Welfare Effects of Pension Finance Reform

by

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I Introduction

It is a commonplace now that the social-security systems, which in most countries are organised according to the pay-as-you-go method, are severely affected by the aging of the population. I would like to mention just one number which illustrates this, namely the ratio of people over 64 to those of age between 20 and 64. This ratio was 0.25 in Austria in the year 2000 and will increase to 0.53 in the year 2050, according to the recent demographic forecast. Similar numbers are to be expected for most industrialised countries. As is well-known, the two factors responsible for this development are an increase in life-expectancy (about six years for women and seven years for men until 2050) and a decrease in fertility.

This fact has originated numerous discussions among academics as well as politicians as to the adequate way of how the social-security system should be reformed. Proposals range from a fundamental rebuilding of the whole system to far less spectacular changes of some parameter values. In order to assess these proposals, it helps to consider them within a unifying framework, which makes the specific characteristics of various changes visible. Accordingly, the intention of the present contribution is to analyse the properties of the social security system and of suggested reforms from a common perspective, as it has emerged within the last decades. Following a public economics approach, the focus is on welfare effects stemming from changes in real variables such as consumption; I do not deal with monetary and financial market effects.

Of course, the contribution does not provide a comprehensive survey of all aspects relevant for pension reform, which are reflected in a huge amount of literature on that topic. Rather, the contribution will be confined to some basic issues, which are at the heart of any reform proposal.[1] It will also not deal with political-economic questions, such as the increasing political power of the older generations, which obviously are very important for public decision-making on social security systems.

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[1] For a broad and careful investigastion of the effects of pension reform see e. g., the recent study by Lindbeck and Persson 2002.

As a first step it is interesting to ask why pensions are a field of public activity at all.[2] One should keep in mind that usually we have the view that public interference in a market economy needs to be justified by some important efficiency or distributive target, which is failed by free markets. The normal answer is that mandatory pension systems are necessary, because otherwise individuals would not provide sufficiently for old age. The two main reasons typically mentioned are: (1) Individuals might act as free-riders, relying on public assistance schemes when old; (2) Individuals might be myopic, that is, at the age of 20 or 30 many people are unable to recognise their future needs, when they will be old. A variant of the latter argument is that individuals tend to act inconsistently over time, that is, though they in principle are willing to provide for the future, they postpone the required saving from one day to the other. In any case, it is clearly a paternalistic position, which in general is considered problematic among economists and should be invoked with particular care only, because it conflicts with the axiom of consumer sovereignty. Similarly, the free-rider argument corroborates only a modest extent of the public pension system, sufficient in order that old-age poverty is prevented.

Nonpaternalistic arguments for a mandatory pension system may refer to limitations in the financial markets, such as asymmetric information problems, or to the target of inter- and intragenerational redistribution. Some of the latter will be discussed in further sections.

II Pay-as-you-go versus funding

In this section we formulate some basic relations describing the functioning of the pay-as-you-go (PAYGO) pension system, within a simple overlapping-generations model. Let N_t, t = 0, 1, ... denote the number of (identical) individuals arriving and working in period t, being retired in period t + 1. Let τ_t be the contribution rate to PAYGO in period t and w_t be the wage rate. With x_t denoting pension benefits per capita we have the PAYGO budget equation in t + 1

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[2] According to Mulligan and Sala-i-Martin 1999, 166 countries have some kind of public old-age pension.

$$\tau_{t+1} w_{t+1} N_{t+1} = x_{t+1} N_t \qquad (1)$$

or

$$x_{t+1} = \tau_{t+1} w_{t+1} \frac{N_{t+1}}{N_t}.$$

Comparing this with the contribution of an individual born in period t, who receives x_{t+1} in retirement, we have

$$\frac{x_{t+1}}{\tau_t w_t} = \frac{\tau_{t+1}}{\tau_t} \frac{w_{t+1}}{w_t} \frac{N_{t+1}}{N_t}. \qquad (2)$$

That is, rentability of PAYGO depends on the growth rates of the contribution rate, of wages (i. a., on productivity growth) and of the labour force. For constant contribution rates and with $\hat{w}_{t+1}$, $\hat{N}_{t+1}$ denoting growth rates, the internal rate of return i_{t+1} of PAYGO in implicitly determined by the relation

$$1 + i_{t+1} = (1 + \hat{w}_{t+1})(1 + \hat{N}_{t+1}) \approx 1 + \hat{w}_{t+1} + \hat{N}_{t+1}, \qquad (3)$$

that is, it equals the growth rate of the wage bill, determined by productivity and population growth. If we compare this with the market rate of return r_t an individual would have earned if she had invested the same amount on the capital market instead of contributing to PAYGO, we arrive at the well-know Aaron condition:

$$r_{t+1} \gtrless \hat{w}_{t+1} + \hat{N}_{t+1}.$$

Contributing to PAYGO decreases/increases life-time income compared to an investment on the capital market (in other words: compared to private saving or to a contribution to a fully-funded system), if the rate of interest is larger/lower

than the growth rate of the wage bill. The usual opinion is that the first of these possibilities holds in the long run, because otherwise the economy is characterised by so-called dynamic inefficiency, which means that reducing capital would increase welfare.[3]

However, even if one accepts this argument (see e. g. Abel et. al. 1989), theory does not tell us how big the difference between r and $\hat{w} + \hat{N}$ is. In concrete projections, productivity growth is usually assumed to lie between 0,015 and 0,025, while estimates for the real market rate of return range from 0,02 to 0,1, where the last number refers to investment in risky assets and includes a risk premium.

Thus, if a person was free to choose a system for the provision for old age, according to the Aaron condition she would probably opt for an investment on the capital market. However, this decision has already been made, and it was for PAYGO, intended in favour of the first generation, where retired individuals in period 0 received some pension x_0 without having contributed when working one period before. That is, for them PAYGO was advantageous irrespective of the Aaron condition.

It is interesting to relate the profit of the first generation to the losses of later generations, given that $r > i_t$. In doing this, we assume, for simplicity, that the interest rate r and the growth rates $\hat{w}$ and $\hat{N}$, remain constant over time, hence also i. We start with considering the discounted loss, caused by the contribution to PAYGO, instead of a capital-market investment for a generation entering in t:

$$\frac{\tau w_t N_t (r - i)}{(1 + r)}$$

Adding the present value of these losses up to infinity we get

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[3] It should be noticed that we take the interest rate as exogenously fixed (small open economy). Most statements hold for an endogenous interest rate as well.

$$\sum_{t=0}^{\infty} \frac{\tau w_t N_t (r-i)}{(1+r)(1+r)^t} \, ,$$

which can be expressed, using growth rates and (3), as

$$\frac{\tau w_0 N_0}{1+r}(r-i)\sum_{t=0}^{\infty}\frac{(1+i)^t}{(1+r)^t} = \tau w_0 N_0 \, . \tag{5}$$

That is, the gift to retirees in Period 0 ($x_0 N_{-1} = \tau w_0 N_0$) equals exactly the present discounted value of the losses of all later generations (Spremann 1984, Sinn 2000, Lindbeck and Persson 2002).[4]

This relation gives us an indication for the answer to a question, which has puzzled economists and non-economists for some time: given r > i, a switch from PAYG0 to a funded system obviously produces a profit for later generations. However, one or more generations in transition lose, because they receive no or only an unexpectedly small pension out of PAYG, though they have contributed when working. Shouldn't it be possible to tax away some of the profits of later generations and to compensate generations in transition, i. e.: is a switch possible where no generation loses? The answer is "no" (Breyer 1989) and it has to do with the formula (5): With an existing PAYGO, a given total amount and a time path of losses is fixed, any change of the system could only change the time path, making some generation worse of and some better off.

III The deadweight loss of contributions to the pay-as-you-go system

Now we briefly turn to another idea how a Pareto-improving transition from a PAYGO to a funded system could be managed (Homburg 1990, Breyer and Straub 1993). It starts from an extension of the above model, which used the assumption of a fixed labour supply l = 1. With variable labour supply, the financing of public activities through taxes causes a deadweight loss. If the contribution to the PAYGO can also be seen as a kind of tax, then removing it through a switch to the funded system would also remove the deadweight loss

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[4] Obviously, the same holds for the pension claims in later periods as well.

and, thus, create a surplus, which could be used for a compensation of the generations which otherwise would lose in the process of transition.

With variable labour supply l, the discounted available labour income (gross income minus contribution plus discounted pension) for an individual, given PAYGO with r > i, can be written as (remember (4))

$$w_t l_t (1 - \tau \frac{r-i}{1+r}), \qquad (6)$$

where $\tau(r-i)/(1+r)$ represents the effective tax rate. It is at least conceivable that abolishing the tax indeed creates additional welfare, whose money equivalent can be used for compensation of potential users.

However, one should be aware that in reality distorting taxes instead of lump-sum taxes exist for a certain reason, which is: differences between individuals. In a world with identical individuals, as it was modeled in the foregoing section, it does not make sense to have distorting taxes, one could always use a head tax, which does not cause any deadweight loss. Thus, in order to discuss the above idea adequately, one has to depart from the assumption of identical individuals, that is, in the present context, of identical wage rates.

With differing individuals, (at least) two different versions of PAYGO are possible, concerning the way, benefits are ascribed to pensioneers: either there is a single lump-sum benefit x_{t+1} for every individual, or benefits differ according to prior contributions, that is to labour income. It is straight forward to see that in case of the latter, when benefits are strictly proportional to own contributions (which could be termed an individually "fair" system), formula (6) still describes the marginal tax rate where w_t^k and l_t^k should both be indexed by k to indicate differing individuals. In case of the former, this is no longer true. Because of the strong redistributive element, in fact τ represents the effective marginal tax rate, as the benefit x_{t+1} is lump-sum, independent of labour income. It is clear that in such a system the associated deadweigh loss is much larger.

The important point now is that with either system, some given distribution of the contributions, benefits and deadweight losses over the individuals is associated. Any step in the reduction of PAYGO, in order to decrease the deadweight loss, can only mean a reduction of the contribution rate and an introduction of a lump-sum element. It is true that this reduces the deadweight loss, but at the same time it changes the distribution of taxes and benefits. One can show that except in specific cases[5], it is not possible to design a change of the contributions such that indeed the deadweight loss is reduced and at the same time enough revenue is collected to finance the pensions of the retired, without making some of the individuals worse off (Brunner 1994, 1996). That is, redistribution within a generation occurs.

IV Reactions to aging

So far we have discussed two main ideas how to transform PAYGO to a funded system without making some individual or generation worse off. Unfortunately, it turned out that these ideas do not really work. In the literature, other proposals for a painless transformation were made, but it seems fair to say that these do not provide realistic alternatives either.

Given this insight, what should then be an adequate reaction in view of the expected aging of the society?

First of all, the non-existence of a Pareto-improving reform obviously does not preclude any reform. However, as any reform implies specific redistributive effects across (and probably also within) generations, these effects should be made visible and they should be justified by some accepted norm. Moreover, as was mentioned in the introduction, a main argument for establishing a mandatory system at all is based on a paternalistic view and should therefore not be applied on a large scale.

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[5] Essentially: when with the existing PAYGO system contributions are collected in an inefficient way. Obviously, this inefficiency could also be removed without changing the system.

As can easily be seen in our simple model in section II, the consequence of a decline in population growth in period t + 1 is a fall of the internal rate of return of PAYGO (unless an increase in productivity growth offsets this effect, but there is no convincing reason to assume this to occur). There are three obvious possible reactions:

1. accept the fall of the rate of return, that is, the lower pension x_{t+1}.
2. increase the contribution rate τ_{t+1} in order to keep the rate of returns i_{t+1} at the level of the period before the decline of labour force growth.
3. force individuals in period t to save an additional amount, by collecting this as a contribution to a newly established funded system, such that the (low) PAYGO benefit x_{t+1} plus the repayment from the new funded system is roughly equal to the PAYGO pension benefit in case that population growth would not have fallen.

What can be said concerning the welfare effects of these alternatives? First, it is clear that with the first one the burden due to a fall of $\hat{N}$ is laid on the generation born in t, while this generations profits from the second.

However, returning to formula (5) above, one observes immediately that this profit goes at the costs of later generations: the present value of the sum of their losses from a participation in PAYGO increases.

Whether variant 1 or variant 2 is preferred depends on value judgements and cannot be decided by an economist. The answer is certainly not clear-cut as the following example indicates: given the assumption of future technical progress, the Rawlsian criterion might suggest to lay some additional burden on future generations, who will be better off anyway (Breyer 2000). However, one should surely be reluctant to suggest this solution, as it appears unfair to burden future generations.

Secondly, a further observation concerns the third alternative mentioned above: it is difficult to see how this could be superior to the first, because in addition to the acceptance of the lower internal rate of return of PAYGO it implies forced saving,

which certainly does not increase welfare of the affected generation, at least not in our standard economic model of household behaviour. One has to invoke additional arguments (myopia, imperfect financial markets,…) in order to justify this measure. From a liberal point of view, one might say that, as long as the existing PAYGO will, even with a reduced internal rate of return, provide a sufficient minimum pension, an additional mandatory system can hardly be justified. What seems to be more important is a clear and timely projection of future payments out of PAYGO, in order that individuals can adapt their own provision.[6]

Finally, it should be mentioned that in our simple overlapping-generations model with only two periods it is not possible to investigate a further possible reaction to a decrease of population (growth), namely an increase of the retirement age. In principle, this measure is not too much different from alternative one above, because in a sense it replaces the burden of a lower rate of return by that of a longer working time, without higher benefits. Obviously, how these alternatives are ranked, depends on the relation between marginal disutility of labour at retirement age and marginal utility of income when retired. The most preferable way seems to be to give the individuals a choice between working longer or receiving a lower benefit. However, defining appropriate incentives for this choice is not a straightforward task.

V Macroeconomic considerations

In the last section we turn to a discussion of some macroeconomic questions, which are related to pension reforms. We start with the well-known and much criticised Mackenroth's thesis, which states that in every period consumption of the retired must come from GNP of that period. Taken literally, this statement is certainly true, but does it mean that the method of how the pension system is organised does not matter? Sometimes it is interpreted in that way.

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[6] It is of course also a possibility to induce additional savings through tax incentives instead of a mandatory contribution. This way of government intervention needs to be justified by specific arguments as well.

Obviously, Mackenroth's thesis is valid for a given level of production in every period. However, the question indeed is whether the pension system influences the level of production in an economy in the course of time. The theoretical line of argument goes as follows: if, in the period of introduction of PAYGO, the contributions of the working generation would have been saved instead of giving them to the retired for their consumption, this would have raised the available stock of capital, therefore production (and income) in the following periods would have been larger (see, e.g.; Homburg 1988). Again, we see that the profit of the initially retired generation comes from losses of later generations.

Similarly, it follows from this argument that any attempt to introduce more funding into the pension system – through mandatory saving or saving incentives – has a real positive effect only if it leads to a larger available income in the future. Otherwise it may have an influence on the share of consumption of the old and the young, respectively, but an expansion of each reduces that of the other.

There are two question one has to ask then:

First: Does additional mandatory (or tax-credit induced) saving indeed increase macroeconomic savings? It seems not to be very realistic to assume that a one-to-one increase takes place, part of the additional savings for pensions will simply replace other forms of holding wealth (comp. e.g., Mitchell and Zeldes 1996). This again seems to suggest that measures to establish additional funding should be confined to guarantee a minimum necessary pension, in order to avoid free-riding and myopia.

Second: Does additional macroeconomic saving indeed produce higher income in the future? Obviously, it is not savings but some form of real investment, which is decisive. Of course, from a (neo-)classical perspective, the answer to this question is clearly "yes": savings are the prerequisite for investment. However, from a Keynesian perspective, things are not so clear, because increased savings means less aggregate demand: savings may mean less production instead of more investment. Usually it is argued that in the long-run – which is the appropriate horizon for pension reforms – the classical perspective is the relevant

one. However, an appropriate view could also be that the long-run consists of a sequence of short-runs and it is those, which matter.

Whatever the true view may be, the consideration of these macroeconomic aspects certainly sheds additional light on the question of funding the pension system. In particular, it makes clear that it is not investment of money in some investment fund which ultimately determines future available income, but how this affects the real-economy variables like investment and production.

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