Demographic Fluctuations, Sustainability Factors and Intergenerational Fairness – An Assessment of Austria's New Pension System

Markus Knell[1]

This study discusses important elements of Austria's recently harmonized statutory pension system. In particular, the author investigates in how far the new system responds to the twofold demographic challenge of declining birth rates and increasing life expectancy and what this means in terms of fiscal sustainability and intergenerational redistribution.

Austria's defined benefit system is found to have more in common with Germany's system of earnings points than with Sweden's notional account system – with the exception that the sustainability factor, the adjustment mechanism triggered by demographic changes, has been designed differently in Germany and in Austria. A critical analysis of the Austrian provisions identifies the following problems: First, the application of the sustainability factor is activated only by deviations from projections and not to demographic movements as such. Second, adjustments are not to be automatic. Third, the requirement of an "even adjustment" is not spelled out in detail. Fourth, it is doubtful whether evenness is a desired feature in the first place since generation-specific reproductive behavior is neglected in this scenario.

Overall, the basic structure of Austria's new model gets a favorable rating, as it increases the degree of intergenerational fairness, supports individual, intersectoral and international flexibility and corrects some design flaws of the old pension regime. Conversely, weaknesses are identified with regard to the transitional arrangements, the contribution side and the sustainability factor.

1 Introduction

In early 2005, a new acronym – APG (Allgemeines Pensionsgesetz – General Pension Act) – was added to the Austrian legal framework. The APG lays down the fundamental structure of the new, harmonized statutory pension system in 16 articles, making specific reference to those sections – specifically transitional arrangements – where the provisions of the existing social security acts continue to apply. This study discusses important elements of the APG. Special emphasis is placed on the basic design principles of the new system. The main objective is to identify in how far the new system responds to demographic changes and what this means in terms of fiscal sustainability and intergenerational redistribution.

The basic structure of the APG is presented in chapter 2 and compared with the German and Swedish pension models. According to this comparative analysis, Austria's new (defined benefit) pension system has more in common with the (classical) German system than with the Swedish model, which is likewise structured as a notional account system, yet is of the defined contribution type.

Chapter 3 is dedicated to the question on how the demographic challenge is tackled under the new system. In addition, the Austrian sustainability factor is juxtaposed with its German counterpart and critically examined.

The study concludes with a summary assessment of Austria's new statutory pension system in chapter 4.

2 A Comparison of the Austrian, German and Swedish Pension Systems

Let us start out by studying and comparing the central design principles underlying the Austrian, Swedish and German pension systems. The Swedish and German systems lend themselves as benchmark models as they are frequently discussed in the literature and represent two archetypes of

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a pay-as-you-go (PAYG) pension system.

2.1 Austria's New Pension Model – A Notional Defined Benefit System

Austria's harmonized pension system revolves around a *personal notional defined benefit (NDC) account*. Such an account was already proposed by the Austrian pension reform commission as a possible design principle. The new pension system, indeed, broadly reflects the conclusions and recommendations of the commission's report (PRK, 2002) in this respect and on a number of other points.

The *formula 45-65-80* encapsulates the target benefit that the contributions accrued on the notional account are designed to provide – namely on (average lifetime) earnings replacement rate of 80% at a retirement age of 65 after 45 years of contributory service. To this effect, 1.78% *(accrual rate)* of the attained earnings (i.e. of the contribution base unless this exceeds the maximum contribution base) are credited to the account per year and *accrue interest* at the growth rate of the *average contribution base*, which over a period of 45 years results in 80.1% (= 1.78% × 45). This rate can only be reached in case retirement becomes effective at the normal retirement age of 65. Retirement during a pension *corridor*, i.e. between the age of 62 and 68, results either in a benefit decrease (pre-65) or increase (post-65) of 4.2% p.a.; but only persons with at least 37.5 years of pensionable service are eligible for such a "corridor pension." The notional account captures all paid-in contributions and the accrued interest, and as from 2007, the pension insurance system must send an account statement on the insured person's request.[2]

The uniformly applied *contribution rate* stands at 22.8% (with employees accounting for 10.25% and employers for 12.55%). Farmers and self-employed persons, by contrast, pay a rate of only 15% and 17.5%, respectively. Existing pensions are *indexed to the inflation rate*. For *substitute contribution periods,*[3] statutory contributions are credited to the notional account. Special provisions apply to *heavy workers* (in particular regarding retirement eligibility age and benefit deductions). The *transition* from the existing to the harmonized pension system is based on a parallel calculation (for all persons under 50 years of age). In other words, at the time of retirement, pension benefits are calculated both according to the old and the new legal provisions (for the entire service period), and the definitive pension is then determined in line with the principle of pro rata temporis. A *cap* is to be applied to losses resulting from the 2003 pension reform, which is set to increase from 5% in 2004 to 10% by 2024. Last, but not least, the APG introduces a *sustainability factor*, which will be activated when central demographic (life expectancy) variables deviate from projections. The sustainability factor will be discussed in more detail further below.

[2] *For examples of such account statements, see the explanatory notes to the APG (p. 55) or Stefanits et al. (2004, p. 429).*

[3] *Periods during which a person subject to compulsory insurance does not pay contributions into the statutory pension scheme but which are counted towards the qualifying period necessary for benefits, including particularly childcare periods, periods of unemployment/welfare benefits, sick benefits, military and alternative civilian service as well as compassionate care leave.*

2.2 Sweden's Pension Model – A Notional Defined Contribution System

Sweden is beyond doubt the best-known example of a country switching from a traditional PAYG pension system to a notional account, i.e. a notional defined contribution system. Before comparing it with the Austrian system, let us take a brief look at its main characteristics.[4]

The total contribution rate on earnings amounts to 18.5% (split evenly between employer and employee), 16% of which is paid into the PAYG account and the remaining 2.5% is channeled into a mandatory funded component, i.e. a capital-market based pillar.[5] Contributions paid into the personal notional account are revalued at the notional interest rate, which in Sweden equals the growth rate of average earnings. At the time of retirement, the capital accumulated in the notional account is converted into an annuity. In the most straightforward version of this model, the notional capital is simply divided by life expectancy, which is why increased longevity automatically translates into reduced pension benefits.[6]

2.3 Germany's Pension Model – Earnings Points and Current Pension Value

The German pension system is designed as a point system.[7] An insured person's annual earnings points are determined by dividing his or her annual income by the average earnings of all future pensioners. Hence, an annual income equivalent to the average earnings in a given year is worth one earnings point; two points are assigned for double, half a point for half the average income. The sum total of earnings points times the current pension value, which indicates the pension entitlement represented by one earnings point, equals the pension benefits. Like in Austria, deductions or supplements apply when retirement is taken before or after the normal retirement age of 65. The target benefit that the system is designed to provide thus broadly depends on the definition of the current pension value. In the past, the pension value was defined such that the "benchmark" pensioner (who takes retirement at the age of 65 after 45 years of contributory service) was assured a net replacement rate of around 70%. However, the recently introduced sustainability factor has considerably changed the way the pension value is determined. We will come back to this later.

2.4 Comparison of the Pension Systems in Austria, Germany and Sweden

The example presented in the box "Different Methodologies for Calculating Pension Benefits" highlights the similarities and differences between the Austrian, German and Swedish pension systems.

[4] *For a description, see Palmer (2000), Disney (1999) and Holzmann (2004). For in-depth, partly critical discussions of the NDC system, see Börsch-Supan (2003) as well as Williamson and Williams (2003).*

[5] *For details on this second pillar, see Sundén (2004).*

[6] *This mechanism is accompanied by "frontloading" in Sweden, which partly moves expected pension adjustments forward (Palmer, 2000, Appendix 1).*

[7] *For a detailed description of the German pension system, see Börsch-Supan and Wilke (2003) as well as Börsch-Supan et al. (2003).*

Table 1

Comparison of the Austrian, German and Swedish Pension Systems

				Notional defined contribution account (Sweden) contribution rate: 25%			Notional defined benefit account (Austria) benefit target: 50% accrual rate: 12.5%			Point system (Germany) benefit target: 50% Pension value (period 5): 2,758.88		
1 Period	2 Individual earnings	3 Average earnings	4 Growth rate of average earnings in %	5 Annual contribu-tion	6 Total capital	7 Pension benefits	8 Annual partial credit	9 Aggregate pension credit	10 Pension benefits	11 Earnings points	12 Total earnings points	13 Pension benefits
1	10,000.00	20,000.00	×	2,500.00	2,500.00		1,250.00	1,250.00		0.50	0.50	
2	15,600.00	20,800.00	4	3,900.00	6,500.00		1,950.00	3,250.00		0.75	1.25	
3	26,780.00	21,424.00	3	6,695.00	13,390.00		3,347.50	6,695.00		1.25	2.50	
4	32,457.36	21,638.24	1	8,114.34	21,638.24		4,057.17	10,819.12		1.50	4.00	
5		22,071.00	2		22,071.00	**11,035.50**		11,035.50	**11,035.50**			**11,035.50**
6		22,733.13	3			**11,366.57**			**11,366.57**			**11,366.57**

Source: OeNB calculations.

Different Methodologies for Calculating Pension Benefits

The workings of the three different systems are illustrated in table 1. This simple example does not reflect the exact parameterization of the existing pension systems but is mainly meant to capture the basic structures, using the example of a fictitious person who is employed for four periods and then spends two periods in retirement. Column 2 shows the individual earnings per period, while columns 3 and 4 display the level and the growth rate of average earnings, respectively. The contribution rate is assumed to stand at 25%.

Columns 5 and 6 reflect the entries in a notional defined contribution (NDC) account, which corresponds to the Swedish model.[1] The annual contributions are given by 2,500 = 0.25 × 10,000, 3,900 = 0.25 × 15,600, etc. The (notional) total capital comprises the current annual contribution and the account value of the previous period indexed to the rate of growth of covered average earnings (column 3), i.e. 6,500 = 3,900 + 2,500 × 1.04, 13,390 = 6,695 + 6,500 × 1.3, etc. Upon retirement in period 5, the total capital (reflecting also the revaluation from period 4 to 5, i.e. 22,071 = 21,638 × 1.02) is divided by life expectancy, which stands at two periods in this example. The initial pension benefit thus equals 11,035.5 = 22,071/2. The determination of the pension benefit in period 6 will be discussed below.

Columns 8 and 9 reflect the development of pension benefits and entries in a notional defined benefit (NDB) account, which resembles the new Austrian system. This example has been construed such that the NDB account yields the same pension benefit as the Swedish NDC account, i.e. that the replacement rate of 50%, which implies that the accrual rate must be set at 12.5%. The yearly partial credit is calculated as follows: 1,250 = 0.125 × 10,000, 1,950 = 0.125 × 15,600, etc. The current aggregate credit consists of the annual credit amount and the aggregate credit of the previous period revalued at the average wage growth rate. The initial pension benefit in period 5 equals the (revalued) aggregate credit of the last working period, amounting to 11,035.50.

Germany's system of earnings points is illustrated in columns 11 and 12. The earnings points reflect a person's relative income in the individual periods; in our example, they amount to 0.5, 0.75, 1.25 and 1.5 for the four periods. The example has been construed such that the earnings points add up to 4, which corresponds to the amount of earnings points accumulated by a benchmark pensioner during his or her working life. Once again, the replacement rate is assumed to be 50%, which translates into a current pension value of 2,758.88 and adds up to pension benefits of 11,035.50 (= 4 × 2,758.88).

All three systems evidently yield identical initial pension benefits, provided the parameters are set accordingly. If the pension benefits are adjusted synchronically under all three models, later pension payouts will not diverge, either. On the assumption of wage-based indexation, the pension benefits in period 6 reach 11,366.57 in all three cases (this is assumed in table 1). In line with the APG, existing *pensions are to be adjusted only for the inflation rate, i.e. they remain constant in real terms. This, however, does not alter the general conclusion that in a demographically stationary society the three systems may be designed such that they produce equivalent outcomes.*

[1] For an in-depth illustration of an NDC account, see Palmer (2000, p. 7).

The following observations result from this comparative analysis:

– *Constant demographic structure*. In a demographically stationary society, the differences between the three systems are small. If the parameters are chosen in an appropriate way, all models produce identical contributions and pension benefits, as shown in table 1.[8] This, in turn, ensures that the equivalence between contributions and benefits is the same in all three systems.[9] What is more, the German and Austrian systems are also nearly identical in design. The definition of the benchmark pensioner under the German system (who receives the defined replacement rate at the age of 65 after 45 years of contributory service) corresponds to the 45-65-80 formula in Austria. Furthermore, calculating pension entitlements via earnings points is fully equivalent to the accrual rate method of the Austrian system, provided all income years are taken into account and revaluation is based on the growth rate of the average wage and not of the wage bill.[10] In contrast, a marked difference is evident in the way pension benefits are adjusted. In Austria, existing pension benefits are merely adjusted for the inflation rate, while in Germany – due to the earnings point method – indexation is based on wage growth. In conclusion, while designed as a notional account system, the Austrian pension system nevertheless has more in common with the German model than with Sweden's NDC account system.[11]

– *Increasing life expectancy*. In the defined contribution model, an increasing life span automatically reduces pension benefits.[12] In standard defined benefit systems, a targeted replacement rate (as opposed to annuitization) determines the pension payout, which is also why such systems as a rule do not feature an automatic adjustment mechanism. Of course, it would be possible to link the definition of the benchmark pensioner or the 45-65-80 formula to life expectancy, but this is at

8 "Notional accounts are, in effect, identical to a well designed defined benefit pay-as-you-go scheme with reasonable actuarial adjustments and benefits based on revalued average lifetime earnings." (Disney, 1999, p. 36); see also Börsch-Supan (2003).

9 In the literature on PAYG pension systems, this type of equivalence is frequently called "actuarial fairness" or "quasi-actuarial fairness" (Lindbeck and Persson, 2003).

10 In a first stage, any demographic adjustment factors and mechanisms are not accounted for. Such factors may naturally lead to considerable differences between the systems and, in an extreme case, blur the lines between defined benefit and defined contribution systems.

11 In the literature, differing definitions are used for "defined contribution"2 and "defined benefit" systems. In this study, a defined contribution system refers to a system in which the pension benefits depend on the accrued contributions. In contrast, a defined benefit system denotes a system in which the effective pension benefits are not determined by total contributions.

12 If life expectancy rose from 6 to 7 periods in the example given in table 1, the initial pension at the time of retirement in period 5 would amount to a reduced 7,357 = (22,071/3) and many subscribers would probably opt to prolong their working life to counter the decrease in pension benefits.

present not planned, at least not in Austria.[13]

- *Variable cohort sizes*. None of the three models (according to the basic design principles) automatically responds to fluctuations in the cohort size. In the case of an ongoing trend (e.g. a sustained reduction in the birth rate), at one point or another adjustments will have to be made on the contribution and/or the benefit side. According to the Swedish model, a change in the contribution rate entails an increase in the funds to be paid into the notional account and thus also in the future pension claims. For this reason, adjusting to a demographic shock proves particularly difficult in a defined contribution system and an automatic budget balance can no longer be guaranteed in such case (Valdés-Prieto, 2000).[14] As a matter of fact, the transparency and individual determinability of notional account systems might prove to be disadvantageous in this context, since for political reasons it is difficult to alter such "securitized pension claims." In a typical defined benefit system, definitive pension benefits are determined only at the time of retirement, which makes it easier to implement changes in benefit calculation (Börsch-Supan, 2003).

3 The Implications of Demographic Fluctuations and the Role of Sustainability Factors

3.1 Empirical Developments in Austria

As mentioned earlier, two demographic processes pose a challenge to pension systems, potentially jeopardizing fiscal sustainability.

- *Fluctuations in the size of birth and work cohorts*. In Austria, the birth rate has been on a steady decline in the past decades, as reflected by chart 1. While migration and stepped-up labor force participation have helped to somewhat constrain the effects of this downward trend on the size of the work cohorts, fluctuations in the cohort size are nevertheless problematic for a pension system designed to be sustainable and intergenerationally fair.[15]
- *Life expectancy* has continuously risen over the past decades. The trend line in chart 1 indicates that life expectancy in Austria has been increasing incrementally by 0.24 years per calendar year since 1951.[16] If this process persists while the retirement eligibility age remains constant, the ratio of the employment period to the pension period will continue to shift steadily.

The pension reform commision calculated that the aggregate impact of these demographically induced

[13] *The provisions on the sustainability factor in Austria and Germany will be discussed in detail later on.*

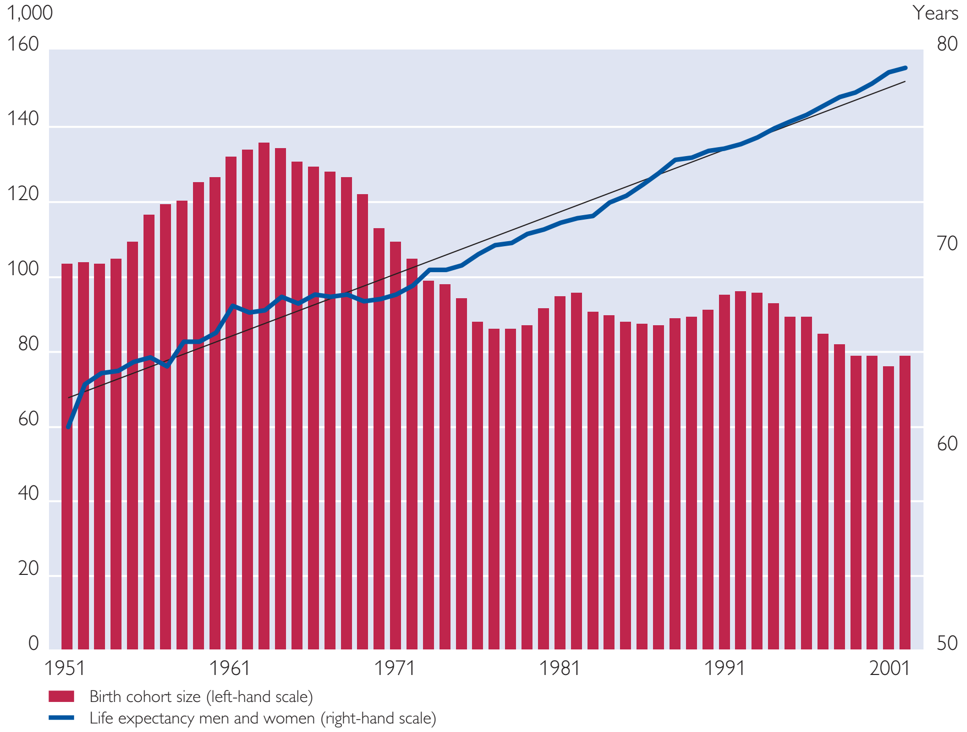
[14] *The Swedish system has a built-in automatic balance mechanism (Settergren, 2001), which fails, however, to achieve a complete balance.*

[15] *This is a widespread phenomenon: "Given the underlying demographic ageing of the OECD population, it is striking as to how few countries have a fall in the support ratio. [...] Demographic ageing has largely been offset by rising participation rates, especially among married women. However, when the baby boom, with its historically high economic activity rates, retires from 2010 on it is likely that economic support ratios will start to fall sharply unless offset by later retirement." (Disney, 2004, p. 308).*

[16] *Looking at the increased life expectancy as at the age of 60, we see that the gain has been smaller (by an average 0.12 years since 1951), but still marked.*

Chart 1

Twofold Demographic Challenge



Quelle: Statistics Austria.
The birth cohort size (left-hand scale) follows the "Live births" column (Statistics Austria 2003, Table 1.01), life expectancy equals the mean of men's and women's life expectancy (right-hand scale) at birth (Statistics Austria 2003, Table 4.20). The trend line is given as y = 0.235x + 65.97; R2 = 0.983.

fluctuations might drive up the old-age dependency ratio (= persons aged over 64 divided by persons aged between 15 and 64) from 22.9% (2000) to 40.7% (2030) (PRK, 2002, p. 72).

The Swedish NDC account automatically reacts to extended longevity, but there is no mechanism in place for dealing with a continual decline in the cohort size. Some countries using defined benefit pension systems have chosen a different strategy, as will be discussed in the following sections for the examples of the German and Austrian models.

3.2 The Sustainability Factor in the German Pension System

The 2004 German pension reform incorporated a demographic adjustment factor (sustainability factor) into the pension system. Should the pensioner dependency ratio change over time, the sustainability factor stipulates that a share α of the necessary adjustment be brought about by reducing the relative pension level (or the replacement rate) and a share $(1-\alpha)$ by raising the contribution rate. The parameter α was set at 0.25.[17] In the event of an increased old-age dependency ratio, pensions will rise to a lesser extent than gross earnings. By 2030

[17] *See Börsch-Supan et al. (2003); Sachverständigenrat (2004). These papers provide more information on the specificities of the German system (e.g. the phased increase in private supplementary pensions also referred to as "Riester ladder"), which will not be discussed in this study. In addition, the minimum retirement eligibility age was raised to 63 years in 2004.*

the contribution rate is projected to have advanced from about 19.5% to 23% and the gross pension level is expected to have fallen from 52.5% to around 43% (Börsch-Supan et al., 2003).

The German sustainability factor (GSF) has a number of interesting characteristics, which will be described below to subsequently contrast it with its Austrian counterpart.

3.2.1 The GSF Reacts to an Increase in Life Expectancy as well as to Fluctuations in the Cohort Size

The pensioner dependency ratio may increase on account of various developments, namely higher life expectancy against an unchanged cohort size, decreased cohort size against unchanged life expectancy and (as is to be expected) a combination of these two scenarios. A rise in the pensioner dependency ratio will at any rate result in a reduced pension level and a higher contribution rate.[18]

3.2.2 The GSF Reacts Automatically to Demographic Change

Owing to the statutory provision, adjustments will be automatic and not triggered by discretionary measures.

3.2.3 The GSF Spells out Explicitly How to Respond to Demographic Fluctuations

It is stipulated by law which parameters – the contribution rate and the pension level – are to be used to ensure sustainability. Furthermore, the relative weighting of these parameters is defined precisely given that $\alpha = 0.25$. Note that this specification blends elements of a defined contribution and a defined benefit system. At $\alpha = 0$, the sustainability factor would be inactivated and aging processes would result in an increase in the contribution rate only (defined benefit approach), while $\alpha = 1$ would correspond to a typical defined contribution approach entailing only an adjustment of the pension level. Setting $\alpha = 0.25$ is tantamount to blending these two pension formats, which the German government's council of independent economic advisers labeled a "paradigm shift" (Sachverständigenrat, 2004, p. 299).

It is important to add that the chosen value of α seems to be traceable primarily to fiscal criteria.[19] At the same time, it should not be overlooked that variations of α would entail disparate effects on intergenerational burden sharing. A chiefly defined benefit adjustment with a variable contribution rate (low α) places greater demands on today's young generation than an adjustment of the pension level (high α). We will come back to this crucial issue later on. The following assessment will be based on a measure of intergenerational distribution (MID) described in the box below.

[18] *The Rürup commission proposed the GSF – and preferred it over other adjustment factors, such as a purely life expectancy-linked factor – exactly for the reason that it responds to both demographic processes (Börsch-Supan et al., 2003).*

[19] *See Börsch-Supan et al. (2003). According to a statutory target, the contribution rate must not exceed 22% by 2030.*

Measure of Intergenerational Distribution (MID)

Pension systems should be assessed not only in terms of sustainability, but also in terms of intergenerational burden sharing. Depending on whether demographic shocks are absorbed primarily through rising contributions or through pension cuts, different generations will have to bear the brunt. A number of procedures and indicators may be used to measure and illustrate intergenerational redistribution effects. Measures frequently used in this context include the internal rate of return, implicit tax rate and generational accounts (Geanakoplos et al., 1999; Fenge and Werding, 2003). The intergenerational redistributiveness of Germany's pension system and various reform proposals has been examined in a number of studies using either the internal rate of return (Schnabel, 1998; Sachverständigenrat, 2004, p. 302f) or the implicit tax rate (Thum and von Weizsäcker, 2000; Fenge and Werding, 2003). To date, no such studies have been published for Austria.

Knell (2005a, 2005b) presents another method, which seems to lend itself particularly to the analysis of intergenerational redistribution aspects in theoretical pension models. This method, which is based on a proportionality measure, is also applied in this study to assess intergenerational redistribution. The MID for the average member of generation t is defined as follows:[1]

$$MID_t = \frac{\text{sum of relative benefits}}{\text{sum of relative contributions}}.$$

The denominator values denote the contribution rates prevailing in the respective years, the relative benefits correspond to the respective promised pension level (i.e. the pension amount relative to the prevalent average wage). In the example presented in table 1, the MID for the fictitious person cited in the example is given as

$$\frac{0.5 + 0.5}{0.25 + 0.25 + 0.25 + 0.25} = 1.$$

In general, a balanced pension system has a constant across-generational MID of 1 given a demographically stationary society. Section 3.3 presents cases with demographic nonstationarities, where the MID is no longer identical across all generations. For further details, examples and a discussion of this method, see Knell (2005a, 2005b).

[1] Generation t refers to that generation which enters the labor force at time t.

3.3 The Austrian Sustainability Factor as a Process

The new Austrian pension system also features a sustainability factor, which has, however, little in common with its German counterpart. Rather than having been explicitly defined with a formula, the Austrian sustainability factor (ASF) refers to a scenario process deviations from which will trigger adjustments. This process is defined in Article 108e paragraph 9 ASVG (General Social Security Act) and is summarized as follows in the explanatory notes: "A sustainability factor is introduced with a view to securing long-term funding [of the pension system]. This factor is based on life expectancy figures for people aged 65 up to 2050 reflecting the medium scenario of Statistics Austria. Deviations from this 'medium forecast' automatically impact – in equal financial proportions – the contribution rate, growth rate, retirement eligibility age, pension adjustments and the government's contribution in order to safeguard fiscal sustainability."[20]

The ASF differs from the GSF in all three characteristics mentioned in section 3.2, as will be discussed below.

[20] *In the legal act, these five potential adjustment parameters are explicitly referred to as "sustainability factors." Such usage of the term "sustainability factor", however, may be misleading and cause confusion with the GSF.*

3.3.1 The ASF Responds to Deviations from Forecasts and Refers Primarily to Life Expectancy Developments

While the pensioner dependency ratio and thus also the GSF react to changes in the cohort size and in life expectancy, under the Austrian system the focus is on the discrepancy of effective from projected life expectancy. It is even quantified by law when measures must be taken, namely if "for the period starting from the first deviation of the revised average period-linked life expectancy at the age of 65 from the reference life expectancy laid down in Appendix 12 of the APG a discrepancy of more than 3% on average is ascertained by the year 2050" (Article 108e paragraph 9 ASVG). Even though lit f stipulates that an analogous procedure is to be applied in case of "other demographic and economic assumptions […], in particular with regard to the factors labor force participation and productivity" it is nevertheless noteworthy that for these factors no quantifiable trigger points are set forth, and interestingly enough, the law does not *explicitly* refer to population (and cohort) development projections, either.

It is in particular important to note that (unlike the GSF) the ASF does not respond to *demographic change* as such, but only to *deviations* of a projected value from the actual outcome (or revised forecast). The reference scenario, however, envisages fundamental shifts in both demographic dimensions, namely an increase in the reference life expectancy (at age 65) from 18.5 to 21 (2030) and 22.9 (2050) as well as a decrease in the economically active population (persons aged between 15 and 64) from 5,499,360 to 5,217,195 (2030) and 4,748,987 (2050).[21] Should actual developments correspond to this trend path, the parameters laid down in the APG are set to remain unchanged. In other words, the financing needs arising from the foreseeable demographic development will have to be met through higher government contributions to pension payments. This arrangement, however, implies intergenerational inequities, even for the trend path of the demographic development. The exact nature of the intergenerational sharing of this demographic burden will depend on which tool – taxation or debt – is used to fund the government's pension transfers. The consequences of this provision are, however, in any case straightforward. First, the envisaged adjustment to the demographic development is limited to the revenue side and does not translate into any change on the benefit side (i.e. pension level and retirement eligibility age remain unchanged), and, second, the funding source will increasingly shift from contributions to taxes.

The wisdom of such an arrangement may be challenged. As will be discussed in section 3.3.4, an exclusively revenue-oriented adjustment may lead to an unwanted intergenerational redistribution, placing the main burden on the younger generations. Increased tax-based funding, by contrast, might lower the degree of "actuarial fairness," which is generally regarded as a cornerstone and asset of Bismarckian social security systems.[22]

[21] *However, the labor force participation rate is assumed to advance from 68.8% to 71.8% (2030) and 75.8% (2050), which would dampen the slide in the active population.*

[22] *See Lindbeck and Persson (2003). Only the redistributive elements of the pension insurance system (e.g. means-tested top-up benefits, substitute contribution periods) should be tax-funded according to this rationale.*

3.3.2 The ASF Does Not Include a Mechanism for Automatic Adjustments

While the GSF reacts even to minimal changes in the pensioner dependency ratio on a yearly basis, the ASF only provides for measures once a stated deviation is reached or the pension reform commission identifies a need for more funding. This may be tantamount to "phasing in" intergenerational injustice, as illustrated by the example presented in the box "Intergenerational Distribution for Continuous and Abrupt Adjustment to Demographic Changes." Normally, steady adjustment, as built into the GSF, is preferable to a policy of abrupt reform measures.

Intergenerational Distribution for Continuous and Abrupt Adjustment to Demographic Changes

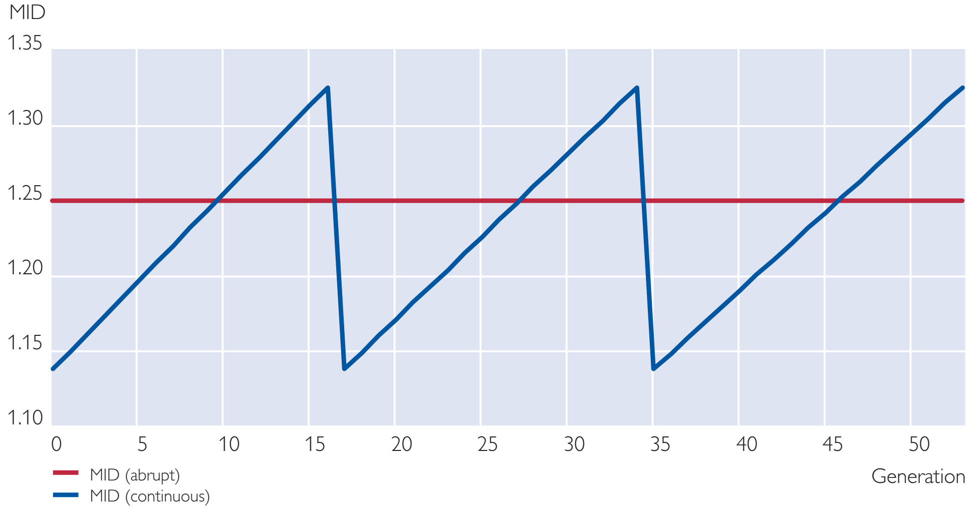
The following example is meant to illustrate the divergent consequences ensuing from continuous or abrupt adjustment. Let us assume that the cohort size remains constant, but life expectancy grows by an annual 0.2 years. The reference case rests on the assumption that the pension insurance system invariably has a balanced budget, which is exclusively attributable to a continuous increase in the retirement eligibility age. An in-depth discussion of this matter in Knell (2005b) reveals that the eligibility age has to be raised by an annual 0.15 years (given the target $\frac{\text{pension years}}{\text{work years}}$ *equals 1/3). Such a continual adjustment means that all cohorts have an identical MID of* $\frac{1}{1-0.2}$ *(see chart 2).*[1]

Abrupt adjustment produces a different outcome, though. The underlying assumption in this scenario is that the eligibility age is changed only if the deficit of the pension system exceeds a specified limit (20%). Any adjustment of the eligibility age is aimed at restoring a balanced budget. Deficits of the years in between adjustments are funded from general tax receipts. Generations taking retirement during years of reform measures show a lower MID than those to which an unchanged retirement eligibility age applies regardless of higher life expectancy.

[1] *A steadily rising life expectancy – similar to a growing population – may be regarded as an increase in the "biological interest rate" (Knell, 2005b), which explains why the MID is greater than 1 for all generations.*

Chart 2

Measure of Intergenerational Distribution (MID) for Abrupt and Continuous Adjustment



Source: OeNB calculations.

3.3.3 The ASF Provides Only Broad Guidelines on How Adjustments Are to Be Made

As cited above, the law stipulates that any necessary adjustment be spread evenly among the parameters *contribution rate, accrual rate, eligibility age, pension adjustment* and *federal subsidy*. Unlike the GSF, for which adjustments are distributed according to $\alpha = 0.25$, the ASF is not based on any explicit weighting. Two questions arise in this context. First, how can the requirement of an even distribution be implemented, and, second, under which circumstances is such an even distribution meaningful or desirable in the first place? Let us deal with the first question right away, while we will consider the second issue in section 3.3.4.

Operationalizing the requirement of distributing the reform measures evenly among the five parameters is difficult for at least two reasons. First of all and as mentioned in the APG itself, the effects of these parameters manifest themselves with varying time lags. As a case in point, of the two parameters that are linked to the pension level the accrual rate impacts the level of *future* pension benefits, whereas the pension adjustment affects the *current* pension level.[23] Second, the adjustment parameters are measured in different units (e.g. percentages against years), which is why they are not directly comparable. A ten-percent increase in contributions (from 20% to 22%) cannot automatically be compared with a ten-percent reduction in benefits (with the replacement rate falling from 60% to 54%) and even less so into a ten-percent hike of the retirement eligibility age (from 65 to 71.5 years).

To analyze this in more detail, let us draw on a model patterned on the German pension insurance system with only three adjustment parameters.[24] Under these conditions, it is possible to formulate a heuristic and feasible operationalization of the postulate of an even distribution. To this end, we first calculate to what extent a given parameter x would have to be adjusted for it to neutralize demographic change, while all other parameters remained constant. This "extreme value" (or "ceteris paribus value") is denoted as x^*, the original value as x_0. The value that must actually be chosen for the parameter x is set via a linear combination of the initial value x_0 and the extreme value x^*, with λ_x referring to the relative weight, i.e. $x = \lambda_x x^* + (1 - \lambda_x) x_0$. Even adjustment means that λ_x is identical for all parameters – contribution rate, pension level and eligibility age (i.e. $\lambda_x = \lambda, \forall x$). It can be shown that under these conditions the value for λ is uniquely determined.

The following simple example is meant to illustrate how this would work in practice. The initial state of a pension system is given as a contribution rate of 20%, a replacement rate of 60%, life expectancy of 80 years and a retirement eligibility age of 65 years (in addition, working life is assumed to commence at the age of 20, which results in a working life of 45 years). The cohort size is

[23] *Here, the Austrian system differs significantly from the German system of earnings points, where – as has already been mentioned – all pensioners having accumulated a given number of earnings points draw identical pension benefits. By extension, a change in the pension value (or the pension level) affects all pensioners in the same fashion irrespective of their age. This is also why the earnings point system has only four adjustment parameters (and does not need to differentiate between the accrual rate and the pension adjustment factor).*

[24] *The federal subsidy is assumed to be constant; in other words, this scenario posits a balanced budget.*

assumed to remain constant over time,[25] but life expectancy climbs from 80 to 84 years. In line with the proposed definition of evenness, the contribution rate would have to be raised from 20% to 21.67%, the replacement rate would have to be cut from 60% to 55.37% and working life would have to be extended from 45 to 46 years in order to keep the pension budget balanced.

3.3.4 Under Which Circumstances Is an Evenly Distributed Adjustment Meaningful and Intergenerationally Fair?

This question is, of course, complex and multi-facetted, touching on issues of welfare economics and on questions of distributive and intergenerational justice. For lack of space, in this study we can only follow through on some of the implied aspects. To neglect this issue altogether, however, would not be expedient since the terms "fairness" and "intergenerational justice" are perennials in the public debate, even though the underlying ideas are hardly ever conceptualized.

The problems in this context are self-evident given declining or fluctuating reproduction rates. The box "Intergenerational Burden Sharing When Reproductive Behavior Changes" centers on such a scenario, which is again based on a model patterned on the German system and its GSF.

Intergenerational Burden Sharing When Reproductive Behavior Changes

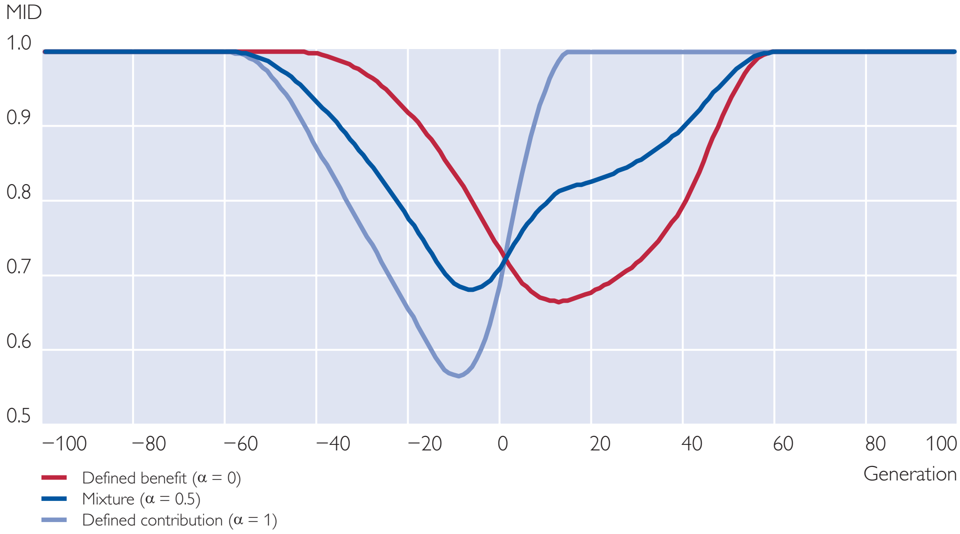
In analogy to section 3.3.3, the initial state of the pension system is again characterized by a contribution rate of 20%, a replacement rate of 60%, life expectancy of 80 years and a retirement eligibility age of 65 years. In this scenario, life expectancy is, however, assumed to remain constant, while the population is non-constant. In particular, a break is assumed to occur in the development of the cohort size at a given time t = 0, with the cohort size cut by half (e.g. from 100,000 to 50,000). Note that this example is by no means intended to be realistic, but rather to highlight the central features of the various adjustment methods.

Chart 3 shows the MID development by generation and sustainability factor (at a constant eligibility age). A value of α = 1 again corresponds to a defined contribution system, α = 0 to a defined benefit system and α = 0.5 to a mixture of the two. In each of the three variants, some generations are faced with a deterioration of the MID, because the reduced cohort size will cause a decrease in the economically active population, which in turn lowers the sum total of contributions. For the budget of the pension system to remain balanced, the contribution rate must be raised and/or the pension level has to be reduced. Any one of these adjustment options affects a (different) set of generations. The paths of the curves will be discussed in the main text.

[25] *This assumption serves to keep the example simple. The method proposed here is also applicable to variable cohort sizes.*

Chart 3

Measure of Intergenerational Distribution (MID) for Different Sustainability Factors



Source: OeNB calculations.

Box 4 on "Intergenerational Burden Sharing When Reproductive Behavior Changes" and chart 3 illustrate the intergenerational redistribution effect for various sustainability factors, which is triggered by a plunge in the cohort size. Even though the example is stylized and unrealistic, the conclusions are applicable to the general development path of the cohort size and the birth rate (Knell, 2005a). Two observations are particularly noteworthy. For one thing, the MID fluctuations between the generations (measured e.g. by the variance) are smallest for a mixture of the defined benefit and defined contribution systems ($\alpha = 0.5$). For another, the share in the adjustment burden placed on generations born after the break in population developments ($t = 0$) is the lower, the more contribution-oriented (high α) the system. This is highly plausible, since a policy of contribution hikes (low α) places the highest burden on the cohorts born shortly after the break. If, by contrast, the adjustment involves pension cuts, the older generations (including those with birth dates before $t = 0$) assume a greater share of the burden.

Various criteria can be used to evaluate the relative merits of different sustainability factors. Three of them will be discussed below: (i) even burden sharing among all generations; (ii) collective burden sharing according to the "causation principle"; (iii) individual burden sharing according to the "causation principle."

If an even adjustment mechanism is preferable (i.e. one which causes the smallest MID variation among the generations), α should take on an intermediate value (somewhere around $\alpha = 0.5$).

On the other hand, one might also require those generations to carry the highest burden which are "responsible" for the declining birth rate. In fact, the potential parent generations, i.e. those born between 20 and

40 years before a given cohort, are accountable.[26] As of generation 0 a full reproduction rate is again reached, which is why, according to this criterion, the generations from –40 to –1 should bear the lion's share of the adjustment burden. One could, naturally, also argue that – indirectly – all generations that are alive at a given point in time and thus shape the social and political life are at least partly responsible for the prevailing reproductive pattern. From this perspective, the adjustment burden (reduction in the MID) should be placed on all generations born before $t = 0$. In any event it is difficult to justify why the generations born at or after time $t = 0$ should be "penalized" for their parent generations' reproductive behavior, as they themselves again account for an equally large number of births (and thus "equilibrium birth rates" of 2).

In the light of these arguments, it would be better to have pension systems in place that feature a more "backward looking" intergenerational burden sharing, i.e. are rather contribution-oriented with a largely constant contribution rate (high α). In some cases a sharp slide in the birth rate may well be attributable to extreme events (e.g. natural disasters and wars), which then calls for the application of a different set of criteria (e.g. levying contributions from all generations according to the ability-to-pay principle). At the same time, it should be stressed that here the focus is on the basic design principles of pension systems. It became evident that a contraction of the birth rate[27] results in a demographic extra burden, which *must* be borne by some generations. Any decision for or against a certain setup of the pension system and sustainability factors inevitably implies a decision for or against a certain mode of intergenerational burden sharing. Therefore, it seems appropriate to explicitly consider such characteristics when designing a pension system or a sustainability factor.

The example given in box 4 "Intergenerational Burden Sharing When Reproductive Behavior Changes" and the discussion so far have revolved around a scenario marked by decreasing birth rates and constant life expectancy. Of course, one may also wonder whether an intergenerationally even adjustment is justified in the reverse case of increasing life expectancy and largely constant cohort sizes. This question largely depends on the projected path of life expectancy. If the linear increase, observed for many decades now, is considered to be just a one-off process set to discontinue once a biological maximum age is reached, evenly adjusting the contribution rate, eligibility age and benefit parameters may make a lot of sense. Since a rising life expectancy affects all generations, to identify the desirable parameter configuration is eventually a collective political decision. At present, it is, however, very difficult to predict the life expectancy development path. Against this backdrop, a slow (ideally, continuous, see section 3.3.2) increase of the eligibility age seems to be the most appropriate and primary adjustment measure. Otherwise, the contribution rate would at some point reach a level which would prove unsustainable either from a factual (>100%) or an economic point of view (Knell,

[26] *In Austria, 93.5% of all female and 87.5% of all male parents fall into this age bracket.*

[27] *If not balanced out by migration or in the absence of a sustained increase in the labor force participation rate.*

2005b). To summarize, also in the presence of rising life expectancy the contribution rate should be increased only with care.

Up to now, we have only talked about a generation's *collective* responsibility and *collective* reproductive behavior when referring to intergenerational redistribution in the face of declining birth rates. This generalizing approach does not account for the fact that behaviors differ greatly at the individual level. For instance, childless members of a cohort contrast with other members who have numerous children. A pension system which disregards such differences may be considered ill-designed and intergenerationally unfair. A pay-as-you-go pension system essentially represents a three-generation model, where the working generation not only has the obligation to fund the older generation's pensions with their contributions, but is also responsible for generating offspring and providing for the livelihood of the next economically active generation. A pension system should thus reflect not only a generation's aggregate, but also its individual behavior.

In recent years, Germans heatedly debated the idea of child-related pensions. In this context, some proposed that only childless persons should be asked to build up the funded pillar. "To receive pension benefits in old age, one must have accumulated either human or real capital. A generation having failed to do either must go hungry in old age, because nothing comes from nothing. […] Instead of placing a collective burden on an entire generation, pension cuts […] should be exclusively directed at the childless" (Sinn, 2003, p. 362, 390f). It would be in line with both the causation principle and the ability-to-pay principle to call especially on the childless members of the society to fund additional pension plans. How and to what extent the number of children are factored into the calculation of pension benefits will, of course, depend on a set of other parameters, in particular on the amount of public expenditures that are related to childcare and to education. In the meantime, several economists have come to speak out in favor of considering the number of children in pension calculations. Not only did Hans-Werner Sinn promote the concept of a child-related pension in his bestseller "Ist Deutschland noch zu retten?" (Sinn, 2003),[28] but also Peter Bofinger's (2004) antithesis "Wir sind besser als wir glauben" contains a proposal very much along these lines.[29]

With a view to the Austrian pension system, two observations can be gleaned from this digression. First, in the light of these considerations, the demand for an even adjustment should be weighed carefully. Both the arguments presented here and in-depth studies by Knell (2005a, 2005b) make a case for moving away from the principle of an even distribution of the adjustment burden and for assigning lower weights to contribution hikes than to modifications in

[28] *"The pension for the childless should not be reduced to zero [..] but it seems to be appropriate to cut the average pension […] by half. […] Those affected by cuts must be called upon to invest in a Riester pension to the extent to which the PAYG system can no longer give a guarantee for lack of contributors" (Sinn, 2003, p. 391).*

[29] *"As a generation that produces fewer children, one cannot demand the same pension level as the (post-war) parents of the baby boom generation" (Bofinger, 2004, p. 155). Further down (p. 218) Bofinger additionally proposes that women should be credited a third of the insurance cover of the pension insurance for each child (up to a total of three children per woman).*

the eligibility age and the benefit parameters. Second, it should be noted that childcare periods are already accounted for under Austria's current pension system, albeit only indirectly by treating such periods as contribution periods. In the new system, a woman's notional account is credited with the median female earnings (in addition to any contributions resulting from employment) for each year dedicated to child rearing (up to a maximum of four years). Here, it would be interesting to examine whether this method does not underestimate the genuine contribution a child makes to maintaining the solidity of the PAYG system.[30] There is strong evidence in favor of more generous childcare-related credits, which are granted, for instance, in Sweden. Under the Swedish system, the parent with the lowest earnings is automatically accredited with childcare pension rights worth four years of contributory service, with the imputation based on the most favorable of the following three variants: (i) a supplementary payment equal to 75% of average earnings of all persons covered by the pension insurance scheme; (ii) a supplementary payment of up to the person's own earnings the year prior to childbirth; (iii) a fixed-amount subsidy. Such subsidies are granted irrespective of the earnings record and are designed such that they offer reasonable credits for as many typical earnings histories as possible (Palmer, 2000, p. 16).

4 Summary Assessment

To summarize, the basic structure of Austria's new, harmonized pension system is in many ways a considerable improvement over its predecessor. Here, some positive aspects which we have not yet dealt with in detail in this study deserve to be briefly touched upon.

- The lifelong averaging period increases the degree of intergenerational and actuarial fairness. Preferred treatment of shorter working periods and steeper earnings profiles is eliminated, which also minimizes potential negative work incentives (Lindbeck and Persson, 2003).
- The presence of a pension corridor allows persons to choose when to retire in line with their individual preferences with regard to pension level and working life. Furthermore these decisions will have an actuarially neutral effect if the deductions and supplements are chosen appropriately. A prerequisite for this is, however, that retirement is truly voluntary and that the labor market situation does not "force" premature retirement.
- Previous contributions are revalued adequately. The old revaluation formula was not only unnecessarily complex, but also yielded undesired results in terms of inter- and intragenerational fairness (Knell, 2004).
- The harmonization[31] not only eliminates inequities among various occupational groups, but also boosts intersectoral flexibility and portability. A transparent design of the notional account may, by extension, facilitate a harmonization of Europe's pension systems (Holzmann, 2004) and

[30] *Calculations for Germany are indicative of this (Sinn, 2003, p. 376f; Werding, 1999).*

[31] *Apart from the fact that some occupational groups (such as civil servants at the regional and local level) are not considered.*

the incorporation of additional elements (e.g. life account model; see Orszag and Snower, 2002).

In total, all these improvements could help maintain confidence in the PAYG system and strengthen its acceptance as the centerpiece of the provision of old-age security.

From this perspective, some elements of the new pension system must, however, also be evaluated more critically as they partly conflict with the principles of simplicity, transparency and sustainability as well as inter- and intragenerational fairness.

– On the contribution side, harmonization is incomplete because farmers and self-employed persons are still subject to contribution rates that are lower than those applied to employees. In the explanatory notes to the legal act this is justified by referring to the "lack of matching partner contributions" for the self-employed and to the fact that the risk of becoming unemployed or sick is not cushioned in the same way as for employees (via substitute periods). This argumentation is, however, not entirely convincing. Studies on the incidence of social security contributions usually identify a high degree of pass-through and a negligible impact of the formal division of funding into employers' and employees' contributions.[32] At any rate, consideration should be given to the issue of whether harmonizing the contribution side would not prove favorable, not least given the symbolic importance of such a move, while existing differences between systems can be balanced out via other measures.[33]
– The long parallel-calculation period and its complicated design are definitely flaws of the new system. Only in about 40 years' time will the first pension exclusively computed according to APG rules be paid out. In the near future, pension calculations will therefore be governed by the rather complex and opaque transitional provisions, which basically undermines the increased transparency and determinability of the new notional account system.[34]
– As spelled out in this study, the current provisions on the sustainability factor are grossly imprecise. While it is, on the one hand, understandable that the 45-65-80 formula is meant to provide a consensual anchor for the new system, it would, on the other hand, also be important to clarify – in particular with a view to facilitating calculations and planning – how this formula would be modified in the face of demographic change. The following aspects of the sustainability provision are considered to be problematic. First, the sustainability factor reacts only to deviations from projected values and not to demographic movements as such and it is, above all, geared toward life expectancy developments. Second, there is no automatic adjustment, which – already at the design level – produces intergenerational inequities. Third, the postulate of an even adjustment is not spelled out in detail. Fourth,

[32] *"Invariance of Incidence Proposition." See Gruber (1997) and Ooghe et al. (2003).*

[33] *See Mayrhuber and Url (2004).*

[34] *For an interesting proposal on how to remedy this (by also showing the claims as accrued according to the old system), see Stefanits et al. (2004), p. 436.*

it is doubtful whether evenness is a desired feature in the first place because a contribution-based adjustment makes future generations pay for their parents' reproductive behavior. And last, but not least, there is the controversial proposal to place more weight on the number of children in calculating pension benefits.

A host of important aspects had to be disregarded in this study. A case in point is the question whether adjusting existing pensions for the inflation rate – as currently envisaged – is the optimal approach (Knell, 2004). Furthermore, this study did not examine whether the level of the deductions and supplements applicable to the pension corridor are appropriate and along which lines an adequate occupation-specific individualization of the pension system (e.g. provision for heavy workers) should be constructed. These issues as well as the aspects covered in this study deserve further investigation to help guarantee that the PAYG system continues to play a pivotal role in Austria's pension scheme.

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