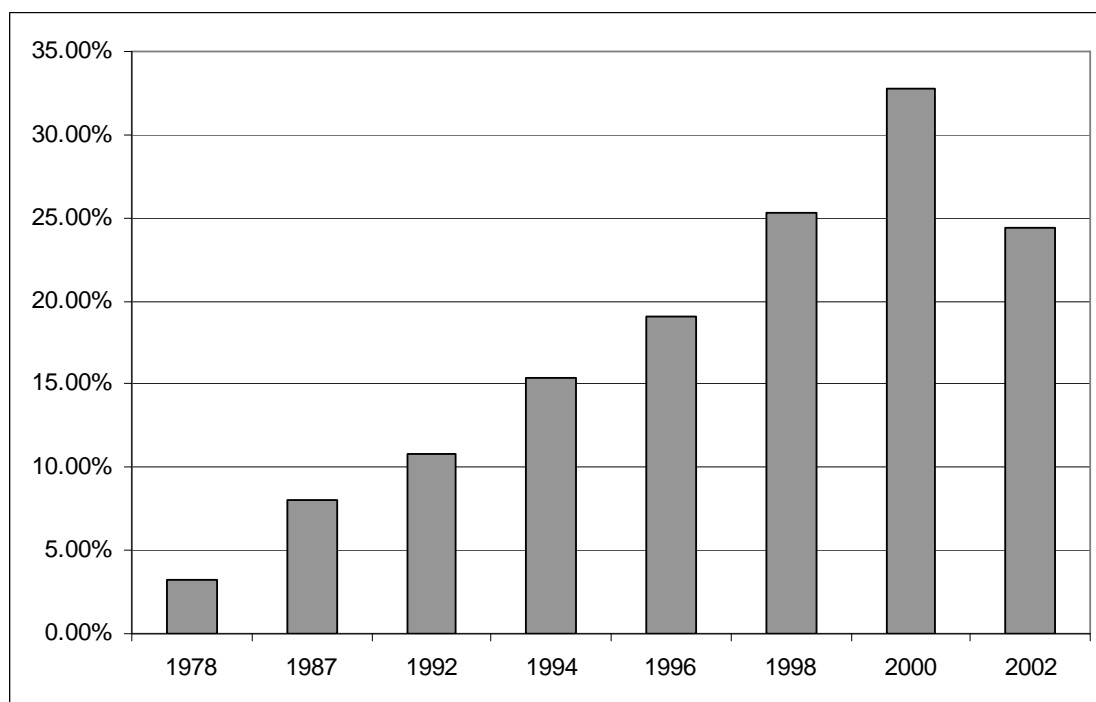
The *Legal Quote* was set at 90% in order to still guarantee some competition. Hence, the remaining maximal 10% can be used by the insurer to build up solvency and risk

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[98]IAS = International Accounting Standards
[99]LeVG = Bundesgesetz über die direkte Lebensversicherung
[100]LeVV = Verordnung über die direkte Lebensversicherung

Figure 24: Total Investment in Shares

capital, which is necessary to stay in this business and to protect insured individuals against risks. Compared to analogous rules in other European countries the rule in Switzerland is the most restrictive one.

The regulator, in this case the BPV/OFAP[101], completes the task of supervising the insurance companies and it is also responsible for the implementation of the new standards. Since these new rules cause additional expenditures for insurance companies, the regulator is encouraged to reduce their administrational burden as much as possible. Insurance companies may be forced to reduce their activities in the field of occupational old–age provisions. This could occur in the following manner

- They leave the old–age provision business. This would have direct consequences for the SMB[102], since they would be obliged to have their risks insured by a Suppletory Institution (see below).

- The insurance companies could link recapitalization measures directly to their affiliated pension funds. This would increase the financial burden for both the insured and the employees.

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[101]BPV = Bundesamt für Privatversicherungen / OFAP = Office fédéral des assurances privées
[102]SMB = small and medium-sized businesses

- Insurance companies might start to select the risks they insure. This would affect new affiliations as well as renegotiated contracts. Pension funds that are too risky would have to seek the service of the Suppletory Institution.

6.5 Other regulative Aspects

Organization and Administration:

Each pension fund that offers an insurance within the mandatory part of the income needs to be registered. Furthermore, it must be organized in the form of a foundation or a cooperative. Pension funds under public law, however, are exempt from this rule. Apart from these requirements, pension funds are free to design (but still within the limits of the pension law) their provisions, their funding, as well as their organization. Both the employers and the employee delegate the same number of representatives to the administrative management[103].

Supervision[104]:

Supervision of occupational pension institutions is overseen by the Swiss Federal Council. Pension institutions without national or international importance are supervised by cantonal supervisory authorities[105]. The Federal Office for Social Insurance supervises the cantonal supervisory authorities, as well as pension providers with national or international importance. Moreover, the Federal Office for Social Insurance is also in charge of the so–called Suppletory Institution, and even more importantly, of the BVG/LPP *Guarantee Fund*[106]. The chief task of all these different authorities is to control periodically the management, the accounts and the investments. It is worth noting that the different layers and the large segmentation of the supervisory authority potentially reduce the quality and transparency of supervision.

Suppletory Institution and Guarantee Fund

The *Suppletory Institution* covers individuals seeking insurance on a voluntary base, in particular self-employed individuals, as well as employees whose employer is not affiliated with an occupational pension provider despite the legal provisions. Finally, it fulfils the task of insuring the recipients of unemployment compensation against the

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[103]c.f. Art. 48 sqq. BVG

[104]c.f. Art. 61 – Art. 64 BVG

[105]The 26 cantons are the Swiss states. They enjoy a considerably independence from the confederation in many important areas such as tax setting, schooling, and regulation.

[106]Sicherheitsfonds

risk of death or disability[107]. The Suppletory Institution is considered as a pension fund. It is self-financed by all concerned parties, like any other pension fund with the exception of some special costs that are covered by the Guarantee Fund[108].

The *Guarantee Fund's* most important task is to act as a reinsurance institution, i.e., to secure benefits in accordance with the rules for the beneficiaries of insolvent pension providers. It subsidizes pension funds with an unfavorable age structure and reimburses the Suppletory Institution for their special expenditures. Finally, there are a bunch of additional tasks of minor degree of importance[109]. In contrast to what may be expected of such an institution, the fund does not primarily accumulate reserves,[110] but is financed on a pay–as–you–go base, with a contribution rate of 0.1% of the coordinated earnings at present. To cover its obligations in bad times the Security fund will have to increase the contribution rate when the individual funds face greater difficulties financing their primary obligations. In the case where the Guarantee Fund has a liquidity problem, the government can grant a (conditional) loan[111].

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[107]c.f. Art. 60 BVG

[108]c.f. Art. 72 BVG

[109]c.f. Art. 56 BVG for further details

[110]In the past, its reserves have always been less than 1/10 of the total accumulated retirement assets in Switzerland, and were even negative at times.

[111]c.f. Art. 56a sqq. BVG

7 Major Risks and Risk Management in the Second Pillar

7.1 Introduction

The major risks faced by the different parties in the second pillar parallel the ones in other countries[112]: The usual suspects are market (return) risks, life-expectancy, inflation, and, as a consequence of all of these, the potential bankruptcy of a pension provider. By fixing the conversion factor, the second pillar legislation puts a large weight on reducing the risk for individuals close to the retirement age. Moreover, people already retired are protected from a potential bankruptcy of the plan sponsor within the mandatory part of the scheme, but not from inflation.

As outlined in previous chapters, Switzerland has extensive legislation concerning the design and operation of pension plans. However it has relatively few constraints on how the pension funds should deal with risk. In particular the asset and liability management is left at the discretion of the pension fund. Given the large segmentation of the second pillar, it is also very difficult to obtain representative data as to how the pension funds deal with these issues. Personal conversations with fund managers and actuaries show a huge variation of strategies that cannot easily be summarized.

This section summarizes the major risks faced by the different players in the first part. The second part focuses on the risk management of pension providers. Due to data limitation, this information will not be representative of the asset & liability management strategies of Swiss pension funds. We will finish the section with some case studies of a selection of pension funds. Again, we can expect a clear bias towards sound and successful practices of financially healthy pension funds or insurance companies, as these are much more likely to disclose their strategies.

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[112]BOHN (2005) discusses the impact of alternative tax, pension, and health care policies on different cohorts. The motivation is that traditional retirement programs largely exempt retirees from sharing risk and that consequently a more than proportional risk is imposed to the younger cohorts and future generations.

7.2   Major Risks faced by Involved Parties

7.2.1   Workers

- *Changes in the BVG legislation* usually do not (much) affect people less than 5 years prior to retirement. For all others, changes in the conversion factor (implied by increases in longevity and decreases in market returns) can substantially reduce anticipated benefits.

- *Market returns* affect the level of retirement capital directly (via the minimum interest rate and the investment performance of the plan sponsor) and indirectly (via the conversion factors).

  Short run fluctuations of market returns around a constant level do not constitute a risk for workers as annuities are not priced in the market, the annuity rate risk is thus non-existent.

- *Bankruptcy of the pension fund* constitutes a potential risk for (accumulated) contributions that exceed 150% of the coordinated salary as the Guarantee Fund does not insure this part.

7.2.2   Pensioners

Pensioners face the following risks:

- *Purchasing power risk* as pension providers only have to adjust the benefits to changes in the CPI if the financial situation of the fund allows it.

- *Bankruptcy of the pension fund* constitutes a potential risk for the benefits exceeding the level implied by 150% of the coordinated salary as the Guarantee Fund does not insure this part.

- A *longevity* risk for those choosing the *lump-sum*. The risk of running out of assets too early is especially high if the regular first pillar benefits are low due to an interrupted work career. As all pensioner have access to means tested supplementary benefits of the first pillar, this risk is somewhat limited, but it may still imply, that the pensioner cannot keep the pre-retirement living standard.

7.2.3 Pension Providers

The risks faced by pension funds do not differ from those faced by annuity providers in other countries with one big exception: The provider has little choice in setting the terms of the annuity contract due to fixed conversion factors. If the conversion factor does not correspond correctly to estimated mortality tables and market returns, the provider faces a considerable shortfall risk.

Another feature pension funds are exposed to, is the fact that the old–age credit balances are accumulated and decumulated in the same pension fund. In contrast to the Chilean system, where workers can choose freely among different pension funds (accumulation phase). Thereafter, they purchase an annuity from an insurance company or a withdrawal from a pension fund (decumulation phase). Thus, the asset side and the liability side exhibit different characteristics in these two models (e.g. duration).

7.2.4 Government

The government faces two main risks:

- Different layers of government (federal and cantonal) often have to guarantee the promised benefits and other contractual agreements of affiliated pension funds under public law with a warranty. As it has been previously demonstrated, many of these (large) funds exhibit considerable funding deficits and, therefore, constitute a threat to governments.

- The risk of a large number of bankruptcies that threaten the viability of the Guarantee Fund. As the latter is financed on a pay-as-you-go base without capital reserves, a large number of failures is likely to trigger a very high contribution rate for healthier funds, which in turn may drive more of these into financial difficulty. The financing structure of the Guarantee Fund (which should be operate as a re-insurer in the pension business) has thus a built-in amplifier in case of crises.

  It is hardly imaginable that the government would not step in such a situation as the pensions and old-age credits guaranteed by the fund are mandated by law.

  The *bailing-out* risk is directly related to the regulation of the pension fund itself. The more the minimum interest rate requirements and the conversion factors deviate from the value dictated by medium run market conditions and demographics, respectively, the higher is the risk of bankruptcy for an individual pension fund.

7.3 Risk Management in the Second Pillar

As mentioned in the preliminary chapter, the major risks faced by pension funds are market risks and longevity risks. Figure 25 depicts the distribution of risks[113] for the two (life) insurance companies *Swiss Life Group* and *Winterthur Group*. For both companies, the market risks are among the largest quantifiable risks. In the case of the Swiss Life Group they amount to over 81% of all quantified risks. The underwriting risks, which are defined (in a pure life insurance company) as the risk of longevity, death, and disability (13%) and the credit risks (6%) complete the risk exposure of Swiss Life Group. At Winterthur Group these latter two risk categories constitute a larger fraction of the quantified risks. Thus, the risk exposures of Winterthur and Swiss Life differ and so do their risk measurement methods. Risk management *identifies*, *evaluates* and *manages* these different types of risk and ensures that the respective pension fund is able to meet its (long–term) obligations. The concrete strategies and techniques depend on the internal capacities of the pension fund, on the skills of its risk manager, on the availability and affordability of financial instruments (e.g. hedging with derivatives is costly, thus it may be not affordable nor appropriate for a small autonomous pension fund), and finally on the constraints imposed by regulation.

Figure 25: Distribution of Risks by Category
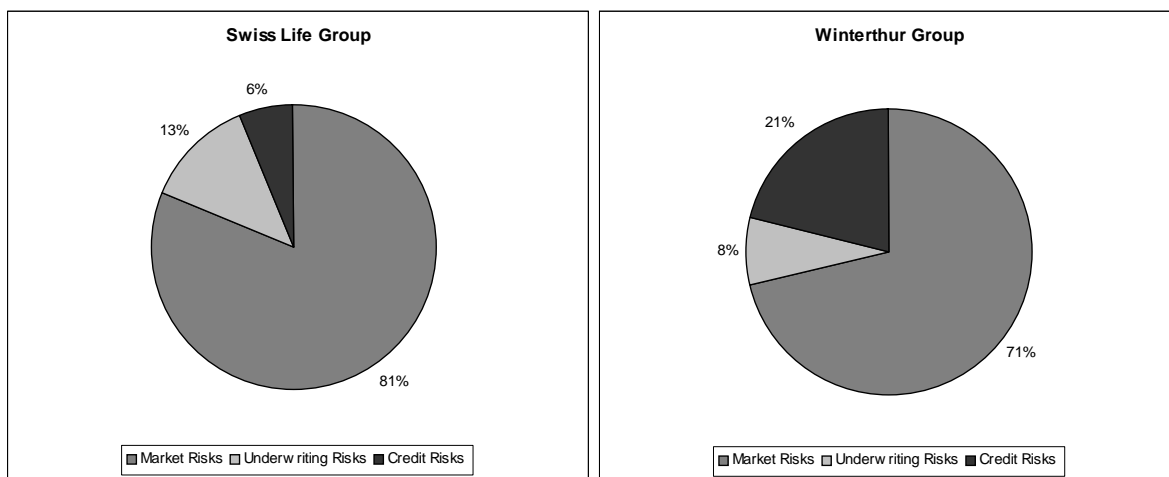
Source: SWISS LIFE (2004), p. 59 and WINTERTHUR (2004), p. 63

Winterthur Group for instance, evaluates risks and its capital requirements by the

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[113]Note: The underlying figures refer to the whole business of the respective company. Nevertheless, they allow the reader to have an idea about the size of the different risk categories. Given that the risks in the general/main business of life insurance companies are similar to the risks in the old–age provision, the figures approximate the situation of pension funds. This is particulary true for the figures of the Swiss Life Group, since the underlying activities of the Winterthur Group also includes a Non–Life part.

measurement method of *Economic Risk Capital (ERC)*. This method measures all risks on the basis of their potential economic loss, irrespective of how they are handled. Thereby it distinguishes between (c.f. also Figure 25):

- *Market Risks*: Market Risks contain adverse changes in interest rates, foreign currency exchange, equity prices, private equity, and real estate values. ERC calculates for each risk type separate figures, which are measured on a 99% confidence level and for 1-year holding period. Assets and liabilities are valued marked–to–market, where the cash flows of the liabilities are determined by actuarial projection methods. Equity, interest rates and foreign currency exchange are calculated by applying historical simulations. Figures related to the real estate ERC are obtained by using a variance–covariance approach. It uses historical country-specific data, i.e., real estate indices.

- *Credit Risks*: Expected losses in the portfolio are calculated by the use of ratings. A component that captures the possible change in the rating of the underlying assets as well as a spread risk component on traded positions are included.

- *Underwriting Risks*: Central reference figures from ALM (asset and liability management) are used to calculate the required ERC from unplanned risk accumulations, such as deviations from expected mortality, disability, longevity, and expected surrender rates (in the life and pension business part).

- *Business Risks*

- *Operational Risks*

The method ensures that Winterthur Group remains able to pay its liabilities up to a specific prescribed level of solvency, even in the case of extraordinary market, business and operational situations. Since ERC is the common denominator for all risks it strengthens the ability to monitor and control them. Furthermore, it contributes to greater risk transparency and it facilities the exchange of risk management issues within the Group.

7.3.1 Risk Management Activities to deal with Market Risks

On the assets side of the balance sheet, market risks refer to fluctuations in the value of securities (e.g. stocks, bonds, real estate), as well as to changes in foreign exchange rates. On the liability side, the risk stems form the guaranteed minimum interest rate.

To mitigate these risks and to additionally achieve an adequate investment performance, suitable investment strategies and derivatives are used. The following listing presents designated hedging instruments:

- Interest Rate Derivatives

- Interest Rate Swaps

- Currency Derivatives

- Currency Forward Contracts

- Equity Derivatives

How do now pension funds manage market risks concretely?

- **Fluctuations in Market Prices:** The risks associated with changes in market prices of securities are handled by fair value hedges. The main instruments to offset unwanted market behavior are options and futures.

- **Interest Rate Risk:** The impact of changes in the market interest rates on assets, on liabilities and on cash flows are mainly managed by the matching of assets and liabilities. This technique, i.e., the asset and liability management (ALM) is the subject of section 7.3.3. To cover the extent that is not practicable by ALM, swap contracts (e.g. interest rate swaps, caps, floors and collar agreements) and other instruments are used.

- **Foreign Currency Risk:** The main method of hedging foreign currency risk is to use forward exchange and option contracts.

In addition, pension funds manage their general exposure to market risks with *asset allocation limits*, *stress tests*, and by *diversification*.

As seen above, most of the hedging strategies use derivatives. Hence, having access to a fully developed capital market is necessary to manage market risks efficiently. This fact is the crux for countries that face a small and not fully developed capital markets. For instance, the fact that Chilean companies have not had access to a range of derivatives, as e.g. long term interest rate swaps, reduces their ability to manage risks at longer durations.

7.3.2 Dealing with Longevity Risks

Pension funds have little scope to set the terms of the annuity contracts in the mandatory part of the system. (Pension funds are free to set annuity conditions in the non-mandatory part.) The risks related to the fixed conversion factor are incorrect assumptions about mortality and market returns. These risks, however, can be substantial. If the conversion factor is set too high, it will be difficult to meet the obligations mandated by the law. This has important implications for the asset and liability management of a fund. Too high conversion factors may induce funds to choose investment strategies with a high expected return to compensate for this.

Almost all pension funds base their estimates on mortality tables provided by the Federal Insurance Fund (FIF), with possible adjustments based on past experience. Note that due to a relatively high degree of homogeneity among the annuitants of a given pension fund (construction workers, teachers, bank employees), the average life expectancy may well differ from the population average.

The implied sorting in the second pillar facilitates tailor made adjustments of the benefit structure. A recent example in Switzerland are the generous early retirement schemes for construction workers that can be financed to a large extent by a well below average life expectancy. As mortality rates are negatively correlated with lifetime income, the sorting of annuitants prevents a redistribution from the short-lived poor annuitants to the long-lived richer annuitants.

As already mentioned in chapter 4 most pension funds do not update their mortality rates on a yearly base. Often liabilities are computed using the published FIF mortality rates and then augmented by 0.4% to 0.5% every year, until the new FIF mortality rates are available, i.e., every 10 years. The 0.4% per year delivers an increase in MWRs over 10 years that coincides almost exactly to the rise in MWRs using the SFSO or FIF improvement rates for all groups of annuitants. Thus it constitutes a good approximation for the anticipated increase in longevity. The 0.5% is a more prudent estimate. When the new mortality tables become available, the pension funds adjust their longevity reserves that had been accumulated over the previous 10 years.

7.3.3 Asset and Liability Management

Asset and liability management (ALM), i.e., getting the right fit between assets and liabilities, is one of the most important aspects of risk management in pension funds. It ensures that services (i.e., current and future benefits) can be abided and further that

actuarial reserves are sufficiently high. ALM concepts comprise therefore the following aspects: fair valuation of assets and liabilities, asset allocation, and compliance with external constraints.

Fair Valuation of Assets and Liabilities:

The *liability side* of the balance sheet of a pension fund consists mainly (c.f Table 38: in 2002, 92%) of capital related to provision of old–age insurance, disability and death. This so–called *fixed and non-fixed capital* comprises mainly accumulated old–age credit balances of the insured active , the present value of current annuities and technical accruals to cover the risk of longevity, disability and death.

Table 38: Aggregated Liabilities of all Pension Funds

Labilities (in M CHF)	2002	in %
Deposits and Borrowed Funds	11'315	2.72%
Mortgages	1'443	0.35%
Funding Status (Schwankungsreserven)	16'805	4.03%
Reserves of employer	3'160	0.76%
Fixed and non-fixed Capital	383'795	92.14%
Total Liabilities	416'518	100%

Source: BUNDESAMT FÜR STATISTIK (2004), p.66

What factors (interest rates) determine now the size of "fixed and non-fixed capital"? In the case of the accumulated old–age credit balances it is the MIR that controls for its size (apart form the contributions of employer and employee)[114]. In the case of the present value of annuities it is the so–called *technical interest rate*. While old–age credit balances are not very sensitive to changes in the MIR in the short run, the present value of annuities is very sensitive to changes in the technical interest rate. The reason is that the MIR is merely applied on accumulated capital and does not affect future benefits to be paid. Thus, in the short run there are no compound interest effects[115]. The MIR is set by the Swiss Federal Council and therefore not directly influenceable by pension funds (c.f. Section 6.1.2). On the contrary, the technical interest rate discounts all future cash flows and enters therefore over exponential effects of compound interest into the calculation of the present value of annuities. Hence, this position is highly sensitive to the choice of the exact discount factor. Responsible therefore is the so–called *technical expert*. In accordance with guidelines for experts in retirement pension

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[114]This view is actually only correct for defined contribution systems. In the case of a defined benefits systems, there is no direct effect of the MIR. This is due to the fact that the size of the individual pension depends on the last salary earned.

[115]Obviously, the effect on an individual balance can be considerable, especially in the case of older insurees as they have already a relatively high credit balance accumulated.

insurance, the technical interest rate should be a reasonable amount of basis points below long run market returns[116]. To be on the safe side, it is advisable to use a technical interest rate that is quite low. As a direct consequence, the present value of future cash flows is larger. Thus, using a lower technical interest rate comes at the cost of a less favorable looking balance sheet (in the sort run)[117]. However, the present practice is still to use a rate of 3.5%. Such high values are only sustainable with the assumption of recovering financial market returns.

The *asset side* of the balance sheet, consisting of investments in securities (c.f. Table 11), is directly affected by changes in market returns (which are exogenous for pension funds), whereas the liability side is solely affected by the MIR and the technical interest rate, which both do not directly depend on market interest rates. As discussed above, it is advisable to use low technical and minimum interest rates. A low MIR would allow pension funds to build (again) reserves and a low technical interest rate discounts less their future liabilities. These measures would reduce the actual performance pressure in asset management (given a high technical interest rate and low reserves) and would further increase the financial stability of pension funds. Thus, it is not only important to manage assets, it is also important to match liabilities accordingly. However, the present practice is primarily focused on asset management.

Asset Allocation:

Asset Management has two particular objectives: First, the management of assets in such a way that they meet the contractual and statutory (e.g. MIR payments) commitments towards insurees. Since old–age insurance is mainly of long–term nature, investment portfolios consist therefore of a large share of fixed-income instruments (c.f. section 3.4). The second objective consists on following an absolute return strategy. The target thereby is to generate positive returns from which the insured can profit in form of "bonuses". To mention are e.g. higher benefits or lower contribution rates of both employer and employe. Moreover, such positive returns can be used to increase the funding status and hence, to present a sounder financial structure of the pension fund to its insurees. Thus, asset allocation should not be any more just the strategic approach with fixed portion of investments in different asset classes, it should rather be a dynamic approach on the basis of existing commitments and risk capacity.

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[116] KEEL and FRAUENDORFER (2003) examine the impact of the technical interest rate on the ability to take risks.

[117] As an Example: The pension fund of the City of Solothurn reduced the technical interest rate from 4.5% to 4% in the financial year 2004. As at 01.01.04, the resulting funding ratio was 78.7% (with a rate of 4%). In contrast, by still assuming a rate of 4.5%, the funding ratio would be 83.8%, i.e., due to increased liabilities the underfunding grew by 6%.

Table 39 presents the strategic asset allocation of some selected pension funds. (Note that all listed pension funds are subject of section 7.3.4.) Additionally, the funding ratio and the number of total insured is presented. As it can be seen, the presented strategies differ from each other. This differences can (probably) be explained by the risk capacity of the corresponding pension fund. Given this fact, it is possible that the high fraction of foreign shares in the portfolio of the pension fund of the city Zürich (PFZH) is due to the fact that this fund is very healthy (funding ratio of 120%). In contrast, it may explain the high fraction of Swiss currency bonds in the portfolio of the pension fund of SBB, which is less healthy (funding ratio of 83%). However, in order to benefit from higher returns, this fund also invests a sizable amount in Swiss and foreign shares. The same strategy could be applied by the CIA (pension fund of the employees of the canton Geneva). Thus, it invests one third in bonds and real estate, respectively, and one third in shares. By applying this approach, the pension fund gets more likely enabled to meet the contractual and statutory commitments on the one side, and to participate in higher returns on the other side. One can summarize that each pension fund invests a high fraction of its portfolio in at least one asset class (either Swiss currency bonds, foreign shares or real estate). The chosen class probably represents the risk capacity of the corresponding pension fund. Additionally, they invest up to 10% in alternative investments, as e.g. in hedge funds or in private equities.

Table 39: Strategic Asset Allocation of selected Pension Funds

PF Asset Classes	PFZH public 2004	PF SBB private Jun 05	PF ABB private 2005	CIA public 2002	Contraves private 2004	Credit Suisse private 2004
Bonds in CHF	25.0%	42.0%	37.0%	16.5%	11.0%	25-60%
Foreign Bonds	12.5%	11.0%	15.0%	17.5%	9.0%	"
Domestic Shares	8.0%	8.0%	8.0%	15.0%	17.0%	0-40%
Foreign Shares	32.0%	16.0%	11.0%	20.0%	6.0%	"
Real Estate	10.0%	8.0%	20.0%	30.0%	37.0%	15-28%
Mortgages	none	7.0%	none	none	4.0%	"
Liquidity	none	4.0%	5.0%	1.0%	5.0%	0-35%
Private Equities	5.0%	0.5%	1.0%	none	n.a.	0-4%
Commodities	2.5%	2.0%	none	none	n.a.	0-5%
Hedge Funds	5.0%	1.5%	3.0%	none	6.0%	0-11%
Foreign Currency						10-40%
Others					5.0%	
Total	100%	100%	100%	100%	100%	100%
Funding Ratio	120.0%	83.0%	103.2%	62.8%	106.7%	112.2%
Total insured	39'766	58'931	15'472	34'928	3'204	18'510

Source: Individual Pension Funds

Other Aspects:

In addition to purely economic considerations, other factors as regulatory requirements and accounting standards have to be considered.

7.3.4   Asset and Liability Management: Examples of Pension Funds

PF City of Zürich: *The pension fund of the city of Zürich was founded in 1913. Since 2002, it is organized as a foundation under public law and covers approximately 25'000 active contributors and 14'000 retirees. Defined contributions, up to 50% of the accumulated capital can be withdrawn as a lump sum, retirement between 58 and 65 (actuarial adjustment of conversion factor). Very healthy (funding degree approximately 120%) and transparent structure (including web page containing all the relevant information)*[118]

The investment strategy of the PF of the City of Zürich is focused on a high long run return on assets and global diversification. The assets are chosen in a way as to benefit from the global real economic growth. As a consequence, the portfolio (at 31.12.04) contains a high fraction of foreign shares (33.7%[119], in particular from emerging markets), but also hedge funds (4.6%) and private equities (1.9%). Other instruments are domestic currency bonds and foreign bonds (27.4% and 12%, respectively), domestic shares (8.2%), real estate (9%), and commodities (2.2%). The investment strategy is complemented by a relatively high level of reserves.

Common with most other pension funds, there are no explicit investment strategies to hedge mortality risks directly. The accrued liabilities computed with constant mortality tables are augmented by 0.5% each year. FIF mortality tables are used.

PF SBB: *The pension fund of the Swiss national railway company (SBB) was founded in 1906. Since 1999, it is organized as a foundation under private law. It covers almost 28'000 active contributors and over 30'000 retirees, from 12 affiliated companies. The majority of the insured are organized in a defined benefit system. This system covers insured incomes up to 100'000 CHF. The maximum pension equals to 60% of the last insured income. Early retirement is possible from the age*

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[118] We would like to thank Dr. Vera Kupper, head of the investment groups and member of the executive board of the "Pensionskasse der Stadt Zürich" for valuable insights and information.

[119] This number exceeds the 25% specified in the law. The reason is that investment requirements do not bind in the non-mandatory part of the scheme.

of 58 years onwards. Up to 50% of the capitalized pension can be withdrawn as a lump sum. Income above the level of 100'000 CHF is managed in a defined contribution system, where up to 100% of the accumulated capital can be withdrawn as a lump sum. With total assets amounting to 11.5 billions CHF in 2004, the pension fund of SBB is one of the biggest pension funds. Since liabilities related to old–age insurances exceed total assets by 2.3 billions CHF the funding ratio is only slightly above 83%, which is considered as a heavy underfunding.

The asset management invests the old–age credit balances with a long–term focus and well diversified. The investment horizon extends over a period of 10 to 15 years. Taking into account their ability to take risks, they assume a return on investment of 4.5%. As at 31.03.05, the portfolio comprises a high fraction of bonds issued in CHF (46%). Foreign bonds (11%), domestic shares (9.9%), foreign share (16.8%) and mortgages (7.7%) are among other important asset classes apparent in the portfolio. For the period 31.12.04 to 31.03.05, the return on investment was 1.95%, whereas the benchmark performed at 2%.

ABB Pension Fund: *The pension fund that is set up for employees of ABB is organized in the form of a foundation. Economically or financially associated companies can join the pension fund. The ABB pension fund accounts for more than 7 thousand active insured and slightly more than 8 thousand retirees in total. The old–age insurance system is organized in the form of defined contributions, where the insuree can choose among three different types: Standard (i.e., same contributions of employer and employee), Standard plus (i.e., higher contributions of employee), and Standard minus (i.e, higher contributions of employer). Early and late retirement is possible, but not earlier than at age 57 and not later than at age 70, respectively. Retirement benefits can be drawn in the form of pensions, or in the form of a capital payment, or as a mixture of both. The risk insurance (i.e., invalidity and death) is organized in the form of defined benefits, where the contributions are fully paid by the employer. The asset side of the balance sheet accounts for 3.2 billions CHF, which covers liabilities related to old–age insurances at a rate of 103.2%. The liabilities were computed by using a technical interest rate of 3.75%.*

The investment strategy of the ABB pension fund is tracking an index[120], i.e., all purchases and sales aim at reproducing a given market index. Thus, this strategy should achieve the market return. Consequently, participating in higher market returns is not possible. On the other side, the risk of achieving a lower return

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[120]in 2001

is mitigated. Deviating from the above strategy are investments in the Swiss money market, in domestic bonds, in emerging market shares, and in private equity. These securities are managed more actively. Generally, all the securities are managed by a specific and specialized institution that is supervised by the foundation board. The portfolio (as at 31.12.04) contains a high fraction of bonds issued in CHF (36.4%) and real estate (20%). Foreign bonds (14.7%), domestic and foreign shares (8% and 11%, respectively), money holdings (5%), private equity (1.6%), and hedge funds (3.1%) complete the portfolio. The return on investments was 4.67% in 2004.

PF Oerlikon Contraves AG: *The pension fund of Oerlikon Contraves provides to its employees and economically or financially associated companies old–age provision. Old–age insurance and risk insurance are funded by defined contributions, where both the employer and the employee pay the same amount. From the age of 60 onwards, members may at their request take early retirement. Additionally, the option of a full or partial capital payment exists. In 2004, this pension fund covered 1084 active contributors and 2120 retirees with old–age insurance. Despite the fact that the majority of the insured are retirees, the pension fund is quite healthy. Since 2002, the funding ratio has been increasing again, and reached 106.7% in 2004. As at 31.12.04, total assets amounted to 1.2 billions CHF.*

The investment in securities follows a strategy with predefined weights, which are orientated on diversification. Additionally, to also participate in short– and medium–term market developments, a deviation margin from the fixed weights is defined. As a consequence thereof, shares were increased (due to the positive market trend) and bonds were sold (due to unfavorable interest rates) in 2004. The management of securities is partly delegated to a specific and specialized institution, i.e., 65% are managed extern and the remaining 35% are managed intern. At 31.12.04 the biggest balance in the portfolio was real estate (35.9%), followed by bonds (17.2%), shares (17.2%) and other investments (29.8%). The return on investment was with 6.4% above the benchmark return of 5.5%.

CIA: *The pension fund of the employees of the canton Geneva was founded in 1929. Like other public pension funds it adopted a defined benefit system. In the best case, retirees are eligible for a rate of 70% of the last insured wage. Members that contributed premiums for at least 25 years are eligible for early retirement at age 50. In all other cases, early retirement is possible at most 5 years before the ordinary retirement age. Retirement benefits are normally drawn in the form of*

pensions. The capital payment option is only available if pension are small. In 2003, the CIA insured over 25'000 active contributors and almost 10 thousand retirees and its total assets were 4.9 billions CHF. In line with other public pension funds, the CIA exhibits a large underfunding. In 2002, its funding ratio decreased by 10% to 61.1%. Due to the good financial year 2003, the funding ratio rose slightly to 62.8%. To calculate future liabilities a technical interest rate of 4.5% was assumed.

The investment strategy of the pension fund of the canton Geneva is focused on long run returns. In 2001, it additionally focused on global diversification of stocks. As a consequence, Swiss shares were reduced and European shares were bought in 2002. Another special characteristic of the investment strategy is the fact that the whole portfolio was actively managed (with only one exception). As a result of the bad performances of actively managed mandates, the pension fund changed this strategy in 2003. Consequently, part of the portfolio was invested in passively managed mandates. The management of all securities is delegated to a specific and specialized institution. As at 31.12.2003 the portfolio contained a high fraction of real estate (33.2%) and bonds issued in CHF (18%). Foreign bonds (13.9%), domestic shares (14.2%), foreign shares (14.3%), and money holdings (6.4%) were the remaining investments. The returns on investment before and after deductions for value fluctuation reserves were 8.39% and 5.12%, respectively.

PF of Credit Suisse Group: *The Pension fund of Credit Suisse Group (Switzerland) ensures its employees and those from companies that are legally or commercially closely associated with Credit Suisse Group. The annuity plan is a defined benefits scheme. The insured is entitled to a retirement pension from the age of 55. A bridging pension until attainment of the ordinary retirement age is only possible if the event of retirement is after the 60th birthday. Without providing any reasons the insured can request a lump sum payment of maximal up to 50% of the capitalized annual pension. In 2004, the pension fund of Credit Suisse accounted for almost 19'000 insured. Thereof were almost 8'500 retirees. The funding ratio at year–end (2004) was 112.2%. The underlying total assets amounted to almost 9 billions CHF.*

The investment strategy is focused on long–term asset allocation. The Board of Trustees defines a strategic bandwidth and the representative benchmark. The tactical investment bandwidth for securities (which lies within the strategic investment bandwidth) is quarterly defined. The chief strategy thereby is *Timing*

and Selection. The asset allocation as at 31.12.2004 is the following: Swiss bonds (36.2%), direct and indirect real estate (14.8% and 4.1%, respectively), Liquidity (12.5%), foreign and convertible bonds (9.3% and 1.7%, respectively), foreign equities (7.7%), Swiss equities (6.5%), hedge funds (5.6%), and private equity (1.6%). The performance of the above assets was 5.1%.

PF City of Solothurn: *The pension fund of the city of Solothurn is an institution under public law and insures 362 active contributors and 274 retirees. It uses as pension plan a defined benefit system, where the employer contributes 60% (i.e., 13.65% of the insured wage per annum) and the employee the remaining 40% (i.e., 9.1% of the insured wage per annum) to premiums. The contributions to term insurance are equal for both parties (i.e., 1% of the insured wage per annum). Pension benefits are paid in the form of annuities and reach maximal 60% of the last insured wage. The accumulated capital can only be withdrawn as a lump sum for low income levels. The retirement age can be postponed in both directions by 5 years. In 2003, the guaranteed (by the employer!) interest rate on the old–age credit balances was 4.5% and in 2004 it was 4% (due to the decrease of the technical interest rate from 4.5% to 4% it was adjusted accordingly). As at 31.12.03, total assets were 108 millions CHF and the funding ratio was at a rate of 83.8%.*

The investment strategy is of long–term nature and optimized with respect to the risk capacity of the pension fund. Depending on the type of securities, the investment management is handed over to a specific bank. In 2003, the largest positions in the overall portfolio were domestic currency and foreign currency bonds (31.4% and 19.5%, respectively), followed by mortgages (12.6%). Foreign shares (9.4%), Swiss shares (9.3%) real estate (8.1%), estate funds (5%), and hedge funds (1.7%) complete the investment in securities. The remaining fraction is held in cash (3%).

8 Summary and Conclusions

Switzerland has a long experience with a fully funded pension system. The 1985 law that mandated occupational pension coverage for all workers above a certain income merely institutionalized what had been common practice in medium and large firms before. Not surprisingly, the current structure still reflects the long history of the system and the preferences of workers and employers with all its advantages and disadvantages. Occupational pension plans had always played an important in attracting and keeping skilled and motivated workers. Annuity schemes were (and still are, to a certain extent) a part of the labor market, but not of the financial market.

Demographic and socio-economic changes during the last decades have uncovered a number of short-comings of the system. Its structure is tailored to the needs of single-earner families under relatively stable market conditions. A very high divorce rate (more than 40%) and a high labor market participation of women lead several modifications of the law. But the system still redistributes to relatively well-off married men at the expense of single men, and does not cover well part-time workers (particularly women). The second pillar is well integrated with the PAYG first pillar with respect to the coverage of labor income. However, in the pay-out phase, the law does not require a minimum amount of annuitization (together with the first pillar) to prevent the elderly from running out of assets too soon.

A more critical feature of the system is the rigid legislation on minimum accruals and the conversion factor at which the accumulated assets have to be translated into a life-long annuity. The main problem, however, is that the requirements are not rule-based and thus are not automatically adjusted to changing market conditions and increases in longevity. As a consequence, the rules are susceptible to political pressure, and a too sluggish response to a changing environment leading to financial problems for the pension providers. The rationale for minimum standards in the Swiss system is a high emphasis on stability of pensions across different cohorts. As second pillar annuities are not priced, the annuitization rate risk is basically non-existent. This would not be a problem *per se*, if the legal requirements were based on prudent estimates of market conditions and mortality rates leading to Money's worth ratios that are more in line with the financial sustainability of the system.

Given the large size of the second pillar and the high effective replacement rates in old age, it is not surprising that there is little scope for an annuity market in the strict sense of a market. Market annuities make up for less than 1/2 percent of the pension volume. They come in many different forms (most containing a minimum

capital payment in case of death) and insure a highly non-representative part of the population. As a consequence we are unable to report any meaningful estimates of MWRs in the market.

Despite the high conversion factors, most pension funds are surprisingly healthy. The only exceptions are pension funds under public law that enjoy an explicit warranty from the (cantonal or federal) state. This demonstrates that incentives matter a lot more than investment regulations (which are the same for all legal forms of pension funds). Obviously some internal mechanisms have compensated the lack in transparency and insufficient supervision in the past.

It is not easy to draw conclusions for other countries. The history of old-age provision and the structure of the labor market are very important for the success in implementing a system. Nonetheless, two big risks can be identified that should be borne in mind in setting up an annuity scheme. The first is an explicit guarantee of the state that seems to lead to excessive risk taking and to generous benefits. If the second pillar is large enough as in the Swiss case, this constitutes a big threat for public finances. The second, and equally important, risk stems from an inadequate regulation of the scheme. If the rules are not automatically adjusted to market conditions and demographic change, they will become a punch ball of politics and may thus threaten the viability of the pension funds and the equitable treatment of different generations.

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