Working Paper

Evaluating a Pension System Considering Children Born: The Case of Austria

Christopher Prinz

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International Institute for Applied Systems Analysis □ A-2361 Laxenburg Austria

Telephone: +43 2236 715210 □ Telex: 079137 iiasa a □ Telefax: +43 2236 71313

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ABSTRACT

The paper discusses the consequences of the adoption of a new pension system that considers the number of children born in Austria. Combining a demographic family model with a pension model and cost profiles of social security expenditures, a policy simulation tool is obtained which allows the testing of different social security policies. The feasibility of the suggested pension reform is examined on both the system level and the individual level to determine under which circumstances such a policy is reasonable and affordable.

The first conclusion is that the new pension system would be cost neutral. Secondly, provided a certain response to the pronatalist character of the new system in the form of an increase in fertility, the performance of the social security system would improve. Thirdly, the new system would significantly change the income distribution of retired women to the extent that single and divorced women with children are no longer discriminated. Thus, the emancipatory goal of the policy is fulfilled.

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EVALUATING A PENSION SYSTEM CONSIDERING CHILDREN BORN: THE CASE OF AUSTRIA

Christopher Prinz

1. INTRODUCTION

Fertility and social security issues are frequently dealt with simultaneously, as several links between low fertility and the existence of social security and particularly pension provisions exist. In societies which lack collective systems to provide for retirement, people are dependent on their offspring for old age security. In such societies, old age security is recognized as one of the motives for having children (Joshi, 1991). As a consequence, pension provision has been suggested as a policy to reduce birth rates in poor, high fertility countries.

Pension provision has also been pointed at as an explanation of low fertility in rich countries. As Paul Demeny (1987) stated: "The emergence of national social security schemes that made old age support a collective social responsibility completed this process [of weakening the motives for having children] by severing the link between persons' economic status in old age and their fertility behavior in the earlier stages of adulthood".

Falling fertility rates cause a problem for the financing of old age security, since large generations of the retired expect transfers from a smaller generation of workers. This is particularly true for Pay-As-You-Go social security systems which characterize Austria and most industrial countries. Each generation of workers contributes collectively to the pensions of their predecessors, hence current and expected changes in the age structure will put a strain on this inter-generational contract. One way to resolve the difficulty would be to maintain fertility at replacement levels. It was suggested that the new direction for pronatalist policies "should be a search for institutional innovation that would re-establish the positive material link between fertility behavior and old age security" (Demeny, 1987).

Rather than transferring part of individual social security contributions directly to living parents as suggested by Demeny, the pension reform presented in this study increases entitlements for retired women according to their parity. Additional benefits do not depend on the professional activity and income of a woman's own children but only on the number of children she has raised. The pension policy should have several effects: First, the policy aims at re-establishing the positive link between childrearing and pension entitlement. Women with children should no longer be discriminated with respect to their income during the period of retirement (emancipatory goal). Second, the policy aims at increasing fertility to avoid both excessive population aging and excessive population decline. Women should be encouraged to give birth to additional children

by offering them certain pension benefits in dependence on the number of children (pronatalist goal). Third, the new pension system should not significantly worsen the performance of the social security system in general, even if there is no response to the implementation of the system in the form of an increase in birth rates (performance neutrality).

The feasibility of the suggested pension reform has to be tested on both the system level and the individual level. A cost/benefit analysis on the social security level demonstrates under which circumstances the policy is affordable. A cost/benefit analysis on the individual level shows whether the policy is reasonable.

2. DEMOGRAPHIC MODEL AND DATA

A projection of the female population by family type is needed from the demographic side to calculate costs and benefits of the pension policy suggested. In the projection model, family type is characterized by the dimensions age, marital status and number of children ever born.

The projection model fulfills the minimum requirement for a family model, that is connecting adults and children, and it is of the dynamic multistate-type. The model allows simultaneous analysis of family formation processes for both dimensions, marital status and number of children ever born. It is based on the concept of the "family related life cycle of individuals" which is an extension of the "family cycle concept". The latter assumes a standard sequence of events given a nuclear family (i.e. first marriage, birth of the first child, ..., birth of the last child, ..., death of the spouse), neither allowing for different sequences, e.g. first marriage only after the birth of the first child, nor for different events, like divorce or remarriage. The family related life cycle concept, which is still based on legal marital status, however, is flexible both with respect to possible events and to their sequence.

The increase of new living arrangements, like non-marital consensual unions, has introduced new limitations to the concept of the life cycle. Considering marital status only, it is for example not possible to distinguish between an unmarried two-parent family and a family consisting of a single mother and her child(ren). The extent of the bias connected with the choice of using marital status depends on the particular country under consideration and on the extent marital status is a good predictor of the relevant behavior of the individuals considered. For the following analysis it seems appropriate to rely on legal marital status statistics. In Austria, marital status still is a reasonable proxy for living arrangements of individuals aged 25 and over. The Austrian pension system now as before uses information on marital status and not on actual living arrangements.

The model is a one-sex model, which is typical for most of the family models in operation. It is hierarchical with respect to the parity dimension and of increment-decrement type in the marital status dimension. It distinguishes 12 life cycle stages of a woman, namely

1 single, no child
2 single, one or more children
3 married, no child
4 married, one child
5 married, two children
6 married, three or more children
7 widowed, no child
8 widowed, one child
9 widowed, two or more children
10 divorced, no child
11 divorced, one child
12 divorced, two or more children.

It is assumed that births of parity 4+ among married women, parity 3+ among widowed and divorced women, and parity 2+ among single women do not cause a change in the life cycle. Changes in the life cycle result from birth of a child (depending on parity), first marriage, divorce, remarriage, and widowhood caused by the death of the husband. Removal or death of a child does not affect the mother's life cycle, since both the model and the pension policy investigated are based on the number of children ever born. Demographic events that affect the life cycle are assumed to occur independently. Possible events included in the model are given in Table 1.

Entry into and exit from the state space, namely birth of a girl and death of a woman, both depend on a woman's age and marital status, but are -- due to a lack of available data -- independent of the number of children already born. Marriage, divorce, and remarriage depend on age and the number of children born; widowhood only depends on a woman's age.

The model belongs to the family of multidimensional population projection models which are based on the Markovian assumption. That is, the model supposes that future behavior only depends on current status, and not on the path via which this status was reached. For some of the variables considered, this assumption may be too crude an approximation of reality, since for example divorce rates increase with marriage order. However, to incorporate such dependencies would greatly complicate the model. A detailed mathematical description of multistate projection models is for example given in Willekens and Drewe (1984).

Status-specific fertility and mortality rates were taken from the database of the Austrian Statistical Office. Occurrence/exposure rates between life cycle stages have for the most part been made available from a recent study undertaken by the Demographic Institute of the Austrian Academy of Sciences (Aufhauser and Lutz, 1987). They used a similar model to analyze the family related life cycle of Austrian women from a purely demographic point of view. They estimated occurrence/exposure rates using the Austrian 1986 microcensus, where women aged 16-59 were asked about their complete marriage and birth biography. The respective population at risk and the absolute number of events, i.e. changes between statuses, were estimated on a monthly basis for the years 1981-1986 to calculate monthly rates. To eliminate random fluctuations, average monthly

rates for the period 1981-1986 were calculated and converted into annual occurrence/exposure rates.

Table 1. Possible events considered in the family model.

Life cycle status before event:	Life cycle status after event:											
	s0	s1	m0	m1	m2	m3	w0	w1	w2	d0	d1	d2
single, 0	-	B	M	*	*	*	*	*	*	*	*	*
single, 1+	*	-	*	M	M	M	*	*	*	*	*	*
married, 0	*	*	-	B	*	*	W	*	*	D	*	*
married, 1	*	*	*	-	B	*	*	W	*	*	D	*
married, 2	*	*	*	*	-	B	*	*	W	*	*	D
married, 3+	*	*	*	*	*	-	*	*	W	*	*	D
widowed, 0	*	*	M	*	*	*	-	B	*	*	*	*
widowed, 1	*	*	*	M	*	*	*	-	B	*	*	*
widowed, 2+	*	*	*	*	M	M	*	*	-	*	*	*
divorced, 0	*	*	M	*	*	*	*	*	*	-	B	*
divorced, 1	*	*	*	M	*	*	*	*	*	*	-	B
divorced, 2+	*	*	*	*	M	M	*	*	*	*	*	-

events:
'B' ... childbearing,
'M' ... marriage or remarriage,
'D' ... divorce,
'W' ... widowhood,
'*' ... impossible event, and
'-' ... no event.

With these 12 statuses, the number of possible transitions is 28: 12 for marriages (first marriage or remarriage), 4 for divorce, 4 for widowhood and 8 through birth of a child. Another 12 transitions result from the exit from the state space (death). All newborn enter the population via the status single/parity 0.

Given the model and the data, projections of the number of women by age, marital status and number of children born were prepared using the DIALOG Personal Computer software, a general multidimensional population projection model, developed by Sergei Scherbov (Scherbov and Grechucha, 1988). Their projection model is a mixture of the linear and the exponential type, while occurrence/exposure rates estimate the parameters of an exponential model. The resulting bias, however, is not of significance for the purpose of testing policy reforms. Starting with the 1985 female population of

Austria by age, marital status and number of children born, the future population distribution is obtained by applying the estimated transition intensities, taking into account observed status-specific fertility and mortality rates.

3. POLICY SIMULATION TOOL

Combining the demographic family model with a pension model and cost profiles of social security expenditures, a policy simulation tool is obtained which allows tests of different social security policies. The simulation tool can be used not only to look at the performance of the social security system but also at policy consequences for individuals.

3.1. Pension Model

The pension projection model is the one used in the comparative study of which results are presented in Gonnot (1992). Benefits received by an individual are calculated as the product of the yearly benefit rate multiplied by the number of years insured multiplied by past gross salary. Since no information on salary by family status is available and the yearly benefit rate is constant, only the number of years insured differs by family status. As in the model in Gonnot (1992), number of years insured are assumed to equal the number of years worked and are thus estimated from observed labor force participation rates along cohort lines. Labor force participation rates of Austrian females are available both by marital status and by number of children born, but cross-classifications by marital status and number of children, i.e. by family status, had to be estimated. Labor force participation rates are kept constant at their 1985 level. Observed recent increases in female labor force participation rates result in an increase in the number of years worked of around 3-5 years by 2015. The estimation procedure resulted in family status-specific average number of years worked at mean age at retirement as shown in Table 2.

The average number of years worked is highest among divorced and lowest among married women, and strongly declines with the number of children born. For example, married women retiring in 1985 with parity 0 have on average worked 29.6 years, and women of parities 1, 2 and 3+ worked around 5, 10 and 12 years less, respectively. These figures observed in 1985 influenced the decision on how to introduce a pension scheme considering children born. In a recent Norwegian study, it was estimated that a woman born in 1950 who has had two children, the first at age 21-22 and the second a couple of years afterwards, worked 6.8 years less up to the age of 37 than a childless woman (Kravdal, 1991). In a recent British analysis it was estimated that the time diverted from market work by a two-child mother was 9.1 years up to age 60 (Joshi, 1990).

Other variables needed to calculate total pension benefits are kept constant at their 1985 level: the proportion of the population retired at each age (90% of the female population aged 55 and over), the mean age at retirement (58.9 years) and average gross salary of women (141,192 Austrian Schillings per year).

Table 2. Average number of years worked by family status, 1985 and 2015.

Family status	1985	2015
single, parity 0	30.6	34.7
single, parity 1+	24.9	28.3
married, parity 0	29.6	34.3
married, parity 1	24.1	27.9
married, parity 2	19.0	22.0
married, parity 3+	17.6	20.3
widowed, parity 0	30.5	35.3
widowed, parity 1	24.8	28.7
widowed, parity 2	19.5	22.6
widowed, parity 3+	18.0	20.9
divorced, parity 0	36.0	40.9
divorced, parity 1	29.3	33.3
divorced, parity 2	23.0	26.2
divorced, parity 3+	21.3	24.2

3.2. A Pension Scheme Considering Children Born

The idea of introducing a pension scheme considering children born is based on several facts and also expectations. Continued fertility below replacement level significantly reduces the size of the population and thereby the labor force and most likely a country's economic competitiveness. Pay-As-You-Go pension systems are only sustainable on the basis of an increasing or at least constant cohort size. Fertility around replacement level is in the long run a precondition to avoid both excessive population aging and excessive population decline, which relates to the concepts "quality of life" and "continuity of life", respectively. Today's level of fertility in Austria is around 1.4-1.5 children per woman thus reproducing only around 70 percent of a generation. With no change in fertility, Austria's population would decline from around 7.5 million in 1985 to around 5 million in 2050. In order to avoid excessive immigration only an increase in fertility would keep Austria's population sustainable in terms of population and cohort size. Introducing a pronatalist policy may be one possibility to increase fertility, although hardly any signs indicating a shift from increased individualism and desire for independence back to familism or rather towards a new and modern form of familism can be observed. One reason for the low number of births is the bad financial situation of families and more so of one-parent families, which still to 90 percent consist of women

and their children. Parents are materially disadvantaged compared to individuals or couples who have no dependent children. Childrearing costs have increased to an extent which in no way reflects the essential contribution that the existence of a child makes to the future of a nation. Not only are (mainly) women and especially divorced women with children discriminated during the time of childrearing, but also during their retirement. Consequently, the notion of a pronatalist policy has to be expanded to an emancipatory policy as well.

The suggested pension policy includes a provision of five years counting as years of insurance per child born -- up to 3 children -- i.e. 5 years for one child, 10 years for two children and maximally 15 years for three or more children, to compensate for the interruption of work during active life. It is not possible to compensate a woman's loss of career opportunities. Compensation of direct childrearing costs by increasing child allowances is not considered in this paper since the aim was to test a pronatalist pension policy and not a pronatalist policy in general. Having children is interpreted as part of consumption and whether increasing family allowances may be beneficial to the state as well is beyond the scope of this paper.

This policy that considers children born is easy to implement both in the pension model in hand and in reality. A problem may arise in the case of women who do not take care of their children, e.g. after a divorce. It is assumed that those women do not lose their pension rights. In the model, years worked are set equal to years of insurance, thus the respective status-specific number of years worked (see Table 2) is increased by 5, 10 or 15 years for women with children. The additional number of years provided are seen to be sufficient to devote enough time to children present in the family when they are in urgent need of their parents. Whether providing five years per child is sufficient to make up for the pension disadvantage of mothers during their period of retirement is tested in the model. Only women are considered, since still most fathers' economic activity is not affected by the birth of a child. What is not considered in the model is a possible reaction to the new policy that consists in a reduction in female labor force participation rates. Although such a reaction sounds realistic, in fact it is not since women's economic activity has clearly increased during recent decades and is generally expected to increase even further. In the model, constant activity levels are assumed which reflects the author's belief that activity rates, even with the new policy introduced, will increase rather than decline.

The pension policy to be implemented will have a second characteristic, namely a gradual cancellation of the provision of survivor benefits. Survivor benefits, also called widowhood pension, in Austria, mainly ensure a minimum income for elderly woman, and they make up around 35 percent of the total pension expenditures paid to women in 1985. Survivor benefits provided by the current system equal 60 percent of the husband's former pension and are paid out independent of the woman's old age pension. Within the framework of an emancipatory pension policy it seems reasonable to partly or even completely cancel survivor pensions, depending on how many additional years per child counting for the pension are provided. In this model, a complete cancellation of survivor benefits is assumed in the long run. Whether savings to the state due to the cancellation of survivor benefits are sufficient to compensate additional old age benefits provided by the new pension scheme is one of the major questions to be tested in the model.

For the introduction of the pension policy a period of smooth transition is assumed. The new system is implemented for birth cohorts 1946 and thereafter only, i.e. for women below age 40 in 1985. During the coming two decades the old pension system is still in operation. From 2005 on, new retirees receive their benefits according to the new rules. From this time on, two parallel systems are in operation until the new system reaches maturity (around 2030). This smooth transition period was taken for both old age and survivor pension benefits, thus increasingly canceling provisions of survivor benefits until the year 2030.

The pension policy considered involves two scenarios concerning future fertility:

a) A "benchmark scenario" assuming the marital status-specific fertility levels will remain constant at their 1985 level.
b) A "fertility scenario" assuming an increase in fertility corresponding to half a child per woman or 0.5 in the total fertility rate, resulting in almost two children per woman on average.

Both scenarios assume mortality, (re)marriage, divorce and widowhood rates to remain constant at their 1985 level. Occurrence/exposure rates between family statuses that are related to fertility, e.g. the jump from married/parity 1 to married/parity 2, are changed proportionally to the change in fertility. The increase in fertility which is assumed in the fertility scenario is based on the assumption of an immediate response to the new pension policy introduced. While it is not possible to foresee whether women respond to the new pension policy by giving birth to additional children, it is possible to calculate costs and benefits of the different pension policies based on certain population developments and reactions.

For the social security system mainly the cost neutrality of the new pension system matters. Other macroeconomic consequences of both the policy itself and a possible fertility increase, like additional education expenditures or shifts in consumption and savings, are not considered.

3.3. Cost Profiles of Social Security Expenditures

To calculate total and per capita pension benefits both with the current system and with the new regulation, and to calculate how many benefits an individual would gain per additional child in this new regulation and how much this would possibly cost the system is only one side of the problem. Both for the system and for individuals other calculations have to be added.

In the case of an immediate and full response to the pension policy, meaning that women decide to give birth to additional children, from the point of view of the performance of the social security system some calculations have to be added (see Table 3). An increase in the number of children and hence in total population would also increase expenses of other social security programs: health expenditures (mainly benefits in kind), work injury and unemployment benefits (only cash benefits), and family benefits including both family allowances and maternity benefits (also cash benefits). Other social expenditures like education expenditures are not considered.

Table 3. Social security revenues and expenditures included in the model.

Revenues and expenditures with the current social security system	
+ additional old age pension benefits - survivor pension benefits	due to the new system
+ contributions losses due to lower economic activity of women - additional contributions of children (i.e additional labor force) + additional health expenditures + additional family allowances and maternity benefits + additional work injury and unemployment benefits	due to a response to the new system, i.e. an increase in fertility

Additional social security costs may -- at least in the long run -- be covered by additional contributions paid by an increased labor force. For the calculation of contributions, the contribution rate for social security is kept constant at the 1985 level which was 43.7 percent of gross salary liable to contributions, 15.6% and 28.1% for employees and employers, respectively. On the other hand, additional children would also lessen the average number of years a woman works and thus reduce social security contributions somewhat.

Apart from pension expenditures, social security costs are estimated using age-cost-profiles of social security expenditures. Observed age-cost-profiles for Austria in 1986 are taken from Findl et al. (1987) and kept constant throughout the projection period. According to their estimates, Austria's total social security expenditure in 1986 was around 335 billion Austrian Schillings (ATS) or 29.5% of GNP, of which 60% was paid for pensions. A further 22% was used on health expenditure, 11% on family benefits and 7% on work injury and unemployment benefits. Social security expenditures depend not only on the age structure but also on the marital status structure of the population. Hence, in a model age-marital status-cost-profiles should be preferred. But as information on the marital status structure of social security costs is lacking, only age-profiles have been used. Observed age-cost-profiles of social security expenditures for the three social security programs are given in Figure 1. Health expenditures increase with age, while family benefits mainly apply to the youngest age groups. Unemployment is more frequent at ages 20-30 and ages 50-60, work injury mainly concerns people aged 50 and over.

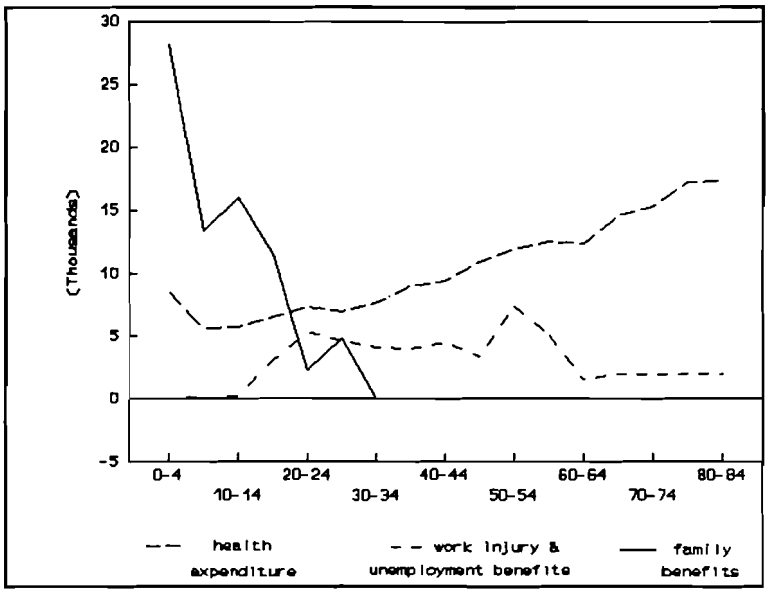

Figure 1. Age-profiles of social security costs, 1986.

3.4. Childrearing Costs and Savings-Type Pension Scheme

On the individual side, the aim of the pension policy is to remove disadvantages during retirement, but not during active life. The model considers savings losses that are caused by direct childrearing costs. It is assumed that a women uses a certain percentage of her income, in the general model set equal to 10% of gross salary, to realize a private savings-type pension scheme. Childrearing costs lower the income of which 10% is accumulated. The saving-type pension scheme can thus be seen as an alternative to the emancipatory and pronatalist pension rule to be implemented. A woman with children can benefit from the new public pension scheme but less money will go to the private savings-type pension scheme.

Based on data on childrearing costs by household expenditure and number of children published in Münz (1984), childrearing costs by number of children present in the family have been estimated for 1985 as shown in Table 4. Data give childrearing costs including proportional housing costs after subtraction of family allowances.

Table 4. Childrearing costs by number of children present in the family (in ATS).

Childrearing costs	1 child	2 children	3 children
per month	5230	5970	6950
during life	1,254,000	1,566,000	1,923,000
per child	1,254,000	783,000	641,000

Given the costs per month by number of children present in the family, i.e. data in the first row, lifetime costs are estimated on the basis of a specific family formation schedule. Assumptions concerning this schedule include: age 25 at first birth, a 2.5 year birth interval, 20 years childrearing per child and not more than 3 children per woman. Consequently, a mother of one child spends 20 years with her child, a mother of two children spends 5 years with one child and 17.5 years with two children, and a mother of three children spends 5 years with one child, 5 years with two children and 15 years with three children thus spending 25 years with children.

Data in Table 4 show that additional costs resulting from a second and/or third child are to a large extent covered by family allowances, although it looks as if a third child more often leads to a change in housing, because the difference between two and three children is larger than the difference between one child and two children. During a woman's life the costs for one child equal 1,254 million Austrian Schillings or 9 times the average yearly gross salary. Costs for two and three children are, respectively, 25 and 53 percent higher than costs for only one child.

Lifetime childrearing costs by number of children (Table 4) can also be compared to a woman's average lifetime salary. Costs for one child correspond to 36% of the lifetime salary of a woman of parity 1, costs for two and three children amount to 56% and 76% of lifetime salary of a woman of parity 2 and 3, respectively. When comparing per child costs in one, two and three children families, each child in a three children family is half as costly as a single.

Now, to the lower pensions: Savings losses due to childrearing are calculated out of lifetime childrearing costs. As women bear their children in their twenties (between age 25 and 30 in our model), for those women who do not have children there is much time to accumulate saved money until retirement. For that purpose an actuarial calculation is added, assuming real rates of interest equal to 0%, 1.5% and 3%.

A second factor reducing a mother's pension is the lower economic activity that is due to the interruption of work during the upbringing of children. Again, lower economic activity results in lower income of which 10% is accumulated in the saving-type pension scheme. This fact is also taken into consideration in the actuarial calculation. Consequently, from an individual point of view, the relevant calculations oppose pension benefit gains that are due to the new pension scheme, and savings losses that are due to childrearing and could alternatively be invested in a private savings-type pension scheme.

One more variable had to be set constant, namely the life expectancy at mean age at retirement, which was 23 years in 1985. This variable is needed to distribute total savings losses due to both childrearing costs and lower economic activity over the period of retirement. While pension benefit gains are calculated on a yearly basis, savings losses are calculated on a lifetime basis and hence have to be distributed over years of retirement to make gains and losses comparable. On average, this distribution procedure is correct; on an individual level, however, a woman who survives more than 23 years after retirement gains more than the average woman.

4. FEMALE POPULATION STRUCTURE

The marital status structure of the adult female population by parity is shown in Table 5. Half of the population aged 15 and over is married with at least one child, and one-fifth is single without children (mainly young women). Every sixth woman is widowed (mainly old women), most of them have two or more children, and only 5 percent are divorced.

Table 5. Women aged 15 years and over by family status, 1985 (in %).

Status	single	married	widowed	divorced
Parity 0	19.7	5.2	1.7	0.7
Parity 1	3.5	13.2	3.0	1.9
Parity 2	-	18.9	5.1	1.8
Parity 3+	-	17.6	7.0	0.7

Age-specific transition rates are shown in Figures 2a-d. Fertility rates are by far highest among married women. In many cases marriage still is a prerequisite for a birth. Note that widowed women have higher birth rates than divorced and single women (see Figure 2a). For example, the average number of children born by a married woman during her main childbearing ages (ages 20 to 35) is 1.03. The corresponding figures are 0.47, 0.33 and 0.23, for widowed, divorced and single women, respectively.

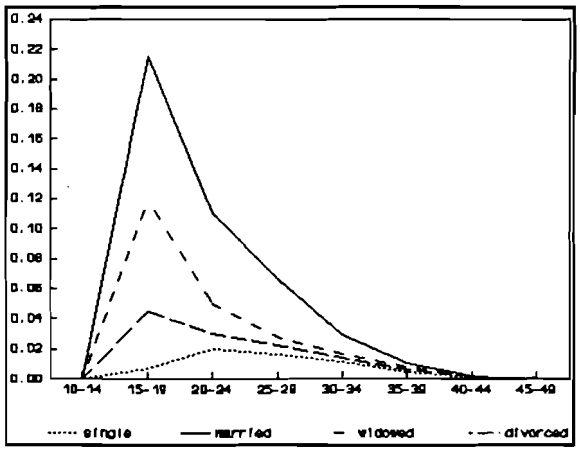

Figure 2a. Fertility rates by marital status.

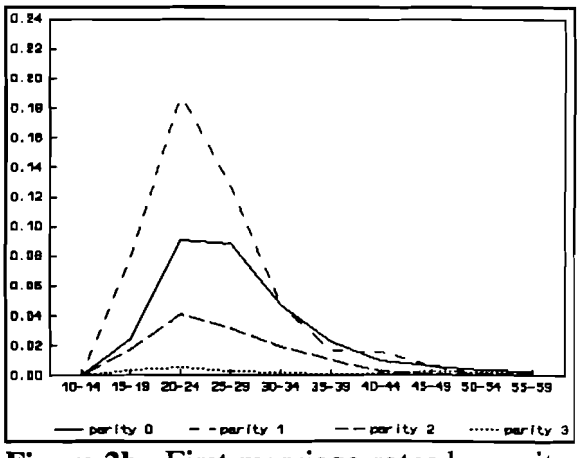

Figure 2b. First marriage rates by parity.

Marriage rates are highest among single women of parity 1, a first birth often being the reason for a first marriage (see Figure 2b). For women with two or more children, first marriage rates are significantly lower than without children. Remarriage rates of divorcees among women with parity 3+ are by far lower than among parities 0-2 (see Figure 2c). Both first and remarriage rates peak at age 20-24 and decline rapidly with

age, the exception being remarriage rates among childless women which indicate a second peak at age 40-44. Divorce rates clearly decrease with parity, independently of a woman's age (see Figure 2d). Divorce rates also indicate a first peak at age 20-24 and, except for childless women, a second peak at around age 40.

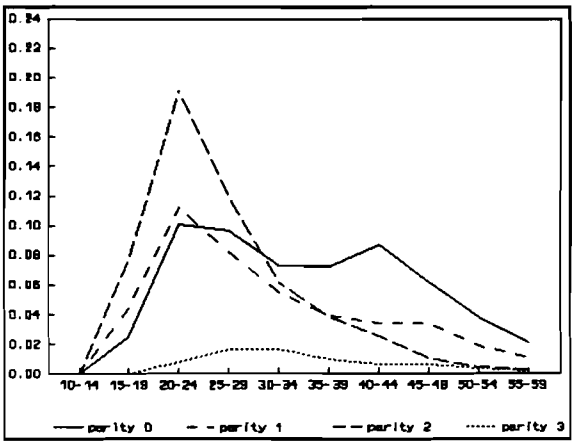

Figure 2c. Remarriage rates by parity.

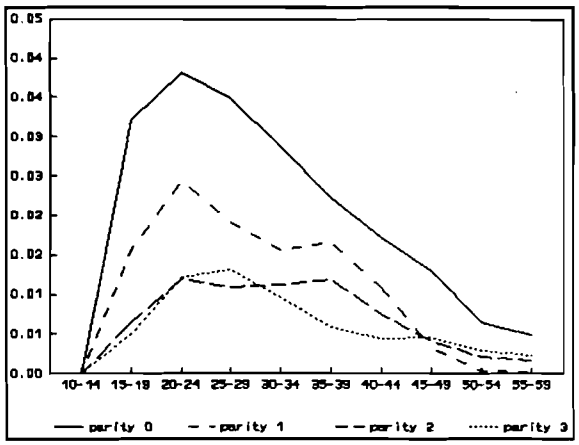

Figure 2d. Divorce rates by parity.

Similar to fertility, mortality rates are lowest for married women, but they differ insignificantly for the other marital statuses. The results of the demographic family model are already interesting by themselves. Both the structure by marital status and by number of children ever born will change significantly. Changes in the marital composition have been documented in Gonnot (1992). Table 6 contains results concerning the number of children born per woman only. Since the aim of this policy simulation is also of a pronatalist nature, resulting changes in the population structure are especially interesting with respect to changes in fertility.

Table 6. Women aged 15 years and over by parity, 1985-2050 (percentage).

Scenario	Parity	1985	2000	2015	2030	2050
Benchmark Scenario	no child	27	27	28	29	31
	one child	22	23	24	26	27
	two children	26	28	29	29	28
	three children	25	22	18	15	14
Fertility Scenario	no child		25	27	27	28
	one child		23	23	24	24
	two children		29	30	31	30
	three children		24	21	19	18

In 1985, an almost equivalent share of women falls in the categories parity 0, 1, 2 and 3+ (see Table 6). Assuming both constant fertility and constant family formation and dissolution rates (Benchmark Scenario), the share of women giving birth to one child at most will increase by around 10 percentage points at the expense of the share of women with three or more children.

With an increase in fertility by 0.5 children per woman (Fertility Scenario) the 1985 population distribution will only change to a small extent: the share of women of parity 2 will grow at the expense of the share of women of parity 3+. This shows that the share of women of parity 3+ will decline even when an immediate response to the new pension policy in terms of an increase in fertility is assumed.

5. COST/BENEFIT ANALYSIS

From around 338 billion Austrian Schillings in 1985, total social security expenditure would steadily increase until 2030 up to around 372 billion Austrian Schillings assuming constant fertility and mortality rates (Benchmark Scenario (BM), see Table 7). In this period, total population size already declines significantly, thus social security contributions would decline from around 303 billion Austrian Schillings in 1985 and 2000 to around 231 billion Austrian Schillings in 2030. The decline in total population size is also reflected in a decline in family benefits (minus 42%) and to a smaller extent a decline in health expenditure (minus 9%) and unemployment benefits (minus 18%). Although total population size decreases, the number of pensioners increases and pension expenditure would increase by around 30%. The share of pension expenditures among total social security expenditure would thus increase from around 60% in 1985 to more than 70% in 2030. The resulting balance between social security contributions and benefits, the ratio contributions/expenditures, would decline from 0.89 in 1985 to 0.62 in 2030 assuming constant contribution rates.

Table 7. Social security expenditures and contributions, 1985-2050 (in billion Austrian Schillings).

Year	Old age and survivor pensions		Other social security expenditures		Social security contributions		Ratio contributions/ expenditures	
	BM	Fer	BM	Fer	BM	Fer	BM	Fer
1985	204	204	134	134	303	303	0.89	0.89
2000	219	219	130	138	303	302	0.87	0.85
2015	239	239	122	139	283	297	0.78	0.79
2030	265	265	108	137	231	274	0.62	0.68
2050	218	225	87	132	181	276	0.60	0.77

Comparatively, it is not before 2015 that the assumed increase in fertility by 0.5 children per woman would have its impact on the performance of the Austrian social security system (Fertility Scenario (Fer), see Table 7). In the short run additional children would increase family benefits and thus total social security benefits, deteriorating the ratio contributions/expenditure. In the long run, however, the assumed increase in fertility would result in a stable size of the labor force, while according to benchmark assumptions the labor force would start to decline rapidly. As a consequence, the ratio contributions/expenditure would swing back up to 0.77 in 2050.

Figures in Table 7 are based on the current Austrian pension (and social security) system. Below, costs and benefits of a pension policy considering children born are tested from the point of view of the social security system on the one hand and of individual retiring women on the other hand.

5.1. Social Security System Perspective

It is assumed that the new pension system will be matured in 2030. In the year 2000 the old system still applies for each retiring woman, while in 2015 roughly half of the retired female population will receive benefits according to the new rules. As a consequence, in the year 2000 pension benefits do not differ from those calculated for Table 7.

Old age pension benefits provided for women will increase even with the current Austrian pension system and constant 1985 demographic settings, by 37% until the year 2030 (see Table 8, item a) -- due to an increase in the retired population and due to an increase in average old age benefits per beneficiary by around 20%. The latter increase is a consequence of the observed increase in female activity levels during the last two decades. Under the new system, i.e. 5 additional years of insurance per child, old age benefits would rise by an other 27%. Assumptions on fertility levels have no impact on pensions expenditures before around 2045.

Total pensions expenditures for women (see Table 8, item b) have a different effect. In the long run, the pension policy introduced could even reduce the expected increase in total pension expenditures somewhat, in 2030 by 6%. The increase in old age benefits is more than made up for by the decrease in survivor benefits. Calculations for the new system are based on a gradual cancellation of survivor pensions. In 2030, when the system has reached maturity, total pension benefits equal old age pension benefits.

Whether the existence of a survivor's pension, which has been a social necessity, can be challenged in the future is difficult to judge. This issue is connected with the question of the role and status of women in the future society. Calculations for this study are based on the assumption that the following decades will bring the desirable development to end the discrimination of women in all respects, including their economical, political and personal situation. In view of this assumption, a cancellation of survivor regulations together with an implementation of an emancipatory policy is both sensible and desirable. The total amount of benefits hardly changes, but the distribution of benefits among the female population changes significantly. With the current system, childless married (and at a later date widowed) women benefit at the expense of single or divorced women with

children. The more children a woman has the more she is discriminated by the pension system.

Table 8. Old age and total pension benefits of women in million Austrian Schillings; current versus new pension system.

a. Old age pension benefits						
System	Scenario	1985	2000	2015	2030	2050
Current system:	Benchmark	61796	66444	73723	84875	72468
New system:	Benchmark	61796	66444	86214	108017	89836
	Fertility	61796	66444	86223	108022	95281
b. Total (= old age plus survivor) pension benefits						
System	Scenario	1985	2000	2015	2030	2050
Current system:	Benchmark	94274	96024	103176	115381	97917
New system:	Benchmark	94274	96024	105849	108017	89836
	Fertility	94274	96024	105858	108022	95281

While an increase in fertility as a consequence of the introduction of a pension system considering children born has virtually no impact on total pension expenditures -- at least not before the end of our projection period -- it immediately influences other social security expenditures. Table 9 gives social security costs by major program (excluding pension expenditures) both for Benchmark and Fertility Scenario assumptions. Since the calculation for social security costs is based on "social security age-profiles", changes in time and differences between scenarios are entirely due to changes in the age structure of the population. While current low fertility (Benchmark Scenario) reduces family benefits by 42% until 2030, fertility around replacement level (Fertility Scenario) keeps family and maternity benefits almost at the 1985 level (see Table 9). The assumed increase in fertility gives a 40% increase in family benefits until 2015, a 70% increase until 2030 and a 120% increase until 2050, compared to constant fertility.

Since health expenditures significantly increase with age, and work-related benefits mainly apply to people at working ages, these types of expenditures are less sensitive to both the expected change in the population's age structure and assumptions concerning fertility. With constant fertility, the decline until 2030 is only 9% for health expenditures and 18% for work-related benefits, which consist of unemployment benefits and work injury costs. On the other hand, an increase in fertility results in an increase in health expenditures by 5% and almost constant work-related benefits until the year 2030. Compared to constant fertility this corresponds to a 15% increase in both types of social security expenditures in the year 2030.

Table 9. Social security costs by major program, 1985-2050 (in million Austrian Schillings).

Scenario	Expenditures	1985	2000	2015	2030	2050
Benchmark	Health expenditures	72862	73590	71978	66638	53914
	Family benefits	37829	32519	26567	21939	16949
	Work-related benefits	23813	23827	23229	19467	15623
Fertility	Health expenditures	72862	75636	76932	76374	72821
	Family benefits	37829	38497	37136	37545	36995
	Work-related benefits	23813	23841	24475	22461	22667

Apart from higher social security costs the assumed increase in fertility results in an increase in the labor force and thus in social security contributions. The female labor force will slightly decline in the short run, since the increase in fertility gives a different distribution of women across parity and thus reduces overall labor force participation rates (see Table 10). In the long run, however, additional children will move into the labor force, which will then increase by 5%, 19% and 52% until 2015, 2030 and 2050, respectively, compared to the Benchmark Scenario.

Table 10. Additional labor force due to the assumed increase in fertility, in 1000 people and in percentages of total labor force.

Sex	2000	2015	2030	2050
Women	-33	64	191	413
Men	0	95	286	638
Both sexes	-33	159	477	1051
Women	-2%	+5%	+18%	+50%
Men	0%	+5%	+19%	+53%
Both sexes	-1%	+5%	+19%	+52%

Having collected both costs of and contributions to the social security system, it is possible to elaborate on the performance of this system in dependence on the political and demographic assumptions. From around 36 billion Austrian Schillings the Austrian social security deficit will increase almost exponentially to 142 billion Austrian Schillings in 2030 if the current system and current fertility are assumed to continue (see Table 11). In percentages of contributions the deficit amounts to 62% in 2030 and 68% in 2050.

The deterioration is most dramatic in the period 2015-2030, when the aging process reaches its maximum. If the new pension system is adopted, the deficit would be slightly lower than with the current system even under constant fertility assumptions -- although the difference is barely significant. A possible response to the new system in the form of an increase in fertility, however, could substantially improve the performance of the system. The growth of the deficit accelerates in the following decades, but it is more limited during the periods of strongest aging. In percentages of contributions, the deficit amounts to only 44% in 2030 and 26% in 2050. The ratio contributions/expenditures will again improve after 2030, thus in 2050 being back to the level of 2015.

At this point it seems interesting to show how a pension scheme considering children born that still provides full survivor benefits would perform. Assuming fertility increases by 0.5 children per woman, the deficit with such a system would be significantly higher than with the current pension system given no increase in fertility. After around 2035, however, the increase in fertility starts playing a positive role, keeping the deficit increasingly lower than with the current system and current fertility. This demonstrates that in the long run any scenario would be better than continued low fertility.

Table 11. Estimated social security deficit, 1985-2050.

Year	Deficit in billion ATS		Deficit in percent of contributions		Ratio contributions/ expenditures		Proportion of pension benefits among ss-costs	
	BM	Fer	BM	Fer	BM	Fer	BM	Fer
1985	-36	-36	12%	12%	0.89	0.89	60%	60%
2000	-45	-55	15%	18%	0.87	0.85	63%	61%
2015	-78	-83	27%	28%	0.78	0.78	66%	64%
2030	-142	-120	62%	44%	0.62	0.70	71%	65%
2050	-123	-73	68%	26%	0.60	0.79	71%	62%

It is interesting to look at the distribution of social security costs by major programs. While under constant fertility assumptions the share of pension expenditures would increase at the expense of other programs, especially family benefits, shares of the major programs would almost remain unchanged if fertility reaches a level around two children per woman.

Still, some other measures like, for example, increasing the mean age at retirement would be necessary to prevent the social security system from a partial breakdown. The main conclusion from the point of view of the social security system is that the implementation of a pension policy of the kind suggested in this paper will

- by no means deteriorate the performance of the social security system;
- possibly improve the performance of the system if a certain response in the form of an increase in fertility occurs;
- put an end to some of the discussions currently going on in Austria. Among those is the conflict concerning the lower legal age at retirement for women, which is 60 years in contrast to 65 years for men, that blocks any change in the system since the Austrian Constitutional Court declared this law unconstitutional. The only decision made by the government so far (January 1992) was to suspend this Court's decision by one year. The ongoing discussion concerning the role of the survivor's pension, its relevance in the light of the strong changes in people's living arrangements, the question whether it should be extended to divorced spouses as well, could all be swept aside. Replacing survivor benefits by additional old age benefits of course requires a certain attitude towards women's rights and an adequate policy to achieve equality. It would almost be of no consequence if certain survivor benefit regulations, possibly in a different form, would be kept for the few women who are not entitled to their own old age pension.

5.2. Individual Perspective

From the point of view of a retiring woman quite different questions arise. What pension benefits will a mother of three children on average receive compared to a childless mother? How much money could this mother already have saved during her life if she had decided not to have children? What should a pension policy look like to, at least, compensate a mother's lower income during the period of retirement?

With the current system, average old age pension benefits differ strongly by a woman's family status. This is not surprising since benefits are directly proportional to the number of years worked, or rather years of insurance, which depend on family status as shown in Table 2. The main aim of a pension scheme considering children born would be to achieve a kind of equation for childrearing efforts, at least during the period of retirement.

Table 12 opposes status-specific average old age pension benefits women would receive on the basis of the current pension system and the new pension system. The table gives average benefits by family status in percentages of the overall average for the year 2030, since this is the year when the new system would be mature. With the current pension system, single and divorced women are better off since they on average have less children than married and widowed women. Old age pensions significantly decline with parity, the average of a childless mother being 60% higher than the average of a mother of three or more children. With the new system implemented, differences by parity are no longer significant and so are differences by marital status.

In the case of the current pension system, the uneven distribution of pension benefits across family status is even more pronounced when survivor pensions are included and hence total pension benefits are compared. Differences by marital status are changed to the opposite. Widowed women receive by far the highest amount of total benefits, while divorced and single women are discriminated. Married women usually still live with their spouse and can expect to become widowed some time in the future.

Pension differentials by parity are not influenced to a significant degree when survivor benefits are added, but there is a small reduction in the expected differences.

Table 12. Average old age pension benefits in 2030 by family status (average = 100).

	Marital status (average = 100)				Parity (average = 100)			
System	sin	mar	wid	div	0	1	2	3+
Current system	121	95	95	113	130	111	88	81
New system	99	98	100	108	102	99	97	104

How much money would a retired mother receive because of her children under the new pension system? Yearly gains in old age benefits by parity are given in Table 13. Figures again relate to the year 2030 when the new pension system would have reached maturity. Since 5, 10 and 15 additional years of insurance are granted to women with 1, 2 and 3 children, respectively, the increase in additional old age benefits with parity is approximately linear. Yearly benefit gains amount to around 11,100, 25,000 and 36,600 Austrian Schillings or, expressed in percentages of the average old age pension in 2030, 12.3%, 27.7% and 40.5% for parities 1, 2 and 3, respectively.

Table 13 also shows average losses of savings by parity and depending on the real interest rate. As discussed in Section 3.2, savings losses consist of losses due to direct childrearing costs and losses due to lower economic activity caused by the existence of children. For both parts, losses are calculated assuming a 10% savings rate and alternative real interest rates of 0%, 1.5% and 3%. The two components of savings losses -- childrearing costs and loss of income due to lower economic activity -- are responsible for around 50% of total savings losses each. Savings losses have been calculated on a lifetime basis and have then been distributed over years of retirement to make gains and losses comparable.

Given a real interest rate of 0%, savings losses -- distributed over 23 years of retirement -- amount to around 9,700, 13,800 and 15,700 Austrian Schillings (see Table 13) for parities 1, 2 and 3, respectively. Savings losses do not increase linearly with the real interest rate, since compound interests give an exponential increase. Hence, savings losses for a mother of two children equal 23,000 Austrian Schillings with a 1.5%, and even 38,000 Austrian Schillings with a 3% interest rate. Losses do not increase linearly by parity either, as a consequence of the shape of parity-specific childrearing costs and economic activity levels. The ratio of savings losses by parity is -- assuming a 0% interest rate -- 1.0 (for parity 1) : 1.42 (for parity 2) : 1.62 (for parity 3), which roughly averages the ratio of parity-specific childrearing costs (1.0 : 1.25 : 1.53, respectively, see Table 4) and the ratio of losses in economic activity (1.0 : 1.65 : 1.73, respectively, see Table 2).

Table 13. Yearly gains and losses by parity due to the new pension policy in the year 2030 (in Austrian Schillings).

Real interest rate	Parity	Gain in benefits	Loss of savings	Absolute difference gain-loss	Difference in % of av. pension
0 %	1 child	11103	9702	1401	1.6%
	2 children	25028	13810	11219	12.4%
	3 children	36573	15693	20880	23.1%
1.5 %	1 child	11103	16439	-5336	-5.9%
	2 children	25028	22994	2035	2.3%
	3 children	36573	25673	10900	12.1%
3 %	1 child	11103	27577	-16474	-18.2%
	2 children	25028	37988	-12960	-14.3%
	3 children	36573	41768	-5195	-5.8%

Comparing pension benefit gains and savings losses, it turns out that from the point of view of the individual woman no consistent conclusion can be drawn. Whether the new pension policy implemented could actually force women to have additional children is difficult to say, since the conclusions heavily depend on the economic assumptions adopted. What actually was looked at in those calculations is the following: are additional pension benefits provided by the new system sufficient to make having children more rational than using a certain amount of the additional income, in our calculations 10%, to realize a private savings-type pension in addition to the state pension scheme. In this case "additional income" refers to the difference in salary between parity 0 and parities 1 to 3. The lower the assumed real interest rate, the lower the capital accumulated by a savings-type pension scheme. When viewed by a mother of two children (see Table 13), the policy is effective in the case of a 0% and a 1.5% interest rate (yearly gains of 11,200 and 2,000 Austrian Schillings, respectively), but a 3% interest rate clearly gives preference to the savings-type option (yearly losses of 13,000 Austrian Schillings). The real interest rate necessary to balance losses and gains is in the case of a mother of two children at around 1.8%. Any real interest rate below 1.8% makes the pension policy reasonable. However, viewed by a mother of only one child or of even three children the balance real interest rates are 0.5% and 2.6%, respectively. For a mother of three children the policy is rational up to a real interest rate of 2.6%. In the case of a 0% interest rate benefit gains (savings losses deducted) would almost reach one-fourth of the average old age pension. For a mother of one child, however, only a low level of economic performance makes the pension policy reasonable. A 3% interest rate induces savings losses (already including benefit gains) of almost one-fifth of the average old age pension.

Even if no general conclusion independent of assumptions on economic variables can be drawn, the above results indicate the following:

- The rationality of the pension policy increases with parity. One-child families are supported the least, three children families the most. The emancipatory goal of the new pension policy is fulfilled.
- From the point of view of a childless mother the incentive to give birth to a child is only modest since one child is not sufficient to exhaust the policy's possibilities. To decide to have more than one child before having any child is a difficult if not impossible precondition.
- From the point of view of a mother of one child the incentive to give birth to a second child is strong. A woman with one child is already discriminated against childless women (in terms of lifetime income including pensions); a second child would significantly increase the income available during the period of retirement.
- From the point of view of a mother of two children the incentive to give birth to a third child is even stronger. Again, a third child would significantly increase the income available during the period of retirement, while -- on average -- economic activity and thus income during active life changes only limited when moving from parity 2 to parity 3.
- It may be possible to achieve the pronatalist goal of the new pension policy. Since one main reason for the low fertility level in Austria is the large number of children without siblings, and since women of parity 1 are encouraged to have additional children, the policy could be effective. Assuming a "rational" fertility behavior, a decrease in the proportion of one child families and an increase in the proportion of families with two or more children should be expected. The proportion of childless women should probably increase further.

It is important to look at the sensitivity concerning assumptions on other variables. The savings rate was assumed to equal 10% of the gross salary. A balance of pension benefit gains and savings losses is easily achieved by changing assumptions on the respective savings rate. The lower the assumed savings rate, the better the suggested pension policy performs in comparison with a private savings-type pension scheme. In the case of a 1.5% real interest rate the savings rates necessary to adjust savings losses to parity-specific gains in benefits are 7%, 11% and 14% for parities 1, 2 and 3, respectively (see Table 14). The higher the interest rate, the lower the required savings rate. Given a 3% real interest rate, from the point of view of a mother with only one child only an unrealistic savings rate below 4% makes the pension policy rational. On the other hand, for a mother of three children and given a 0% real interest rate, even a high savings rate of 22% would give pension benefits that are lower than those provided by the new pension system.

A good indication of a proper specification for a pension policy considering children born can be obtained by calculating the additional number of years of insurance such a policy should offer to balance benefit gains and savings losses, based on assumptions concerning both the savings rate and the real interest rate. The savings rate is again assumed to be 10%, and -- to be consistent with other conclusions -- real interest rates of 0%, 1.5% and 3% are compared. On the basis of a 1.5% real interest rate, the policy should at least provide 7.5, 9 and 10 additional years of insurance for women of parities

1, 2 and 3, respectively, to legitimately be called "pronatalist" from the point of view of any mother (see Table 14). A pension scheme can still be called pronatalist, of course, if only women of parities 2 and over benefit, as would be the case with the provisions of the pension policy tested (given a 1.5% real interest rate). Again, the higher the interest rate the more difficult it is to implement a policy that makes having children rational. A real interest rate of 3% would give the private savings-type pension scheme preference over having children and taking advantage of the pronatalist changes in the pension system, independent of a woman's parity.

Table 14. Sensitivity analysis of the new pension policy, by real interest rate.

Balances by number of children	Balance private savings rate (in % of the gross salary) for real interest rates of:			Balance number of years provided by the policy for real interest rates of:		
	0%	1.5%	3%	0%	1.5%	3%
Parity 1	11	7	4	4	7.5	13
Parity 2	18	11	7	5	9	17
Parity 3+	23	14	9	6	10	17.5

Table 14 confirms the conclusion that the adopted pension policy supports women of parity 3 the most and of parity 1 the least, which can again be interpreted as an achievement of the emancipatory goal of the policy. If one would decide to set up a pronatalist, but not emancipatory policy that supports mothers equally, irrespective of the number of children born, different changes would have to be implemented. The increase in the number of years provided should not be linear, as is the case in the adopted policy which provides 5, 10 and 15 years, for parities 1, 2 and 3, respectively, but rather logarithmic.

6. SUMMARY AND DISCUSSION

By incorporating results of a family model in a policy simulation tool that combines a pension model with social security age-profiles, it was possible to arrive at several conclusions concerning the future of the Austrian pension system. The new pension policy consists of a provision of five additional years of insurance per child born (up to three children) for a woman claiming old age pension benefits. At the same time those increased old age benefits should replace survivor benefits. Assuming a smooth transition period for the implementation of the new pension system, the system would reach maturity in 2030. The first conclusion is that, independent of demographic developments, the new system would not increase total pension benefits. Secondly, it would significantly change the income distribution of retired women to the extent that married and widowed

childless women no longer benefit at the expense of single and divorced women with many children. Thus, the emancipatory goal of the policy is fulfilled. Thirdly, provided a certain response to the new system in the form of an increase in fertility, the performance of the social security system would improve. Discussions that currently prevent the Austrian pension system from being changed at all should seriously consider the options tested.

In the long run, fertility at around replacement level significantly facilitates the maintenance of a social security system of the pay-as-you-go type. To a certain extent the policy implemented could be called pronatalist since mothers could benefit from the new system, depending on the economic variables (savings rates, real rates of interest). On the other hand, for a childless mother the incentive to give birth to a child is only modest. Assuming a strong potential for response to the policy, more two- and three-children families should be expected, while the proportion of one-child families should decline. The proportion of childless women, however, should probably increase further. Given the large number of one-child families in Austria, overall fertility should be expected to increase.

Some general questions arise when talking about the implementation of a pronatalist policy. In light of the recent decline in fertility to a level far below replacement level, which for the time being marks the end of a steady long-term fertility decline over the last centuries, a pronatalist approach does not seem useful at all. Fertility changes and parallel changes in living arrangements were mainly caused by the changing status of women in modern society. In earlier times, for most women, purpose and accomplishment were defined largely in terms of motherhood. Education has motivated women to pursue activities outside the family, and at the same time equipped them with the skills to do so. Higher education brought about higher economic activity and thus economic independence of women. Work has encouraged women to limit their family size by providing them with sources of satisfaction and security outside the family. Women are no more naturally inclined to limit themselves to motherhood than men are inclined to limit themselves to fatherhood. Strong changes in women's rights and possibilities have occurred although women still are discriminated.

Returning to earlier motivations of childbearing is certainly impossible. Any pronatalist policy must provide conditions that encourage people, not women alone, to have larger families. Issues like providing individual child care facilities to an adequate degree, or especially encouraging men to share childrearing efforts with their partner have to be addressed. Thus, using a one-sex model is a simplification not only from a modeling point of view, but also with respect to the contents: both women and men have to be covered in a pronatalist policy in a modern European society. A pronatalist policy should aim at a new form of familism that enables both parents to make their individual freedom and independence and their family ambitions compatible. But even then it is not certain whether policies actually can influence individual behavior.

As a consequence, the main purpose of the pension policy suggested in this paper is emancipatory: it contributes to a society that guarantees a fair treatment of everybody. Neither shall women be discriminated against men, nor shall mothers be discriminated

against childless women. The latter aim is easy to address in an emancipatory pension policy; the former needs additional changes in both policy and society.

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