The Austrian System of Individual Pension Accounts – An Unfinished Symphony

Markus Knell[1]

The new Austrian pension system based on individual accounts is a clear improvement over the former system. A serious shortcoming of the new system, however, is that it does not react to demographic changes, in particular to increases in life expectancy. I contrast the Austrian and the Swedish pension account systems to demonstrate how and why the latter is able to react to demographic changes. I also show how the Austrian system could be adapted to include such an automatic adjustment mechanism. In particular, this would require a continuous modification of the "key formula" 80/65/45 (80% replacement rate after 45 contribution years at a retirement age of 65). In a next step I argue why an increase in the average retirement age seems to be the most appropriate and viable reaction to the increase in life expectancy and why alternative adjustment policies have their limits. Finally, I discuss some commonly expressed objections to this adjustment strategy. I also sketch how a system of individual accounts could be amended in order to take some of these objections into account.

JEL classification: H55, J1, J26
Keywords: pension system, demographic change, life expectancy

The reorganization of the Austrian pay-as-you-go (PAYG) pension system into a regime based on individual accounts is a major achievement that has eliminated many weaknesses of the older defined benefit system, like the short assessment period, the insufficient method of revaluation and the strong incentives for early retirement (see Knell et al., 2006). The new system is an important step in order to advance financial sustainability, to improve the extent of intra- and intergenerational fairness and to strengthen the incentives for later retirement. By the beginning of 2014, also the transparency of the individual accounts will be enhanced since the pre-reform pension entitlements of all insured person born after 1955 will be transformed into "initial credits" that are then transferred to the individual accounts.

These laudable reforms, however, have certainly not solved all present or future problems. Current challenges concern, e.g., disability pensions, the equalization of the statutory pension age for men and women and the full harmonization of all the different pension schemes that still exist in Austria. In this article I will focus on one aspect that is of crucial importance and that is still neglected in the new system: the steady and foreseeable increase in life expectancy.

The available data show that in Austria period life expectancy at birth (average for men and women) increased from 68.7 (in 1960) to 80.8 (in 2011) in an almost perfectly linear manner. In other words, for each calendar year life expectancy increased by 3 months. Using the concept of remaining life expectancy at the age of 60 one can also observe an almost perfect linear trend although the increase is only 1.5 to 2 months for each calendar year. In the demographic literature there exists a controversy about the best prediction of future developments but it is quite common to assume a continuation of the linear increase in life expectancy, at least for the next 100 years (see Oeppen and Vaupel, 2002).[2] This, how-

[1] *Oesterreichische Nationalbank, Economic Studies Division, Markus.Knell@oenb.at.*

[2] *In fact, this also corresponds to the most recent demographic forecast of Statistics Austria that expects an (almost) linear increase in average life expectancy to 86 (in 2040) and 89 (in 2070).*

Refereed by
Conny Olovsson,
Sveriges Riksbank

ever, would put the Austrian pension system under severe stress since in its current form it does not include *any* mechanism in order to react to this development in an automatic manner.

In this paper I will deal with this fundamental deficiency of the new Austrian pension system. In section 1 I describe the main features of the Austrian system and I compare it to the Swedish model (which is also based on individual pension accounts). In section 2 I use examples to show why the Austrian version of the model leads to problems as life expectancy increases and why this is not the case for the Swedish variant. I will also show how the Austrian system *could* be adapted in order to include an automatic adjustment factor to life expectancy changes. This, however, would involve a continuous (and rather complicated) adjustment of crucial parameters like the accrual rate and the reference retirement age. In section 3 I briefly discuss whether an increase in the retirement age is the only viable answer to an increase in life expectancy while in section 4 I deal with various frequently raised objections to this policy. Section 5 concludes.

1 Pension Account Systems in Austria and in Sweden

In this section I describe the main elements of the pension account systems in Austria and in Sweden and discuss similarities and differences.[3]

1.1 The Austrian System

The centerpiece of the harmonized pension system is an individual defined benefit pension account specified in the General Pension Act (Allgemeines Pensionsgesetz, APG). The target benefit level is expressed by the formula "80/65/45:" After 45 years of insurance and retirement at the age of 65, the system provides an initial pension that corresponds to 80% of average lifetime income. This target is implemented by means of an accrual rate ("Kontoprozentsatz"). Every year 1.78% of total earnings (up to a ceiling) are credited to the account while past credits are revalued by the growth rate of the average contribution basis.[4] For early or late retirement within an age corridor between 62 and 68 there are annual deductions and supplements of 5.1% (starting in 2017, before that 4.2%). Only persons with a record of at least 37.5 years of insurance can use the pension corridor.

The uniformly applied contribution rate stands at 22.8%, of which 10.25% are paid by employees and 12.55% by employers (there are some exceptions for farmers and for self-employed persons). Existing pensions are (typically) adjusted for the rate of inflation. For non-contributory qualifying periods (due to childcare, unemployment, sickness etc.) the pension accounts are credited with specified amounts that are financed from the general government budget. Pension entitlements that were acquired before 2005 will be captured by initial credits to be transferred in 2014 to the pension accounts of all persons born after 1955.

1.2 The Swedish System

The most prominent example of a PAYG system that is based on pension accounts is the Swedish "notional defined contribution" (NDC) system. For the sake of comparison with the Austrian

[3] *This section is in part based on Knell (2005), which also includes a comparison with the German system of "earnings points."*

[4] *After 45 years of contributions this amounts to a value of 80% (1.78×45=80.1).*

model I want to briefly describe the main elements of the NDC framework.[5]

The contribution rate is 18.5% (7.5% paid by employees and 11% by employers). 16% of the contributions are paid into the PAYG-based pension account while the remaining 2.5% are used for investment in a funded (capital market-based) pillar. The contributions to the notional account are revalued by a "notional interest rate" defined as the growth rate of average earnings. At retirement this accumulated "notional capital" is transformed into an annual pension payment. In the simplest version of this annuitization the notional capital is simply divided by the remaining life expectancy.[6] An increase in life expectancy will thus lead to an automatic reduction in benefits. Current pensions are also adjusted by the "notional interest rate" (again the Swedish model is slightly more complicated). For non-contributory qualifying periods the system also credits the individual accounts with tax-financed contributions.

1.3 Similarities and Differences between the Austrian and the Swedish Systems

The Austrian and the Swedish systems have a number of characteristics in common:

- There exists a lifelong assessment period and each year of contributions counts equally for the calculation of pension benefits.
- Past contributions are "revalued" in an adequate manner based on the development of earnings.
- There are deductions and supplements for early and late retirement.
- There are non-contributory qualifying periods (e.g. for childcare).
- There exists a minimum pension.
- Both systems use transparent individual accounts and provide (annual) statements.

Besides these similarities there exists, however, also one crucial difference.

- The Swedish model reacts in an automatic manner to demographic developments (in particular to an increase in life expectancy) while such a mechanism is absent in the Austrian model.

In light of the numerous common features this difference might look like a minor detail. Contrary to this first impression it is, however, of central importance as I will explain in the next section.

2 Shortcomings of the Austrian Pension Account System

In order to illustrate the central difference between the Swedish and Austrian systems I will use a simple numerical example. The example is meant to capture the main components of the two systems. The parameter values, however, do not exactly follow the real-world models but are rather chosen to facilitate the calculations and comparisons.[7]

2.1 The Case of a Stable Demographic Environment

I start with a stylized situation where it is assumed that both the size of generations and their life expectancy are con-

[5] *Detailed accounts of the system can be found in the collective volumes Holzmann and Palmer (2006) and Holzmann et al. (2012). These books also discuss many other advantageous properties of NDC system like transparency, flexibility and portability.*

[6] *The Swedish model is slightly more complicated since it "frontloads" part of the expected future pension adjustment (Palmer, 2000, Appendix 1).*

[7] *In a longer background manuscript (written in German) I provide more examples and a sometimes more extensive discussion of various issues that are only touched upon in the present article (see Knell, 2013).*

stant. I focus on one representative (male) individual that enters the labor market in the year 2010 at the age of 20, works without interruption until the age of 65 and receives a pension until his death at the age of 80. The contribution rate is assumed to be equal to 25%. The pension account of this individual is shown in table 1. Column 3 reports his annual earnings while column 4 shows the growth rate of average earnings, which is important for the revaluation of past contributions.

In columns 5 to 7 I show the statements of a *defined contribution system* that follows the Swedish model. The values in the table are calculated from: *7,500=0.25×30,000, 7,650=0.25×30,600* etc. The notional capital is given by the sum of current contributions and the revalued notional capital of the previous period, i.e. *15,300=7,650+7,500×1.02, 23,409=7,803+15,300×1.02* etc.[8]

When the individual retires at the age of 65 the accumulated notional capital (that is once more revalued from 2054 to 2055) is divided by the remaining life expectancy that is assumed to be 15 in the current example. The initial annual pension payment is thus given by *54,852=822,776/15.* The adjustment of current pensions will be discussed below.

Columns 8 to 10 show the pension calculations and the statements of a *defined benefit pension account system* that follows the Austrian model. I have constructed the example in such a manner that the pension payment is the same as

Table 1

Benchmark Case – Constant Life Expectancy

				Defined Contribution Account (Sweden) Contribution rate: 25%			Defined Benefit Account (Austria) Target (at 65 after 45 CP): 75% Accrual rate: 1.67%		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Year	Age	Individual earnings	Average earnings (growth in %)	Annual contributions	Total Capital	Pension	Annual credit	Total credit	Pension
2010	20	30,000	2	7,500	7,500		500	500	
2011	21	30,600	2	7,650	15,300		510	1,020	
2012	22	31,212	2	7,803	23,409		520	1,561	
2013	23	31,836	2	7,959	31,836		531	2,122	
⋮	⋮	⋮	⋮	⋮	⋮		⋮	⋮	
2053	63	70,296	2	17,574	773,252		1,172	51,550	
2054	64	71,702	2	17,925	806,643		1,195	53,776	
2055	65		2		822,776	54,852		54,852	54,852
2056	66		2			55,949			55,949
2057	67		2			57,068			57,068
⋮	⋮		⋮			⋮			⋮
2068	78		2			70,957			70,957
2069	79		2			72,376			72,376

Source: Author's calculations.

Note: The table compares a Swedish defined contribution (columns 5 to 7) and an Austrian defined benefit (columns 8 to 10) pension account model. For both cases it is assumed that the contribution rate is 25%. The example looks at a ficticious individual that started work in 2010 at the age of 20, has an earnings pattern as shown in column 3 and retires at the age of 65. The real growth rate of average earnings (that is needed for revaluation) is assumed to be constant at 2%. CP=contribution periods.

[8] *For the sake of simplicity I assume that the real growth rate of wages is constant at 2% and that the earnings of the individual also grow at the same rate. In other words, I look at a "representative" member of a birth cohort. The starting value of 30,000 is broadly in line with the average contribution basis of the Austrian pension system which was about 32,500 in 2011.*

in the Swedish model. In particular, I assume that after 45 contribution years at a retirement age of 65 the system provides a replacement rate of 75%.[9] This target implies an accrual rate of 1.67%.[10] The annual credit ("Teilgutschrift") follows from: *500=0.0167×30,000, 510=0.0167×30,600* etc. The total credit ("Gesamtgutschrift") on the account (column 9) is the sum of this annual credit and the (revalued) total credit of the previous period. The initial pension at the age of 65 equals the total credit at the end of the working life and is in the present example again 54,852.

For appropriately chosen parameter values, the two systems will thus lead to identical initial pensions. Obviously, also the following pension payments will be the same if both models use the same method of pension adjustment. Assuming, e.g., an indexation to the growth rate of average earnings (as is done in table 1), the pension in the year 2056 will be 55,949 in each of the two cases. The Austrian APG stipulates that current pensions are adjusted only by the rate of inflation. This, however, does not affect the general observation that in a constant demographic environment a Swedish defined contribution and an Austrian defined benefit system can be designed in a way that they lead to identical outcomes.

Finally, it is important to note that both pension accounts shown in table 1 are associated with a financially balanced pension system under the assumption of a constant demographic structure. This is not immediately obvious from the reported example but can be shown with a little bit of algebra (see Knell, 2012).[11]

2.2 The Case of Early Retirement

I stick to the assumption of a stable demographic environment but now assume that the insured individual enters retirement at the age of 60 after 40 years of contributions. The pension calculations for the two pension account systems are shown in table 2.

The *Swedish defined contribution system* reacts in an automatic manner to early retirement. At the moment of annuitization (i.e. when the initial pension is calculated) the notional capital that has been accumulated until the age of 60 will now be divided by the higher remaining life expectancy (20 years). The pension will be: *33,121=662,412/20.* While for retirement at the age of 65 the pension level (or the replacement rate) amounted to 75% *(54,852/73,136)* it is now reduced to 50% *(33,121/66,241)* for early retirement at the age of 60. Due to this automatic reduction the budget of the entire system remains in balance.[12]

[9] *"Replacement rate" defines the ratio of the initial pension to average (revalued) lifetime earnings. In the present example this replacement rate also corresponds to the "pension level," which is defined as the ratio of the pension to current, economy-wide earnings. See, e.g., Knell et al. (2006) and OECD (2012).*

[10] *As described in section 2.1 in the APG the target level is 80% with a corresponding accrual rate of 1.78%. In this case, a balanced system would require a contribution rate of 26.67%. I use a value of 25% in order to make it easier to check the calculations.*

[11] *The sustainability of the pension models can be easily grasped by referring to a case where earnings are constant. In particular, assume that they are fixed at 30,000 and that each cohort has 100 members. Total revenues of the system in each year are then given by the product of the contribution rate (0.25), average earnings (30,000), the cohort size (100) and the number of working cohorts (45), i.e. 0.25×30,000×100×45=33,750,000. Total expenditures, on the other hand, are the product of the average pension (22,500), the cohort size (100) and the number of retired cohorts (15), i.e. 22,500×100×15=33,750,000. Total expenditures are thus equal to total revenues and the system is in balance.*

[12] *This can again be illustrated by an example similar to the one in footnote 11.*

Table 2

Early Retirement

				Defined Contribution Account (Sweden) Contribution rate: 25%			Defined Benefit Account (Austria) Target (at 65 after 45 CP): 75% Accrual rate: 1.67%		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Year	Age	Individual earnings	Average earnings (growth in %)	Annual contributions	Total capital	Pension	Annual credit	Total credit	Pension (no deductions)
2010	20	30,000	2	7,500	7,500		500	500	
2011	21	30,600	2	7,650	15,300		510	1,020	
⋮	⋮	⋮	⋮	⋮	⋮		⋮	⋮	
2049	59	64,942	2	16,236	649,423		1,082	43,295	
2050	60		2		662,412	33,121		44,161	44,161
2051	61		2			33,783			45,044
⋮	⋮		⋮			⋮			⋮
2068	78		2			47,304			63,073
2069	79		2			48,250			64,334

Source: Author's calculations.

Note: See table 1. In contrast to table 1, it is assumed here that the individual retires at the age of 60.

A *defined benefit pension account,* on the other hand, would – in the absence of any additional corrections – grant higher pension payments, which would lead to deficits in the social security system. This can be seen in column 10 of table 2, where the total credit at the age of 60 is 44,161, which would imply an initial pension that considerably exceeds the Swedish pension of 33,121 (67% replacement rate instead of 50%). The reason for this outcome lies in the fact that the defined benefit system takes account of only *one* consequence of earlier retirement, namely the smaller number of contribution years, which reduces total pension credits. The second consequence, however, the larger number of benefit years is neglected. A stable financial balance of a defined benefit system thus also needs a framework of deductions and supplements. In the current example the appropriate, financially affordable pension benefit is the Swedish one given by 33,121. This can be achieved by applying a total deduction of 25% (since *33,121=0.75× 44,161).* This total deduction corresponds to an annual deduction of 5% (arithmetic mean) or 5.59% (geometric mean). In fact, the deductions/supplements that are specified in the Austrian APG (5.1%) are within the range of these "appropriate" values.[13]

Summing up, early retirement leads to an actuarial appropriate automatic reduction of pension benefits in the Swedish model while in the Austrian model a system of additional deductions and supplements is required to achieve a similar result.

2.3 The Case of Increasing Life Expectancy

In the next step I will lift the assumption of a stable demographic environment and I assume in this section that life expectancy increases. In particular, I take the example of table 1 but now assume that life expectancy increases

[13] *The calculation of appropriate deductions is not a trivial task (cf. Brunner and Hoffmann, 2010; Gasche, 2012).*

by 4 years. For the further considerations the reaction of the insured individuals is of crucial importance. I want to deal with two scenarios:

- *Scenario 1:* Each cohort increases (on average) the retirement age in such a manner that the (average) replacement rate stays constant (table 3).
- *Scenario 2:* The retirement age stays constant at 65 years (table 4).

Scenario 1 captures the optimistic situation that each cohort postpones retirement in response to the increase in life expectancy. In particular, I assume that the retirement age is adjusted such as to keep the replacement rate constant at 75%. This means for the present example that three years out of the four additional years of life are spent in the labor market and one year in retirement.[14] The intuition behind this result is straightforward. Before the assumed increase in life expectancy the representative member of a cohort paid contributions for 45 years (from age 20 to 64) and received a pension for 15 years (from age 65 to 79). The ratio of retirement years to working years was *15/45=1/3.* When life expectancy increases by 4 years then this additional lifetime has to be divided in the same proportion in order to preserve the financial balance of the system with constant contribution and replacement rates. This amounts to three additional working periods and one additional year of retirement such that again *16/48=1/3.* The "neutralizing" *reference retirement* age is a crucial measure in the Swedish and even more so in the Austrian pension account system, as I am going to argue below.[15]

Table 3

Increase in Life Expectancy – Scenario 1 (Higher Retirement Age)

				Defined Contribution Account (Sweden) Contribution rate: 25%			Defined Benefit Account (Austria) Target (at 68 after 48 CP): 75% Accrual rate: 1.56%		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Year	Age	Individual earnings	Average earnings (growth in %)	Annual contribu-tions	Total capital	Pension	Annual credit	Total credit	Pension
2010	20	30,000	2	7,500	7,500		469	469	
2011	21	30,600	2	7,650	15,300		478	956	
⋮	⋮	⋮	⋮	⋮	⋮		⋮	⋮	
2054	64	71,702	2	17,925	806,643		1,120	50,415	
2055	65	73,136	2	18,284	841,060		1,143	52,566	
2056	66	74,598	2	18,650	876,530		1,166	54,783	
2057	67	76,090	2	19,023	913,084		1,189	57,068	
2058	68		2		931,345	58,209		58,209	58,209
2059	69		2			59,373			59,373
⋮	⋮		⋮			⋮			⋮
2072	82		2			76,806			76,806
2073	83		2			78,342			78,342

Source: Author's calculations.

Note: See table 1. In contrast to table 1, it is assumed here that life expectancy is 84 (instead of 80) and that the individual retires at the age of 68.

[14] *This "sharing rule" is not only true for the present example but also holds in general, e.g. for a continuous increase in life expectancy, as shown in Knell (2012).*

[15] *For a discussion and an empirical analysis of the reference retirement age in the Swedish NDC system, see Lowén and Settergren (2012).*

The *defined contribution model* organizes the adjustment to the increased life expectancy and the increased retirement age in an automatic fashion. As shown in table 3 the longer working life leads to a higher final notional capital (931,345). The remaining life expectancy is now 16 years and this implies an initial pension of *58,209=931,345/16.* This corresponds to a replacement rate of 75%.

In the *defined benefit model* this is more complicated. In this case it is indispensable to calculate the reference retirement age in order to determine the annual accrual rate that corresponds to the target benefit level. In the present example the reference retirement age is 68 and the new reference contribution periods 48. For an intended replacement rate of 75% this implies an accrual rate of *1.56=75/48.* Using this value one gets again identical pension benefits as in the Swedish system. This means, however, that the crucial formula "80/65/45" has to be adjusted in annual (or at least regular) steps to the increase in life expectancy in order to keep the system in balance. For a life expectancy of 84 the formula has to be changed to "80/68/48" and for a further increase to 85 and 86 years to "80/68.75/48.75", "80/69.5/49.5" etc. If one fails to adjust the formula and keep the accrual rate constant (in the present example at 1.67) then the initial pension would amount to 62,090 (corresponding to a replacement rate of 80%). This, however, would lead to a constant (and increasing) deficit in the pension system. A continuous adjustment of the key formula is certainly possible, although it has to be said that it might be somewhat intransparent (each cohort would have its own formula and its own accrual rate) and arguably also subject to frequent political controversy.

For *scenario 2* I look at a more "pessimistic" (or realistic?) situation in which despite the increase in life expectancy the retirement age remains at 65. Table 4 shows the pattern of pension payments in the two account models. In the defined

Table 4

Increase in Life Expectancy – Scenario 2 (Constant Retirement Age)

				Defined Contribution Account (Sweden) Contribution rate: 25%			Defined Benefit Account (Austria) Target (at 68 after 48 CP): 75% Accrual rate: 1.56%		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Year	Age	Individual earnings	Average earnings (growth in %)	Annual contributions	Total capital	Pension	Annual credit	Total credit	Pension (no deductions)
2010	20	30,000	2	7,500	7,500		469	469	
2011	21	30,600	2	7,650	15,300		478	956	
⋮	⋮	⋮	⋮	⋮	⋮		⋮	⋮	
2054	64	71,702	2	17,925	806,643		1,120	50,415	
2055	65		2		822,776	43,304		51,423	51,423
2056	66		2			44,170			52,452
2057	67		2			45,053			53,501
⋮	⋮		⋮			⋮			⋮
2072	82		2			60,636			72,005
2073	83		2			61,849			73,445

Source: Author's calculations.

Note: See table 1. In contrast to table 1, it is assumed here that life expectancy is 84 (instead of 80) and that the individual retires at the age of 65.

contribution system, the increase in life expectancy at a constant retirement age leads to an automatic reduction in pension benefits. The initial pension is now given as *43,304=822,776/19,* which corresponds to a replacement rate of only 58.2%. The entire system again remains in balance as has already been the case for all previous examples in tables 1 to 3 (see footnote 11). In the defined benefit model, however, one needs again additional deductions and supplements if an individual exits the labor market before the reference retirement age. Without these deductions, the new accrual rate of 1.56% would again imply a higher initial pension of 51,423, which corresponds to a replacement rate of 70.3%. The "actuarially fair" deduction can be calculated as 5.57%, which is slightly below the previous deduction rate of 5.59%.[16]

Summing up, it can be said that the Swedish model reacts automatically to increases in life expectancy, and the system remains in balance in the medium to long run. The adjustment mechanism follows from the principle of annuitization at retirement, according to which both the number of contribution years and the number of retirement years play a role – the former through the size of the notional capital and the latter through the remaining life expectancy at the moment of retirement. The Austrian model, on the other hand, is not inherently designed in a way such as to accommodate a continuously increasing life expectancy. It *could* be adapted to such an environment but this would require a continuous (preferably an annual) adjustment of four crucial parameters: first, the cohort-specific reference retirement age (currently 65); second, the cohort-specific reference contribution years (currently 45); third, the cohort-specific accrual rate (currently 1.78); and fourth, the deduction and supplements (currently 5.1%). In addition, it might also be advisable to adjust the bounds of the pension corridor (currently 62 and 68, respectively) in lockstep with the increase in the reference retirement age. The necessity of explicit continuous adjustments is certainly a disadvantage of the defined benefit system that might – as a consequence – appear more complicated and less transparent and probably be regularly subject to intense public and political debates.

2.4 The Case of Fluctuations in the Cohort Size

So far I have focused on two specific demographic situations: a constant environment (sections 2.1 and 2.2) and increasing life expectancy (section 2.3). There exists, however, another important demographic trend: fluctuations and permanent changes in the average size of working cohorts.[17] The financial stability of a PAYG system crucially depends on total revenues, which are significantly influenced by the size of the labor force. There are three important potential causes for fluctuations in the size of working cohorts: first, baby boom-and-bust cycles, second, the extent of net migration, and third, changes in (age-dependent) labor force participation.

[16] *At first glance it might look astonishing that despite the increase in life expectancy the deduction rate is now lower. This, however, is straightforward. A longer life means that there are more pension payments and a specific deduction rate leads to a higher reduction in "total pension wealth." The annual deduction rate can thus be lower in order to achieve the same total reduction.*

[17] *In addition to adapting to demographic changes, it is of course important that a PAYG system is also capable of dealing with other macroeconomic shocks, e.g. with business cycle fluctuations. A thorough examination of these aspects is, however, beyond the scope of this article.*

One could again construct numerical examples similar to the ones presented in tables 3 and 4 to illustrate the reaction of different pension systems to fluctuations in the average cohort size. For the sake of brevity, however, I will only make a few short comments on this topic.[18] For a defined contribution system it is again rather straightforward to account for this situation. One could, e.g., use the growth rate of the contribution base instead of the growth rate of the *average* contribution base as the notional interest rate in order to take fluctuations in the labor force into account. Under certain assumptions the system will then again be kept in balance. A similar strategy could be used in a defined benefit system but this is currently not planned in the Austrian model and I know of no studies that have discussed such an approach in a systematic manner.

3 Alternatives to an Increase in the Retirement Age?

Both pension account models discussed in section 2 are characterized by the fact that the contribution rate is fixed and that all adjustments to increasing life expectancy are based on a combination of increasing retirement age and lower annual pension benefits. In order to get an idea about the real world dimension and to also discuss possible alternative adjustment strategies it is instructive to look at a realistically calibrated example. In particular, I assume that the size of birth cohorts is constant while the annual increase in life expectancy is 2 months. Starting from a life expectancy of 80 in the year 2010 this implies an increase to 87 (in 2060) and 94 (in 2110). In box 1 I discuss the benchmark equation of every PAYG system on which this simulation exercise is based.

I start the simulations with values that roughly correspond to the current Austrian situation. In particular, I assume that the contribution rate is 22.8%, the government contribution rate is 25%, the average pension level is 60%, the average retirement age is 60 and the dependency ratio is 50% (i.e. there are two pensioners for each employed person).[19] In the following I will report how the system has to adjust to accommodate the increase in life expectancy if only one instrument is changed at a time. In order to keep the system in balance one has to ….

- … increase the contribution rate from 22.8% to 31% and then to 39% (if life expectancy increases from 80 to 87 and later to 94).
- … increase government contributions from 25% to 45% and then to 56%.
- … reduce the average replacement rate from 60% to 44% and then to 35%.
- … or increase the retirement age from 60 to 65 and then to 70 (again if life expectancy increases from 80 to 87 and later to 94).

Summarizing these calculations one can say that if the retirement age remains at its current value of 60 and if there are no changes in the calculation of benefits, demographic developments have to be absorbed by considerable increases in the contribution rate or an even more extensive increase in government contributions (from 25% to more than 50%). If, by contrast, the (individual and government) contribution rates remain constant (together with the retirement age) then pension benefits

[18] *A more extensive discussion of the case of fluctuating cohort sizes can be found in Knell (2010) (where I focus on the German sustainability factor) and in Knell (2012) (where I focus on the Swedish system).*

[19] *Details on the sources of these starting values can be found in Knell (2013).*

Box 1

The Basic Equation of PAYG Systems

The budget of a PAYG system in year t is given by:

$$\tau_t W_t L_t + B_t = P_t R_t,$$

where τ_t is the contribution rate, W_t the average contribution base (or average earnings), P_t the average pension payment, L_t the number of contributors, R_t the number of pensioners and B_t the contributions of the government ("Bundesbeitrag"). This equation has to be fulfilled at the end of a year, independent of how these six parameters are actually determined. In Austria, e.g., this is done by a government guarantee („Ausfallshaftung"), which implies that B_t will increase if total contributions $\tau_t W_t L_t$ turn out to be lower than total expenditures $P_t R_t$. The equation can also be rewritten as:

$$\frac{\tau_t}{1-b_t} = q_t \frac{R_t}{L_t}$$

where $q_t \equiv \frac{P_t}{W_t}$ stands for the average pension level (or – somewhat sloppily – the average replacement rate) and $b_t \equiv \frac{B_t}{P_t R_t}$ measures government contributions as a percentage of total expenditures. The dependency ratio $\frac{R_t}{L_t}$ can increase if – for a constant life expectancy – the working population decreases (which reduces the denominator) or if – for constant cohort sizes – life expectancy increases (which will increase the numerator) or if both of these two processes are present at the same time.

have to be reduced substantially. At the end of the simulation period the average pension level would be around the poverty line (35% replacement rate). In this scenario one would almost unavoidably need extra payments, either via a second or third pillar or through government supplements ("Ausgleichszulage"). In the first case this would again correspond to additional contributions (since the second and third pillars have to be funded), while in the latter case one would again face an increase in government, tax-financed support. In the light of these alternatives the last variant – an increase in the retirement age – seems to be the most "natural" approach.[20] The numerical values of the example also indicate that the necessary increases in the retirement age seem to be feasible. Until the year 2060 (when life expectancy could reach 87) the average retirement age would have to increase to 65, and in the year 2110 (with an assumed life expectancy of 94) the average employee would have to remain in the labor force until the age of 70.

In the public discussion, two additional claims are often raised about how the funding of the pension system can be secured. First, it is proposed that the costs of ageing can simply be financed from expected productivity gains. The argument is based on the observation that higher real incomes allow larger transfers to retired cohorts without leading to lower net incomes of the contributing generations. What is typi-

[20] *This is also the conclusion of N. Barr in a recent report on the Swedish system: "The problem of paying for pensions is largely the result of rising life expectancy with a fixed retirement age. The obvious solution is that pensionable age should rise in a rational way as life expectancy increases" (Barr, 2013, p. 94).*

cally not mentioned by its supporters is, however, that this proposal is basically identical to an increase in the contribution rate.

The second proposal that can often be heard is that the financial stability of PAYG systems can be guaranteed by increasing the number of contributors. This can be accomplished by promoting an increase in the fertility rate, net migration or – what the supporters mainly have in mind – labor market participation. A high labor force participation rate is undoubtedly an important goal in itself. It would, however, be illusive to expect too much from this measure since the participation rates for prime-aged individuals (25–54) are already rather high in Austria (around 90% for men and 80% for women). For older individuals there is certainly room for improvement but any policies to this end are basically synonymous to an increase in the effective average retirement age. Furthermore, one has to take into account that expanding labor market participation in order to account for increasing life expectancy is a rather short-sighted policy. Today's contributors are tomorrow's pensioners and the financing problems return in the future with added strength (for a numerical example see Knell, 2013).

4 Discussion

The results of the previous sections suggest that the most appropriate reaction to an increase in life expectancy is a parallel (although less than 1:1) increase in the retirement age. This raises a number of questions concerning possible objections to this policy. I will mention some of these issues below.

- *Are there enough jobs?*
  It is sometimes argued that a general prolongation of working life will reduce the number of jobs available for younger cohorts, thereby increasing their unemployment rates. While it seems reasonable to assume that a sudden jump in the activity rates of older individuals will lead to labor market ramifications this is much less likely for a slowly moving process that follows the similarly steady rise in life expectancy. In fact, countries with high participation rates of older workers typically do not face higher unemployment (or non-employment) rates of young people. This is, e.g., documented by the OECD (2011, chapter 4). A comparison between the employment rates of older (aged 55–59) and younger people (aged 20–24) shows a significantly positive (instead of negative) relationship, which leads the authors to the conclusion that the lump-of-labor hypothesis is a fallacy.
  In the same publication the OECD, however, also shows that there is some empirical basis for the concern that high seniority wages might make it more difficult for older workers to keep their jobs (or to find a new job after dismissals). It might thus be important to continue the process of redesigning the earnings curves (in particular for white-collar workers) and to also make employment at older ages more attractive for both employers and employees (see, e.g., OECD, 2006).
- *Will people be able to work longer?*
  It is also often stated that declining health will limit people's capacity to work at older ages. Again, however, this claim is not supported by empirical evidence. Many studies have documented the significant "compression of morbidity" that could be observed over the past decades, i.e. the phenomenon that "the age of onset of chronic illness […] [is] postponed more than the age of death and squeezing most of the morbidity in life into

a shorter period with less lifetime disability" (Fries et al., 2011, p.1). Of course this is only an observation about the average member of each cohort and it will be necessary to develop an appropriate and efficient system of disability pensions in order to guarantee the standard of living for those individuals that are no longer able to work due to health problems.

- *Is it enough to just focus on the design of the pension system?*
  An appropriate design of the old-age pension system seems to be a necessary but not a sufficient condition for an increase in the retirement age. First, as mentioned above, also the supply side has to be taken into account and firms have to be encouraged to offer adequate jobs. Second, recent studies suggest that it is important to look at the entire system of social support (including disability pensions and unemployment benefits). Increases in the statutory retirement ages often just lead to higher claims of disability pensions or old-age-unemployment (although these are associated with considerable cuts in pension benefits), thereby leaving the average age of exit from the labor market almost unchanged.[21]
- *Is it unfair to use average demographic parameters?*
  It is a well-documented fact that the socio-economic status (as measured by income, wealth or education) and life expectancy are positively correlated. Gaudecker and Scholz (2007), e.g., report that in Germany the difference in remaining life expectancy at the age of 65 between the individuals with the highest pensions and the lowest pensions is almost 6 years. Waldron (2007) has shown a similar pattern for the U.S.A., where persons with incomes in the top half of the earnings distribution live on average 5 years longer than persons in the lower half. Klotz and Doblhammer (2008), finally, show that in Austria male (female) life expectancy at the age of 35 differs by 6 years (3 years) between people with tertiary and with primary education. This is a difficult issue beyond the scope of this paper, but the following aspects should be considered: First, each pension system contains an (ex-ante) insurance against longevity and the (ex-post) redistribution from short-lived to long-lived individuals is just the mirror image of this arrangement. A potential problem only arises due to the fact that there exists a systematic correlation between the insured event and certain socio-demographic characteristics. In order to decide whether this represents an unfair treatment of certain groups one has to determine whether the lower life expectancy is primarily due to different kinds of jobs with different working conditions or due to personal lifestyle choices (involving, e.g., smoking, alcohol consumption, physical activity, and diet). Second, one has to note that this objection applies to all types of pension systems that are based on uniform retirement rules. Funded systems typically also use identical life expectancy data for calculating annuities (although they mostly distinguish between men and women) and defined benefit PAYG system are also usually based on general rules that do not condition on socio-economic status. Third, NDC

[21] *Staubli and Zweimüller (2013), e.g., study the spillover effects of an increased early retirement age legislated in the Austrian pension reforms 2000 and 2003 on the claims of disability and unemployment benefits.*

systems could in principle take life expectancy differences into consideration by using one-time compensatory payments to the individual accounts (see next point).

- *Is a self-sustained pension system an appropriate goal?*
  Another frequently expressed objection to automatic life expectancy factors and in particular to the NDC system is that it works as a purely self-sustained system that is financed solely by the contributions of the insured population. This absolves the government from any responsibility for the pension system and eliminates all elements of redistribution and solidarity. This argument, however, is not correct. First, even a standard NDC system (like the Swedish) includes various payments that stem from the general, tax-financed government budget. This refers to all compensations for non-contributory qualifying periods (due to unemployment, sickness, childcare or military service) and also to the payments necessary to ensure minimum pensions, which are financed from the general government budget. Furthermore, however, one could also think about an extended NDC system that uses the individual accounts to pursue specific redistributive goals. In particular, at the moment of retirement the system could transfer one-time payments to the notional accounts to compensate the insured individuals for different working conditions, different life expectancies or other intra-generational differences that are inadequately captured by the existing benefits for non-contributory periods. In fact, if one had the intention to freeze government contributions at a specific level (e.g. at 15%, which roughly corresponds to the current government subsidies to the ASVG system) one could even provide *each* insured person with some extra credit at retirement age. All of these one-time payments would not impair the functioning of the system and its automatic reaction to demographic changes, which is characteristic of NDC systems. The redistributive measures would, however, be more transparent than in many of the current PAYG systems. Discussing the design of such an "equitable NDC system" is again beyond the scope of this article but it would be a highly interesting topic for further examinations.

Summary

In this article I have presented an overview of the new Austrian pension account system that was established under the pension reforms of 2003 and 2004 and modified under the stability law of 2012. As mentioned in the introductory section, the new system must be applauded since it eliminated many of the shortcomings of the older system. On the other hand, however, the system is still not flawless, in particular as it includes no mechanism to deal with demographic changes. To illustrate this point I have contrasted the Austrian defined benefit pension account system to its Swedish defined contribution counterpart. I have used various numerical examples to account for the differences between the two systems and to highlight why the Austrian system in its current form is not able to react to the expected increase in life expectancy in an appropriate, self-stabilizing manner. I have also pointed out how the Austrian system *could* be adapted in order to incorporate such an automatic adjustment mechanism. In particular, this would amount to a continuous modification of the "key formula" 80/65/45 in order to account for demographic shifts. Although technically feasible, it could be argued that such a continuously changing yardstick might challenge the comprehensibility, transparency, communication and political implementation of the new system. In later sections of the paper I have also examined some (alleged) alternatives to an increase in the retirement age as the prime answer to increasing life expectancy, and I have briefly discussed some common objections to this strategy. I have argued that the system of individual accounts could be amended in order to take some of these objections into account.

To end on a positive note it must be stressed that by introducing a framework of individual accounts, Austria has established a sound basic structure for a transparent, fair and sustainable pension system. For its completion the framework only requires one additional major movement. Beyond this, however, one could also imagine a further orchestrated account system that functions as the cornerstone of a modern welfare state, documenting and organizing the flows of contributions and benefits between the insured population and the social security system.

References

Barr, N. 2013. The Pension System in Sweden. Report to the Expert Group on Public Economics at the Swedish Ministry of Finance.

Brunner, J. and B. Hoffmann. 2010. Versicherungsmathematisch korrekte Pensionsabschläge. In: Soziale Sicherheit. 614–621.

Fries, J. F., B. Bruce and E. Chakravarty. 2011. Compression of Morbidity 1980–2011: A Focused Review of Paradigms and Progress. In: Journal of Aging Research. Article ID 261702.

Gasche, M. 2012. Alte und neue Wege zur Berechnung der Rentenabschläge. MEA Discussion Paper 12252. Munich Center for the Economics of Aging (MEA).

Holzmann, R. and E. Palmer. 2006. Pension Reform: Issues and Prospects for Non-Financial Defined Contribution (NDC) Schemes. World Bank.

Holzmann, R., E. Palmer and D. Robalino. 2012. Nonfinancial Defined Contribution Pension Schemes in a Changing Pension World: Volume 1 and 2. World Bank Publications.

Klotz, J. and G. Doblhammer. 2008. Trends in Educational Mortality Differentials in Austria between 1981/82 and 2001/2002: A Study Based on a Linkage of Census Data and Death Certificates. In: Demographic Research 19. 1759–1780.

Knell, M. 2005. Demographic Fluctuations, Sustainability Factors and Intergenerational Fairness – An Assessment of Austria's New Pension System. In: Monetary Policy & the Economy Q1/05. 23–42.

Knell, M. 2010. How Automatic Adjustment Factors Affect the Internal Rate of Return of PAYG Pension Systems. In: Journal of Pension Economics and Finance 9. 1–23.

Knell, M. 2012. Increasing Life Expectancy and Pay-As-You-Go Pension Systems. Working Paper 179. Oesterreichische Nationalbank.

Knell, M. 2013. Leistungsorientierte vs. beitragsorientierte Pensionskonten. Bemerkungen zur aktuellen Diskussion. Mimeo.

Knell, M., W. Koehler-Toeglhofer and D. Prammer. 2006. The Austrian Pension System – How Recent Reforms Have Changed Fiscal Sustainability and Pension Benefits. In: Monetary Policy & the Economy Q2/06. 69–93.

Lowén, T. and O. Settergren. 2012. The Impact of Economic Conditions on the Financial Sustainability of Social Security Schemes. Cohort-specific Ages of Retirement. In: International Conference of Social Security Actuaries and Statisticians.

OECD. 2006. Live Longer, Work Longer. OECD. Paris.

OECD. 2011. Pensions at a Glance 2011. OECD. Paris.

Oeppen, J. and J. Vaupel. 2002. Demography — Broken Limits to Life Expectancy. In: Science 296(5570). 1029–1031.

Palmer, E. 2000. The Swedish Pension Reform Model: Framework and Issues. The World Bank, Social Protection Discussion Paper No. 0012.

Staubli, S. and J. Zweimüller. 2013. Does Raising the Early Retirement Age Increase Employment of Older Workers? In: Journal of Public Economics 108. 17–32.

Von Gaudecker, H.-M. and R. D. Scholz. 2007. Differential Mortality by Lifetime Earnings in Germany. In: Demographic Research 17(4). 83–108.

Waldron, H. 2007. Trends in Mortality Differentials and Life Expectancy for Male Social Security-covered Workers, by Socioeconomic Status. In: Social Security Bulletin 67(3). 1–28.