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Working Paper

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Agenda Austria Working Paper, No. 01

Provided in Cooperation with:
Agenda Austria, Vienna

Suggested Citation: Christl, Michael; Kucsera, Dénes (2016) : Actuarial neutrality and financial incentives for early retirement in the Austrian pension system, Agenda Austria Working Paper, No. 01, Agenda Austria, Wien

This Version is available at:
https://hdl.handle.net/10419/163558

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Actuarial neutrality, early retirement, pension system, Austria

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Actuarial neutrality and financial incentives for early retirement in the Austrian pension system

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Abstract

This paper studies actuarial neutrality in the Austrian pension system. It is often argued that actuarial neutrality constitutes an incentive for people to retire. We show that there are almost no financial incentives within the Austrian pension corridor when we use the traditional definition of actuarial neutrality. Taking taxation into account, our results suggest that financial incentives for early retirement stem mainly from the Austrian tax system and not from the pension system itself.

JEL Classification: J26, H55

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1. Introduction

Austria belongs to the countries with the lowest effective and statutory retirement ages among OECD member states. The pension system in most of these countries is significantly affected by low fertility rates and increasing life expectancy, which in turn increase the number of pensioners and decrease the work force.

Because of the generosity of the Austrian pension system the effective retirement age has significantly decreased over the last three decades. This negative trend has been compensated by the pension reform of 2004, which lead to a reduction in pension benefits compared to the former system. Nevertheless, the notional defined benefit system based

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on the formula 45/65/80 still indicates a generous replacement rate: a person retiring at the official retirement age of 65 and after 45 years of contributions to the system is entitled to a pension benefit of 80 percent of his or her lifetime income.

Actuarial fairness and actuarial neutrality belong to the main goals of recent pension reforms of OECD countries in Europe. Actuarial fairness is based on the concept of fairness over the whole life span. The idea is that an individual accumulates pension wealth with his or her own contributions. The pension entitlement is then only based on one's contributions to the system and the expected duration of pension claim. This requirement is not met by the Austrian pension system. In Austria, everyone with the same income history receives the same pension benefit despite the fact that the statistical duration of receiving the benefit varies significantly across age groups due to an increase in life expectancy. To overcome this problem it would be necessary to adapt the pension formula to the statistical increase in longevity. According to Christl and Kucsera (2015) or Knell (2013), a yearly increase of the statutory retirement age of two months could overcome this problem of unequal treatment of different cohorts.

Financial incentives play a crucial role for the retirement decision. Early retirement should not bring an additional burden to the pension system and simultaneously guarantee an equal treatment among individuals and age cohorts. In an actuarially neutral pension system individuals of the same age but different contribution history should be indifferent between retirement and working when facing the retirement decision. Hence, actuarial neutrality assures that the present value of accrued pension benefits for working an additional year is the same as if the individual retires.

In this paper we investigate the actuarial neutrality of the pension system in Austria. We focus on the age corridor ("Korridorpension") that allows early retirement. The earliest legal age to be entitled for the age corridor is 62. For every year of earlier retirement before the age of 65 the gross pension benefit is reduced by 4.2 percent (5.1 percent from

2017). Previous research focused mainly on actuarially neutral deductions for gross pension benefits in the Austrian pension system (see e. g. (Brunner et al., 2010) or (Queisser and Whitehouse, 2006)). This measure is important for a balanced pension system. Annual deductions based on this measure guarantee that early retirement does not affect the financial stability of the system. The pension system is indifferent between retirement and additional year of working. If the actuarially neutral deduction is above (below) the official level, early retirement causes financial burden (advantage) for the pension system. However, if taxation is taken into account, deductions calculated for the net pension entitlements reflects the level at which insured individuals are indifferent between retirement and working an additional year. If this deduction is above (below) the official level, people have more (less) financial incentives to retire, since longer working would bring a financial loss (advantage).

To the best of our knowledge, there is no paper investigating the difference between the actuarial neutral adjustments based on gross and net pension entitlements. Higher and more progressive taxation leads to proportionally less earning for each additional year of work and hence increases the incentive to retire. Therefore, a higher and more progressive tax system might increase the difference between the two measures. The tax system in Austria might therefore significantly contribute to the low effective retirement age. The goal of the paper is first to analyze whether deductions for early retirement are actuarially neutral and do not generate an extra burden for the pension system. Second, we investigate whether the deductions give an incentive for individuals to retire or to stay in the workforce.

The paper is structured as follows: Section 2 gives a short overview of the Austrian pension system. Section 3 presents the model used to calculate actuarial fairness. Section 4 highlights the results of the model, and Section 5 concludes.

2. The Austrian Pension and Tax System

2.1. The Austrian Pension System

The Austrian pension system is based on the General Social Security Act (Allgemeines Sozialversicherungsgesetz) and covers most participants of the labor market.[1] The public pension system is financed by three parts: contributions of the workforce, supplementary transfers[2] and a state subsidy that currently makes up approximately a quarter of the overall yearly expenditures.

In 2016, the contribution rate is 22.8% of gross earnings up to an upper threshold of 4860 Euro. For earnings above this threshold no social security contribution is paid. The contribution of the 22.8% of gross earnings is split into 10.25% paid by the employee and 12.55% paid by the employer. The contribution rate has been stable within the last three decades, while the upper threshold earnings for full contribution has increased approximately along with the average wage growth.[3]

The overall system is a notional defined benefit (NDB) system that is based on the 45/65/80 pension formula. The formula states that after 45 years of insurance and at the retirement age of 65, the Austrian pension system guarantees a pension entitlement corresponding to 80% of average lifetime income. This formula results in an accrual rate of 1.78% every year (80/45) to the pension account. The past contributions are adjusted by the growth rate of the average contribution base and the pensions by the inflation rate.

The statutory retirement age for the pension in Austria is 60 years for women and 65 for men. The Austrian pension system offers various ways to retire before the statutory retirement age. Many of them will be eliminated or amended within the next few years.

[1] There is still an ongoing harmonization of the pension system of public employees. Until 2003 as a base for the pension calculation of a public employee was taken the last income. After 2003 the period for the calculation of the pension base increases gradually. In 2028 the pension base will be computed based on the average income of the last 40 years.

[2] E. g. The Public Employment Service Austria (AMS) is paying the contributions for the unemployed.

[3] See Hofer and Koman (2006).

Early retirement is most commonly used through the age corridor ("Korridorpension") and the heavy labor pension ("Schwerarbeiterpension"). The age corridor scheme is attainable only for individuals aged between 62 and 68 years with at least 39.5 years of insurance, which will increase to 40 in 2017. The deduction for every year of earlier retirement is 4.2% of the gross pension earnings[4]. The annual supplements for working longer than the statutory retirement age is 4.2% per year up to an upper threshold of 91.76% for the initial pension. The heavy labor pension allows for a person with 45 years of contribution to retire at the age of 60, if at least ten years of the contributions in the last twenty years stem from work in heavy labor. The annual deduction in this case is 1.8%. Since the statutory retirement age of women is still 60 and will increase within the period of 2024 and 2032 stepwise to 65 years, both the corridor pension and the heavy labor pension will be not attainable for women before 2028 or 2024 respectively.

2.2. The Austrian Tax System

In the Austrian tax system, pension benefits are taxed in the same way as labor income. Since social security contributions are tax deductible items, the taxable base for pensions is the gross income reduced by social security contributions. As pensioners are not paying pension and unemployment contributions, their tax base is higher. This results in a higher tax burden and an average tax rate for pensioners from the same income.

In general, the Austrian income tax is charged at progressive rates. The first 11 000 EUR of income are tax-free, afterwards, the tax rate increases in steps, as highlighted in Table 1.

The tax system itself is complex, therefore we focus on standard taxation mechanisms for a single pensioner household, hence neglecting several allowances and tax credits for child care, single earners or other family specific tax reliefs. Only general lump-sum al-

[4]In 2017 this will be changed to 5.1%.

Table 1: Income tax rates in Austria

Tax base	Tax rate
0 EUR - 11 000 EUR	0%
11 000 EUR - 18 000 EUR	25%
18 000 EUR - 31 000 EUR	35%
31 000 EUR - 60 000 EUR	42%
60 000 EUR - 90 000 EUR	48%
90 000 EUR - 1 000 000 EUR	50%
>1 000 000 EUR	55%

lowances for pensioners such as the "Sonderausgabenpauschale" and the "Pensionistenabsetzbetrag" are included in our calculations.

The "Sonderausgabenpauschale" is a general lump-sum allowance for housing or life insurance and accounts for 60 EUR per year. The "Pensionistenabsetzbetrag" is a benefit for pensioners with a taxable base (gross pension minus social security contributions) below 17 000 EUR and reduces the tax burden by 400 EUR per year. For incomes above this treshhold and up to 25 000 EUR this benefit is reduced stepwise to zero.[5]

The prevalence of exceptions in the Austrian tax system might result in minor deviations of our calculations from the actual net income of pensioners in our paper. However, any such deviations should be negligibly small. For a detailed overview of the taxation of pensions in Austria see Austrian Federal Pension Fund (2016).

3. Empirical Model and Data

3.1. The Model

Policy makers and economists distinguish between two key actuarial concepts in the design of a pension system. Following Queisser and Whitehouse (2006), the two concepts

[5]Under specific circumstances, this tax reduction can be increased to 764 EUR, depending on marital status, income of the partner and no claim for the "Alleinverdienerabsetzbetrag". This is not included in our calculation.

differ mainly in the time period they relate to:

- **Actuarial fairness** contrasts the contributions paid and benefits received over an individual's whole working life and retirement, respectively. In an actuarially fair pension system there is no redistribution towards and away from an individual; lifetime pension entitlements equal the lifetime contributions.

- **Actuarial neutrality** is a marginal concept that computes the effect of an extension of working life with an additional year. In an actuarially neutral pension system the pension wealth between individuals retiring at different ages is the same, i.e. pension wealth for retiring one year later equals the pension wealth for retiring today adjusted with the pension entitlement earned during that year.

As the Austrian pension system is not automatically adjusted to changes in life expectancy, it can not be actuarially fair. To ensure that the system becomes and stays actuarial fair, the pension formula needs to be adapted each year. Knell (2013) shows that an adoption of the pension formula that implies an increase in the retirement age can mimic a notional defined contribution System (NDC) within the Austrian pension system and would therefore lead to actuarial fairness.

In our paper we focus on the actuarial neutrality of the pension corridor in the Austrian pension system. Since most of the other early retirement schemes will be abolished within the next years, the pension corridor will gain more importance in the retirement decision of individuals. Therefore, two points are of interest: First, whether the deduction is neutral, which means that there is no additional cost for the pension system if a person retires earlier (pension insurance). Second, whether the deduction gives an incentive for individuals to retire or to stay in the workforce. Following Queisser and Whitehouse (2006), in the computation of the pensions wealth we take directly into account the additionally earned benefits during the extra years of work. This is in contrast to Brunner et al. (2010), who

in the calculation of the pension wealth deduct the lost contributions due to an earlier retirement.

Let $PW_{x|y}$ denote the pension wealth at time x conditional on retiring at time y. A pension wealth is the stock of lifetime pension capital and can be computed as a stream of benefits until the death of the insured person. Pension wealth at time t is calculated as the pension entitlement at time t, P_t, multiplied by the so called annuity factor, A_t:

$$PW_{t|t} = P_t * A_t. \tag{1}$$

The annuity factor represents the present value of a yearly stream of a unit pension. This takes into account the duration of the pension disbursal (age of retirement, mortality rate) and the yearly pension adjustment, usually chosen at a level inflation or average earnings growth). Hence, the annuity factor can be expressed as:

$$A_t = \sum_{i=R}^{T} PVPF_i, \tag{2}$$

where $PVPF$ is the present value of a unit pension flow of a person aged R with a maximum life span of T retiring at the time t. Let the future income be discounted at the rate z and the yearly real adjustment rate of the pension entitlement be u.[6] As the present value of the pension flow is conditional on being alive to receive the benefit, the annuity factor depends also on the survival function, s. Thus, Equation 2 can be rewritten as:

$$A_t = \sum_{i=R}^{T} s_i(1+z)^{-i}(1+u)^i. \tag{3}$$

If the individual decides to work an additional year, the calculation of the pension wealth drawn at time $t+1$ and measured at time t requires discounting back the pension

[6]Note that if the pensions are adjusted by the inflation rate u will be zero.

wealth $PW_{t+1|t+1}$ (drawn at time $t+1$ measured at time $t+1$) and additionally controlling for the probability of death during that year:

$$PW_{t|t+1} = PW_{t+1|t+1} * \frac{s_t * (1+u)}{(1+z)} = \frac{P_{t+1} * A_{t+1} * s_t * (1+u)}{1+z}. \tag{4}$$

The pension wealth in equation 4 can be computed either using the net or gross pension entitlement. The pension wealth computed by gross pension entitlement represents the financial perspective of the pension system, while the pension wealth based on the net benefit allows us to analyse the financial perspective of an individual by taking taxation into account. As the average tax rate for a pensioner is relatively high in comparison to a worker, an additional year in employment leads to higher pension benefit, which is however taxed more heavily in the future. For simplicity, in our analysis we keep the tax system constant over time.

3.2. Data and Parametrization

Similarly as for a life insurance, survival probabilities play a key role in the calculation of the pension insurance. The data is based on the mortality tables of Statistics Austria for the year 2014. Since general (unisex) deductions are of interest for policy makers, for the calculation of the actuarially neutral deductions we use unisex survival probabilities. As a robustness check we analyse the effects of different survival probabilities on actuarially neutral adjustments and take into account the difference in the probability of death between women and men.

According to our model, actuarial neutrality depends crucially on the following three factors: riskless interest rate, already collected pension entitlement and the total earnings in the additional year of employment. First, the riskless interest rate influences the annuity factor. A lower riskless interest rate will demand higher deductions because consuming now is valued higher than consuming later. Second, an additionally earned wage for another

year of work influences the future pension payment. Third, the already collected pension benefits influence the pension payments and therefore the pension wealth. Additionally, some other minor factors such as the level of the valorization of the pension account or the accrual rate might influence the actuarially neutral deductions. For both of this factors, higher values lead to a higher pension wealth.

The appropriate riskless rate is usually chosen as the long-term government bond interest rate.[7] The main justification for this choice is that the government pension payouts have the same default risk as government long-term bonds.[8] Therefore, we follow Brunner et al. (2010) and choose a 1.5% riskless rate in our baseline scenario.

For the analysis we distinguish between three different pension account levels at the age of 65 (gross) for individuals deciding between working one extra year or retiring:

- Low pension account level: 15 000 EUR
- Medium pension account level: 30 000 EUR
- High pension account level: 45 000 EUR

Additionally, we take into account the effects of different wages for individuals aged over 60, earned during that year:

- Low earnings: 17 683 EUR
- Medium earnings: 39 510 EUR
- High earnings: 68 040 EUR

The data is taken form Statistics Austria, low and medium earnings reflect the first quantile and the median (gross) yearly earnings in 2014 for individuals aged over 60 in

[7]The possibility of a default of government is supposed to be close to zero, and can hence be neglected.
[8]For other rationales for the choice of the long-term government bond interest rate consult Queisser and Whitehouse (2006).

Austria, respectively. For high earnings we take the upper threshold wage above which the pension contribution is fully paid. For the baseline scenario we choose the medium pension account level and medium earnings.

The valorization of the pension account will be chosen close to reality. Since 2002 the real increase of the pension account equalled on average 0.4% p.a., according to the Ministry of Labour, Social Affairs and Consumer Protection (BMASK). This value will be chosen as the parameter of the baseline scenario.

4. Empirical Findings

4.1. Actuarial Neutrality Based on Gross Pension Entitlement

As presented earlier, the actuarially neutral adjustments based on gross entitlements should represent the financial perspective of the pension system. At actuarially neutral adjustments the pension system is indifferent between retirement and working an additional year. Higher actuarially neutral adjustment constitutes a higher incentive of the system to keep the workers in workforce and hence to avoid early retirement. An actuarially neutral adjustment rate above the official level means that early retirement would cause a financial burden for the pension system. The results for actuarially neutral deductions at different retirement ages of 62, 63 and 64, and gross earnings are shown in Table 2.

We find that the yearly actuarially neutral adjustments depend on the age of the individual. The closer the individual is to the official retirement age, the higher the yearly actuarially neutral adjustment, and therefore the financial advantage of the system from avoiding early retirement. This stems from a shorter pension payment period. The results in Table 2 show that at the age of 62 years the actuarially neutral deduction for a medium-income earner and medium-pension-account owner is 4.32 percent per year. For a person with the same pension account level but an age of 63 years, the yearly deduction is already on a higher level of 4.61 percent. One additional year would result a yearly

Table 2: Actuarially neutral deductions based on gross pension entitlement at different retirement ages (in percent)

Age	Wage	Pension account (Low)	Pension account (Medium)	Pension account (High)
62	Low	4.56	5.53	5.86
	Medium	2.14	4.32	5.06
	High	-1.01	2.75	4.00
63	Low	4.84	5.82	6.14
	Medium	2.44	4.61	5.34
	High	-0.71	3.04	4.29
64	Low	5.07	6.04	6.36
	Medium	2.67	4.84	5.56
	High	-0.47	3.27	4.52

actuarially neutral deduction of 4.84 percent. The reason for this increase is that because of the increased mortality rate over individual's age the probability of a shorter pension payment period increases. Hence, the pension system has a higher incentive to avoid an additional year of pension payment.

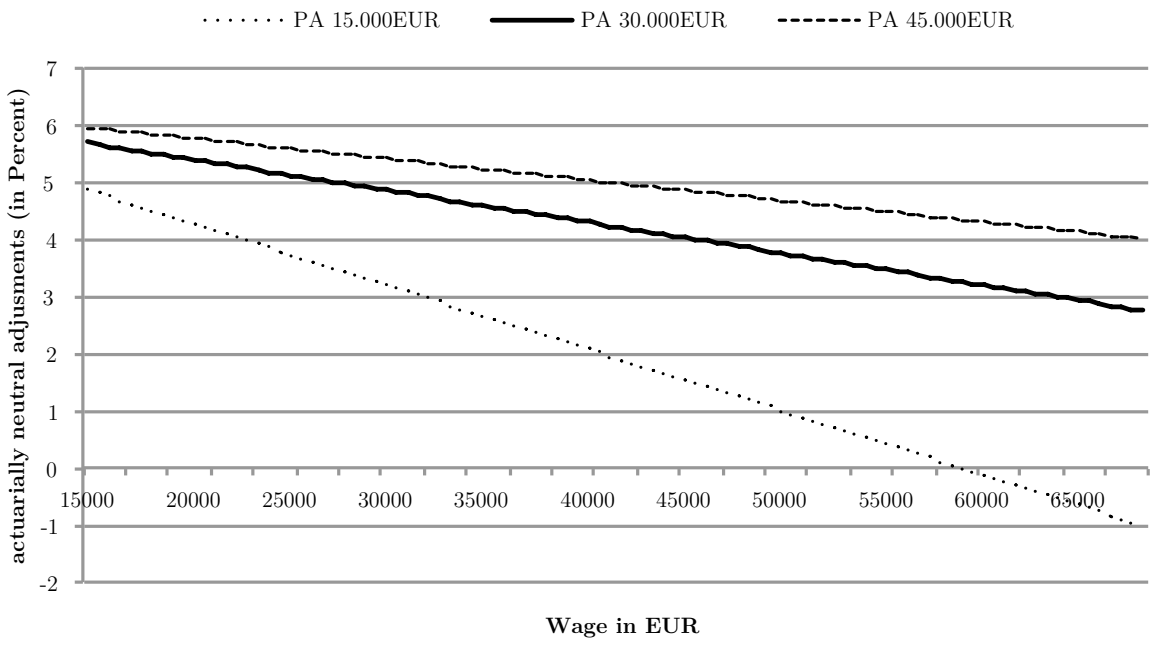
The results are in line with Queisser and Whitehouse (2006). The authors find that the actuarially neutral adjustments of the benefits for people retiring earlier, at the age of 64 years rather than the official retirement age of 65 years, is around 7-8% for OECD countries. One should note that this reduction is calculated for average mortality rates of 2002. However, the expected life expectancy in Austria is at the moment above this level, which indicates that this value should be considered rather as an upper bound for actuarially neutral deductions. Moreover, using a higher interest rate in the model leads to higher neutral deductions. Both issues will be discussed later.

Table 2 shows that the actuarially neutral deductions are increasing along the level of the pension account. The neutral deduction for a medium-income earner at the age of 62 years with a low pension account balance would equal 2.14 percent. At the medium pension account level the deduction increases to 4.32 percent, and when it is at high level,

the deduction reaches 5.06 percent. Additionally, increasing income leads to decreasing actuarially neutral deductions. The actuarially neutral deduction at the age of 62 years with a medium pension account balance lies between 2.75 percent and 5.53 percent for high-income and low-income earners, respectively. These two effects are analyzed in detail in a next step.

The effect of additional earnings on the individual retirement decision is investigated for persons aged 62 with different levels of pension account. Figure 1 shows that the actuarially neutral adjustment decreases with increasing wages and the slopes of the curves become steeper with decreasing pension account levels. The reason is that higher wages increases the pension contributions, which results in higher pension payments in the future. This in turn lowers the incentive of the system to avoid early retirement.

Figure 1: The effect of additional earnings on actuarially neutral adjustments (gross pension entitlement)



4.2. Financial incentives for early retirement

To analyze the financial incentives for early retirement within the Austrian pension corridor, we base our calculations on net benefits. Those retirement incentive neutral deductions are reached when the individual is indifferent between working an additional year and retirement with a reduced pension level. If the neutral deductions are above the official level, people have more financial incentive to retire. Hence, a lower adjustment than the neutral one reflects a financial incentive to retire.

For simplicity, we assume no changes in the tax system and absence of the bracket creep.[9] The results for incentive neutral deduction based on the net pension wealth are summarized in Table 3. The incentive neutral deductions are higher when we use net pension wealth. This is due to the tax system. Working an additional year leads to a higher pension, which due to the progressive tax system in Austria is taxed at a higher level. This in turn reduces the incentive to work longer.

Table 3: Incentive neutral deductions (in percent) at different retirement ages

Age	Wage	Pension account (Low)	Pension account (Medium)	Pension account (High)
62	Low	4.23	6.97	6.43
	Medium	2.05	5.96	5.96
	High	0.37	4.76	5.28
63	Low	4.61	7.64	7.57
	Medium	2.63	6.67	6.74
	High	0.69	5.17	5.73
64	Low	5.37	8.40	8.32
	Medium	3.51	7.21	7.53
	High	1.09	5.57	6.35

The incentive neutral deductions for retiring at 62 are 5.96 percent for a medium income earner and a medium pension account wealth. This is more than 1.5 percentage points

[9]The assumption of a fixed tax system might influence future pension benefits at a specific time, but the overall pension wealth should only be influenced slightly.

higher than the deduction calculated using gross pension wealth. The deductions increases to 6.67 percent and 7.21 percent for the retirement age of 63 and 64 years, respectively. These are respectively around 2 and 2.4 percentage points higher than in the case of gross pension wealth.

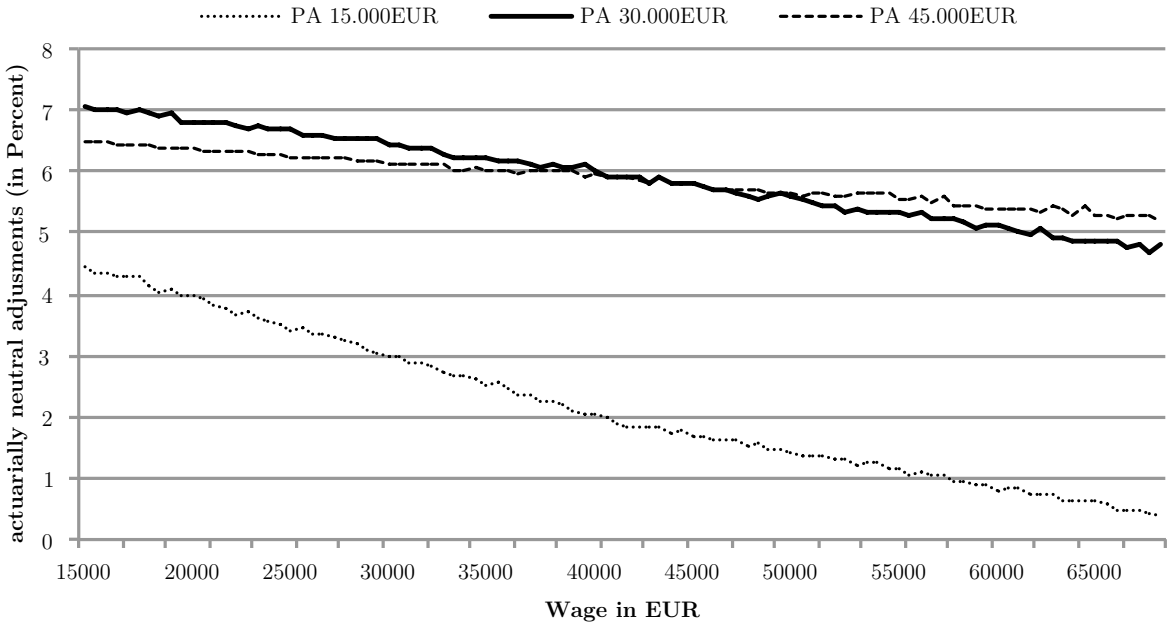
Similarly, the incentive neutral adjustments also depend on the age of the individual. The closer the individual gets to the official retirement age, the higher is the yearly incentive neutral adjustment, hence the incentive to retire. Due to the increased mortality rate and lower remaining life expectancy, the person is no longer compensated by the increased pension entitlement earned during the additional working year. Hence, if the pension decrements are chosen to be constant for each year of early retirement, incentives to work are higher at the beginning of the period of allowance than at the end of this period (for an individual with the same earnings and pension entitlements).

We find that the incentive neutral adjustment decreases with higher wages (see Figure 2). The reason for a lower incentive to retire is that higher wages result in higher pension entitlement, which faces a higher tax rate. Since lower pension entitlements are taxed at lower rates, this effect is higher for low pension account levels (differences in the slopes).

4.3. Sensitivity

Both the actuarially neutral adjustments and the incentive neutral adjustments are significantly affected by the choice of the parameters. In this subsection we discuss the effect of the mortality rate, the valorization of the pension account and the riskless interest rate. As the mortality rate belongs to the key parameters, actuarially neutral deductions depend significantly on the choice of the mortality tables used for the calculations. Since men have lower life expectancy (higher mortality rates at the same age) as women, the level of the actuarially neutral adjustment is lower for them (higher incentive to retire under the same conditions). As the Austrian pension system is not automatically adjusted to the

Figure 2: The effect of additional earnings on incentive neutral adjustments (net pension entitlements)



increasing life expectancy, the actuarially neutral adjustment is also significantly affected by this change.

We investigate the effect of the difference between the male and female life expectancies and the effect of the increased life expectancy over the last 10 years. We compute the actuarially neutral deductions for a person with a medium pension entitlement (30.000 EUR) and medium income (39.510 EUR) based on male, female and unisex mortality rates and for mortality tables 2004 and 2014. The results are highlighted in Table 4.

Table 4: Actuarially neutral decrements (in percent) at different age, sex, and mortality table

Sex	Mortality Table 2014			Mortality Table 2004		
	Age			Age		
	62	63	64	62	63	64
Male	5.04	5.38	5.62	5.56	5.88	6.15
Female	3.74	3.98	4.21	4.02	4.27	4.50
Unisex	4.33	4.61	4.84	4.70	5.00	5.21

Since men have higher mortality rates at the same age, the annuity factor is lower, resulting in a statistically shorter pension flow. Because the life expectancy increases over time, individuals receive a longer pension flow and hence prefer to work longer to get higher pension entitlements.

Figure 3 depicts the effect of the valorization of the pension account on actuarially neutral adjustments for the baseline scenario. We find that a higher valorization paid on pension accounts reduces the actuarially neutral deductions as working longer becomes more attractive.

Figure 3: The effect of the valorization of the pension account on actuarially neutral adjustments

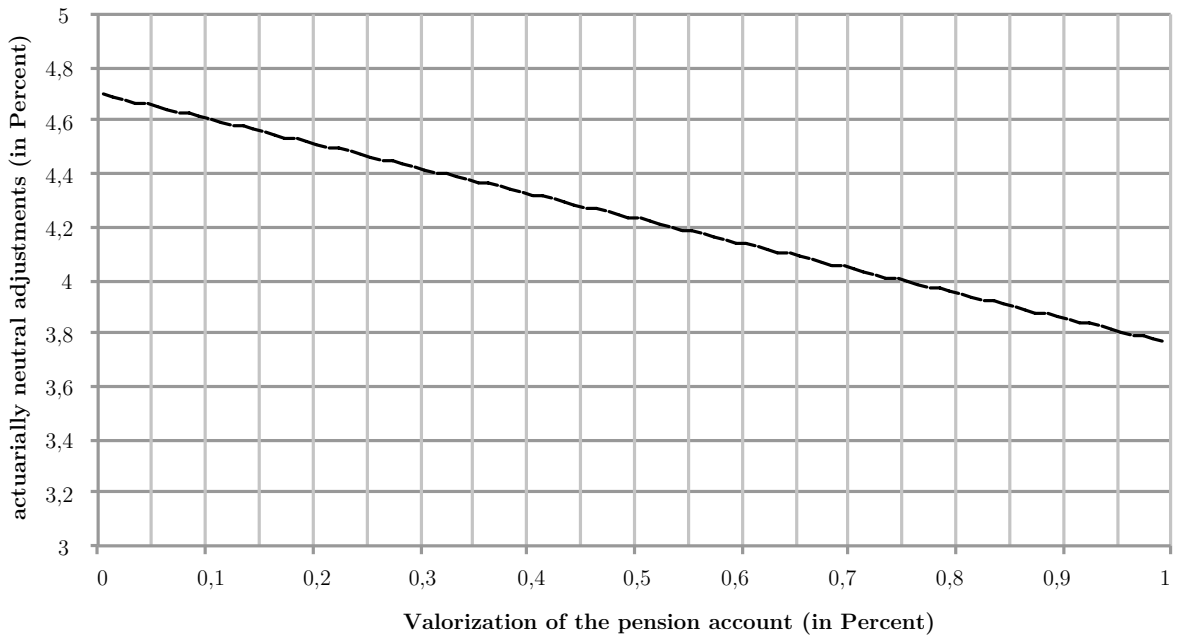


Table 5 shows the effects of different interest rates. A high riskless interest rate reduces the annuity factor and hence increases the actuarially neutral adjustment. This is simply due to the fact that money now is more attractive than money in the future.

Table 5: The effect of the riskless interest rate on actuarially neutral decrements for baseline parametrization (in percent)

Riskless interest rate	Age		
	62	63	64
1%	3.78	4.08	4.30
1.5%	4.33	4.61	4.84
2%	4.87	5.15	5.38

4.4. Discussion

We find that the current deductions in the Austrian pension corridor (4.2 percent per year of early retirement) are on average slightly below the level that would be necessary for actuarial neutrality. Due to the increase of the deductions to 5.1 percent in 2017, the adjustments will then be on average slightly above the neutral deductions. These calculations are especially interesting from the perspective of the pension system. Actuarially neutral deductions imply no additional costs for the pension system for early retirement, since the pension wealth is the same for retiring or working an additional year. These calculations are based on gross pension wealth.

Since the retirement decision of an individual is more likely to depend on the net pension wealth it can give an additional incentive to retire. The Calculation of this incentive neutral deductions for the net pension wealth reveals that the actual deductions are significantly below the neural ones, no matter whether they are 4.2 or 5.1 percent. This implies that there is indeed a financial incentive for earlier retirement.

Even though Manoli and Weber (2011) argue that there is a relatively low responsiveness of retirement decisions to financial incentives in Austria, we show that incentives for earlier retirement in Austria occur mainly due to the tax system, and not due to the pension system itself. D'Addio et al. (2010) show that the financial incentive to prolong working life does not only depend on the change in pension wealth for working longer, but also depends crucially on the net pension wealth when the decision of retirement is

made. Austria is in the group of countries with the highest net pension wealth at the age of 60 which implies an additional incentive to retire earlier. This is not surprising, since actuarial fairness is not fulfilled in Austria's pension system[10].

Additionally, we find that the actuarially neutral deductions fall if the life expectancy (survival probability) increases. Hence, even though the actual deduction might be below the actuarially neutral values, this gap will shrink with increasing life expectancy. This implies that a revaluation of the deductions would be necessary to guarantee actuarial neutrality, at least in the long run.

Under the condition that the task of the pension system is also to ensure an adequate income for older people with a minimum pension income, the two discussed actuarial concepts cannot alone be a target of a pension system. The imposition of actuarial neutrality and fairness might hurt low-income workers because early retirement can push them under the poverty threshold. Furthermore, low income workers might not be able to receive a pension payment above the poverty threshold trough their own contributions. This is an important consideration for policy makers who usually introduce a minimum pension payment to overcome this problem. Nevertheless, if the sustainability cost of the pension system increases because of inadequate incentives to contribute (actuarial fairness) and retirement incentives (actuarial neutrality) the taxes and/or contributions needed to pay the benefits will increase. This in turn affects the labor supply incentives of younger workers, implying that the disincentives of working will be only reshuffled between the age cohorts.

In the discussion of actuarial neutrality and fairness one should not forget that both concepts are defined across the population. Since there are significant differences between the individual life expectancy (women and people with high income live statistically longer than men or individuals with low income respectively[11]), this raises the question whether

[10] see e. g. Knell (2005) or Knell (2013).

[11] see e.g. Von Gaudecker et al. (2007) and Waldron (2007)

it is "unfair" to use average demographic parameters. Following Knell (2013), a one-time compensatory payment to the individual account might overcome and reduce the difference among the individuals.

5. Concluding Remarks

The goal of this paper was to investigate the actuarial neutrality and the financial incentive neutrality for early retirement (age corridor) in the Austrian pension system. Our results contribute to the discussion of the choice of an actuarially neutral adjustment of pension levels for individuals retiring earlier than at the statutory retirement age of 65 years.

In contrast to previous research we investigate not only the actuarially neutral adjustments, but also the incentive neutral adjustments. The first indicator is relevant for the overall pension system, while the second indicator focuses on the decision of an individual.

We show that the choice of a 5.1 percent deduction is on average almost in line with the concept of actuarial neutrality. Still, we show that this concept differs across pensioners. Neutral deductions should be higher for low income groups as well as for individuals with a higher pension account level.

While it is often argued that a deviation from neutral deductions gives financial incentives for early or later retirement, we argue that not the gross pension wealth but the net pension wealth should be considered for the analysis of individual incentives. Our analysis shows that the actual deductions of the Austrian pension corridor are below the incentive neutral deductions, especially for those people with low and middle income and a medium or high pension account level. Even though financial incentives might not be the main reason for early retirement, our analysis suggests that there are financial incentives for early retirement in the pension corridor of the Austrian pension system stemming from the Austrian tax system.

Both the actuarially neutral adjustments and the incentive neutral adjustments decrease if the pension account valorizations are higher, life expectancy (survival rate) increases or the riskless interest rate decreases. Additionally, the deductions increase with the retirement age i.e. when the individual is closer to the statutory retirement age. Moreover, we

find that the use of unisex mortality rates leads to a disadvantage of women against men due to women's higher life expectancy. Unisex deductions therefore lead to an unequal treatment of men and women within the pension system.

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