

**Financial and Banking Services Market**

Dimitrios GOTSIS

**THE FUTURE OF UNFUNDED
PENSION SYSTEMS – INTEGRATING
THE FUTURE GENERATIONS*****Abstract**

After the partial privatization of pension systems in Central and Eastern European countries, politicians have come to realize that the financing of public unfunded parts of the pension systems remains difficult. It is not sufficient to downsize the public unfunded pension systems and to hope simply that it becomes easier to finance a smaller burden. On the contrary, it is necessary to reform the design of the unfunded parts of the pension systems. In this paper, it is illustrated that the human capital theory implies the integration of future generations in the design of unfunded pension systems. A proposal is made as to how this reformed unfunded pension system based on human capital of subsequent generation might work, indicating also which problems must be solved.

Key words:

Social security, public pension reform, internalize positive externalities, human capital, human capital investments, old-age security motive for fertility, pension formula.

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Gotsis Dimitrios, доктор, Університет ім. Й.-В. Гете, Франкфурт-на-Майні, Німеччина.

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I. Setting the Stage

Social security systems in most of the countries all over the world are unfunded. Indeed, they are based on the so-called pay-as-you-go (PAYG) principle. Employees and employers pay social security taxes. At the same time, pensioners get revenues from these taxes so that they are consumed immediately. There are no savings in contrast to private capital-funded pension schemes. In paying social security taxes, the employees are promised to benefit from a public pension when they reach the retirement age.

This pension system is widely criticized because of low yields and distortion of savings. It is also supposed that unfunded pension systems suffer more from ageing populations because the shrinking number of young employees must finance the pensions of a growing number of pensioners. These are the reasons why in its policy report «Averting the Old Age Crisis», the World Bank (1994) has recommended that the unfunded pension schemes be replaced with a three-pillar system. Only one of these pillars should be unfunded as it was in the past. This unfunded pillar should focus only on avoiding poverty among the pensioners. The unfunded pillar should be complemented by two funded pillars – the obligatory and the voluntary funded pension schemes. Under these two funded pillars, an employee saves money on an individual account to accumulate capital for his own retirement. At the same time, a private insurance company guarantees the life-long payment of the pension (annuity) during the whole retirement period until death. The level of the pension benefit depends on the accumulated capital and the rate of return on the capital employed.

In many Central and Eastern European countries, the recommendations of the World Bank were an incentive for the reformers to abandon their old pension systems that they had inherited from the communist era. Thus, many reforms in Central and Eastern European countries resembled the recommendations of the World Bank. First reforms started in Hungary in 1998 and in Poland in 1999. For details of these reforms see Palacios/Rocha (1998) for the Hungarian reform and Góra/Rutkowski (2000) for the Polish reform. Further reforms in Central and Eastern Europe were analyzed in Schmaehl/Horstmann (2002).

Meanwhile, the situation with pension systems remains an important problem in spite of all these reforms. The reason is that unfunded pensions still provide an overwhelming part of overall pensions as older employees and pensioners have accumulated rights to pension during the communist era that must not be taken away nowadays. Due to these restrictions, unfunded pensions will always remain a significant factor in every society, and it will take about 70 years until the last pensioner who has accumulated rights to an unfunded pension during the communist era will have died. Even after this long period of time, unfunded pensions are expected to provide a considerable part of future pensions, not only for the low-paid employees but also for the middle class. Because of the

ongoing importance of the unfunded pension schemes, current and future generations will also have to bear high expenditures for public pensions and the politicians will have to ask themselves how to finance this growing burden that currently reaches up to 15% of the GDP in Italy, for example. This tendency is even increasing due to the demographic development in spite of all the above mentioned reforms.

Apparently, it is not sufficient only to reduce the importance of the unfunded pension system. It is necessary to reform the unfunded pension system itself aiming at an unfunded pension system where only those benefits are promised to the employees that can really be financed by subsequent generations. By contrast, in the present unfunded pension systems, the financing of unfunded pensions is difficult because promises are made about future pensions without integrating the ability of subsequent generations to keep these promises.

II. A Simple Picture of the PAYG Principle

Figure 1 illustrates the functioning of the current unfunded pension system in a model with overlapping generations. From top to down, generations 1, 2 and 3 are symbolized. Further generations could be added, but for simplicity they are omitted here. The life of each member of a generation consists of three periods. The first period is always the childhood with no income. The second period is the employment period with labour income, the payment of social security taxes to the preceding generation, accumulation of physical capital by saving money and the education of children who belong to subsequent generation. The third period is always the retirement period with no labour income but pension benefits. The model is called the overlapping generations model because at a certain point of time, the life of a certain generation overlaps with the life of two other generations. Generation 2, for example, lives from period T_2 to period T_4 . In period T_2 , it is born and is educated by the parents who belong to generation 1. In period T_3 , the generation is grown up, is employed, gets labour income, pays social security taxes to the preceding generation 1, saves money so that the generation owns physical capital and educates children who belong to the subsequent generation 3. Finally, the generation 2 enters the retirement period in T_4 where the generation gets pension benefits from the subsequent generation 3 and can sell the accumulated physical capital to the subsequent generation 3 because meanwhile the members of generation 3 have left the childhood period and have entered the employment period.

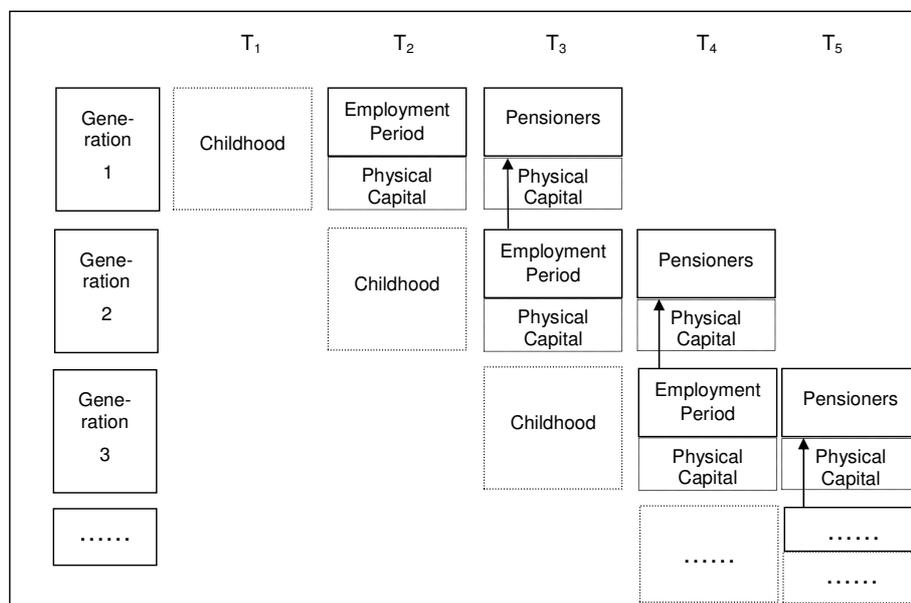
The arrows in Figure 1 indicate what is necessary to get a pension in an unfunded pension system. It is only important to pay social security taxes to the pensioners of the preceding generation during their own employment period. Thus, the arrow from generation 2 in period T_3 points at the generation 1. Only on this condition, the members of generation 2 get the right to receive pension from the following generation 3. This is indicated by the arrow from generation 3 to generation 2 in period T_4 . On the other hand, it is totally meaningless to have

children, to educate them or to save money for the accumulation of physical capital. This is the reason why children and physical capital are written in grave letters in Figure 1. Spending money for child-rearing or saving money for investment in physical capital does not increase the future old age pension.

Nevertheless, child-rearing and education of children are prerequisites for the existence, future employment, future labour income potential and future payment of social security taxes of the subsequent generation to future pensioners.

Figure 1.

The unfunded pension system in the overlapping generations model



III. External Effects of Human Capital

In economic theory, the future labour income potential of an individual is called the human capital. Especially Gary S. Becker (1960) developed a complex human capital theory, even though the importance of this concept was already mentioned by Adam Smith in the 18th century. Based on Becker's reflections, Schultz (1961) explained that individuals must invest in human capital if they want to accumulate it. They can invest in their own human capital or in others' human capital, especially by child-rearing, education, professional training and health care treatment. Furthermore, inborn talent with an economic value that is able to increase labour productivity also belongs to human capital. Daverport (1999: 19) defines total human capital investments as follows:

$$\begin{aligned} \text{Total Human Capital Investment} &= \\ &= (\text{Expenditure for Abilities} + \text{Behaviour}) \times \text{effort} \times \text{time}. \end{aligned}$$

Not only abilities that lead to earn income on the labour market, but also the right behaviour that increases the labour income potential belong to human capital and can be increased by investment in it. But these investments are worthless unless they are combined with an effort of the individual to learn these abilities and the right behaviour. The use of time is also a precondition for the accumulation of human capital so that it is multiplied too.

These expenditures are an investment because first, it is necessary to spend money or to bear the opportunity costs for the use of effort and time in order to get revenues afterwards. The revenues consist of the future increase of the labour income in case of the investment into the own human capital. For a quantification of investment returns, see Psacharopoulos (1994). If someone invests into the human capital of the following generation, he or she also hopes to gain a return on the investment. If the labour income potential of the following generation increases, it will be more capable to pay higher social security taxes that can be used to finance higher pensions during the own retirement period. Thus, higher future pensions are the return of investments into the human capital of the following generations. Consequently, every social security system depends on the existence of human capital of the subsequent generations. By contrast, the human capital of the own generation is useless for retirement purposes, because it is «shut down» at the beginning of the own retirement as it ceases to generate labour income that could be used for the financing of the own pensions.

Using this human capital theory and recalling the facts about the functioning of the current unfunded pension system illustrated in figure 1, it becomes clear that the current pay-as-you-go principle of the unfunded pension systems contradicts to the principles of the human capital theory.

In the existing social security systems, the human capital of the subsequent generations is exogenous because it is implicitly supposed that the human

capital of the following generations is always available in sufficient quantity in order to keep the promises made to the pensioners as if it could fall from heaven. No investment is needed to generate the human capital. This implicit assumption of the current unfunded pension systems is based on the belief that it could be taken for granted that people will always spend money, effort and time for the following generations and that is not an economic decision whether or not they could do so. Based on the rapidly shrinking number of births and the only constant expenditure for education per capita in Germany and many other European countries, this assumption is not wellfunded. Consequently, it cannot be taken for granted that the human capital of the subsequent generations that is necessary to finance the pensions in an unfunded pension system really exists.

Under these circumstances, it is only by chance that the pensions can be paid. But this cannot explain why there are ongoing problems to finance the unfunded pensions. The permanent financial crisis could also be explained by the human capital theory if there could be found a mechanism that could give reasons for the permanent shrinking of the human capital of the subsequent generation.

In this case, the mechanism is the positive externality of human capital investments within the current unfunded pension systems. An investor in the human capital of the following generations creates positive externalities because pensioners who did not invest into it benefit from the others' investments in human capital by receiving pensions to be paid by the following generations although they never contributed to their human capital endowment. This free-rider behaviour is economically rational so that it becomes more and more attractive the higher the benefits from the social security system are. The consequences are that investments into child-rearing, education, professional training and health care treatment for children and adolescents are lower than they would be because the investors cannot appropriate all the investment returns. The design of the current unfunded pension system forces the human capital investors to provide benefits also to the pensioners who have not invested into the human capital of the following generation. Thus, the positive externality of these human capital investments leads to the distortion of the human capital accumulation by less child-rearing, less expenditure for education, less health care treatment and less professional training. So, the growing importance of the social security system is one of the reasons for the demographic development in all industrialized countries and for the growing doubts on the reliability of the retirement income security.

IV. The Reformed PAYG System without the Externality

This negative relationship between the population growth rate and the existence of unfunded pension schemes has already been discussed in the 1970's and 1980's and was called the old age security motive of fertility. This motive of fertility implies that parents want to have children in order to have advantages during their old-age. Nugent (1985) enumerated many empirical analyses where this relationship was shown and gave reasons on what conditions the old age security motive for fertility loses its significance. He summarized that the old age security motive for fertility does not exist any more in developed countries because of the existence of unfunded pension schemes and that most people cannot even imagine that the social security system might have an important effect on fertility rates. Studying the situation in developing countries, however, where such pension systems do not exist or do not function clearly show an important correlation. Nugent adds further circumstances that strengthen the importance of the old age security motive of fertility, especially underdeveloped capital markets as an alternative means for old age security, the insecurity about the necessary savings due to underdeveloped insurance markets, the confidence of parents that they will be able to appropriate a part of the future labour income of their offspring etc. Due to the progress on financial markets, the old age security motive for fertility is certainly less important than in the past centuries, but it nevertheless still exists and consequently, the distortion of the human capital accumulation due to the existence of traditional unfunded pension systems remains, too.

It is not sufficient, however, to reduce the importance of the unfunded pension systems as the World Bank recommended in order to reduce the distortion of the human capital accumulation. Funded pension systems provide more physical capital for the old age security, but do not diminish the distortion of the human capital accumulation. Thus, a way must be found to accommodate the design of unfunded pension schemes. The aim is to find a design of unfunded pension systems so that benefits of an individual depend only on his or her investment into the human capital of the following generations because this is the only asset which is able to produce labour income during the individual's retirement. The more a pensioner has invested in this human capital the higher his or her share in the labour income of the following generation can be. This design would internalize the external effect of the accumulation of human capital and would reduce its distortion. Everybody who diminishes investments into the following generations is punished by getting a lower pension so that no free-rider behaviour as described above would occur in the optimum.

In such a system, an individual in his or her working age would have two obligations. First, the obligation to invest in the human capital of the following generation in order to have a right to get a share in the labour income of the following generation as a life-long old age pension. This can be done by rearing the own or adopted

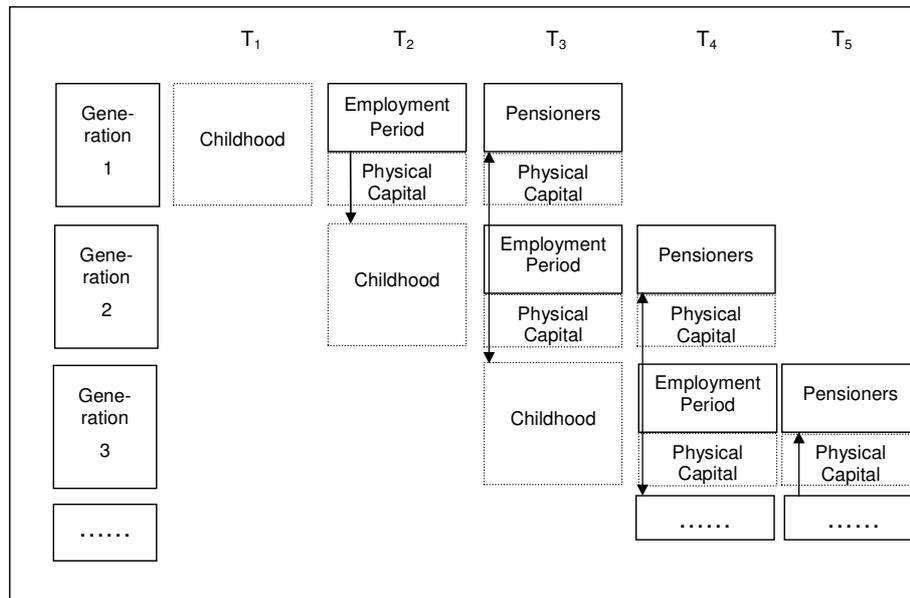
children, and/or paying for the education and the professional training of the own children or other ones' children including taxes for public education, and/or investing in the health care of the own children or of other ones' children. In contrast to private capital-funded pension schemes, there is also the second obligation to pay social security taxes to the old from the own labour income as a reward for the investments received when oneself was still young. That means that social security taxes would become a return on investments in the human capital of the following generation for the pensioners. Simultaneously, the social security taxes would lose their function as a reference for calculating benefits. Paying more social security taxes would not lead to higher benefits during the retirement. These taxes are nevertheless necessary because the preceding generations in their role as the investors are not allowed to possess the investments in the human capital of the following generations in contrast to investments in physical capital. Thus, the investors in human capital can only gain interest on their investments if the recipients of investments in human capital are forced by law to pay taxes during the investors' retirement.

It is also possible to illustrate the functioning of such a reformed unfunded pension system through the model of overlapping generations already used in Figure 1 above.

Again from top to down, generation 1,2 and 3 are symbolized. Further generations could be added, but for simplicity they are omitted here. The life of each member of a generation consists of three periods again with different actions performed during these periods. The only differences compared with Figure 1 are that now only the human capital of generation 1 falls from heaven or is generated exogenously, like the appearance of Adam and Eve as the first generation of human beings on earth. Apart from that, no human capital stock falls from heaven any more because the investment into the human capital of the following generation is integrated into the reformed public pension system. This is indicated by the arrows from the employment period of every generation pointing into the direction of the childhood period of the next generation at a certain point of time. Now, it is necessary to invest into the next generation in order to accumulate pension claims represented by the arrows from generation 1 to generation 2 in T_2 , for example. When the generation 2 has entered the employment period, it is forced by law to pay social security taxes to the preceding generation 1 in period T_3 , represented by the corresponding arrow in figure 2. These taxes are only a reward for the human capital investments made by the preceding generation into the next generation and can be interpreted as the investment return for the pensioners. These taxes paid by the employed people, however, do not qualify for a future pension. It is only a tax. To receive a pension during the own retirement phase, every generation is obliged to invest into the human capital of the subsequent generation. Only these investments must be rewarded by the next generations, not the payments to the pensioners. The higher the investments, the higher the human capital, the higher the future labour income potential of the next generation and the higher the pension claims for the pensioners. In such a system, pensions can always be paid without an increasing burden for the next generations because only those claims exist that can be satisfied by the following generations.

Figure 2.

The reformed unfunded pension system in an overlapping generations model



Finally, the physical capital is not engraved either because it can be incorporated into a pension system if such a reformed unfunded pension system is combined with private capital-funded pension systems. Physical capital is needed here because labour income usually cannot be generated with human capital alone, but only in a combination of human and physical capital.

Such a system where the benefits are based on the human capital of the following generations does not exist anywhere in the world. In developing countries, there are many societies where the income of the old depends on the human capital endowment of the own children. This solution is disadvantageous because the own children are only a small group of people where an investor in human capital relies on so that the own pension benefit becomes very risky, as Rosati (1996) explains. It is also insecure because the links between parents and children get worse due to contemporarily necessary mobility requirements for the employed persons. Moreover, there is only a limited degree of freedom when an investor is forced to invest within the own family. In a system where the pension depends on the investment into the human capital of the following generations by contrast, the investors have the options to invest by child-rearing or by financing the education of other children or by a combination of both.

V. Practical Problems and their Solutions

One of the reasons why such a pension scheme based on the human capital of the following generations does not exist is certainly the problem of identifying investments in human capital. Expenses for child-rearing, education and health care are not only driven by an investment motive but are almost always influenced by consumption motives, too, as Cochrane (1975) pointed out. Thus, it would be wrong to add simply all expenditures on children in order to quantify investments in human capital. Only expenses for the following generation which are able to improve their future labour income potential can be called investments. All the other expenses, however, must be called consumption which has nothing to do with pensions and therefore must not be considered when calculating pension claims.

But in real life, it is impossible to apply this rule as many activities both increase the labour income potential and reflect a certain life style, or increase the own utility in another way without the expectation of future revenues. Expenses for getting a driving licence, e. g., can increase the job opportunities – that means the future labour income potential – and simultaneously satisfy the personal preferences for convenience and life style. It is impossible to identify the investive part and the consumption part that would moreover vary individually. Only approximations could be used to identify investments that could give a right to get a share in the labour income of the following generation during the own retirement.

In political discussions, the outcome of such an approximation would be totally unknown depending on ideology and political power. It could also become time-inconsistent due to different leading political parties and ongoing reforms so that the rate of return of investments on the human capital may become dependent on political constraints and be subject to rent seeking. This may lead to a situation where everyone believes that the benefits are based on human capital although in fact they are not due to incorrect identification of investments in human capital. Current social security systems also suffer from political mismanagement so that this disadvantage should not be overestimated as mismanagement or misregulation occurs in every system, even in private capital-funded pension systems.

The advantage of such a pension scheme would be in any case that people learn that the own pension benefits depend on the existence of a following generation and its human capital endowment which would correspond to the economic relations between the three involved generations. This change in the awareness would change the investment behaviour into the desired direction and could internalize the above mentioned positive externality of human capital investments in the following generations, at least partially. Thus, it is worthwhile to indicate scientific standpoints how to find reasonable approximations for hu-

man capital investments that can be used to calculate pension claims in a reformed public pension system.

Actually in Germany and other countries with a public pension system based on social security taxes, the higher the labour income of an employed person, the higher the social security taxes, the higher the payment to the pensioners and the own pension claims in future. If someone earns the annual average labour income, he or she gets exactly one income point for the calculation of his pension claim, if someone earns 20% more than the annual average, for example, he or she gets 1.2 income points, if someone earns 20% less than the annual average, he or she gets 0.8 income points. During the whole working life, the sum of income points is added. The monthly pension (MP) is computed by the multiplication of the sum of the income points (YP) with the actual pension value (APV), a factor that is increased annually according to the average gross wage sum increase in the society, in order to be able to increase the pensions every year. In Germany in 2006 for example, the APV equals 26.13 € so that an average salary and an average payment of social security taxes for 45 years of employment lead to a monthly pension claim of 1175.85 € (45 income points times 26.13€ APV) that is adjusted annually by the average wage increase. This German level of the APV is also ideologically motivated as the German unfunded pension system is supposed to guarantee 67% of the average salary for employees who have earned the average labour income during their employment period. The monthly pension may also be adjusted by a pension adjustment factor (PAF) that takes into account whether it is a disability pension or an old age pension. Summarizing in one equation, the monthly pension equals

$$MP = YP \times APV \times PAF.$$

According to the above mentioned theoretical discussions, the income points must be replaced by investment points. Not the payment of social security taxes should create pension claims but instead, the investment in the human capital of the next generations. An average annual amount of human capital investments should count as one investment point, with respective increases and reductions for more or less investments. During the whole working life, the sum of investment points is counted. Again, the monthly pension (MP) is computed by the multiplication of the sum of the investment points (IP) with the actual pension value (APV) and the pension adjustment factor (PAF). The above mentioned equation must be slightly changed as follows:

$$MP = IP \times APV \times PAF.$$

While the actual pension value and the pension adjustment factor need not necessarily to be changed, the investment points must be calculated in a totally modified manner. According to the human capital theory, the following information must be collected in order to calculate the investment points of an individual: part of the expenditure for child-rearing that is recognised as an investment, the part of the taxes that finances public expenditure for education and professional training, part of the private expenses for the education that is recognised as an investment, and finally the part of the expenditure for health

care that is spent for children and adolescents. The same information must be collected for all individuals in order to calculate the national average of human capital investments. This can be summarized by the following equation:

$$IP = \frac{\sum_{c=1}^{\bar{C}} \sum_{y=1}^{18} \alpha_y \times R_{c,y} + \sum_{l=19}^P (\beta_l \times T_l + \gamma_l \times E_l + \delta_l \times H_l)}{\sum_{c=1}^{\bar{C}} \sum_{y=1}^{18} \alpha_y \times \bar{R}_{c,y} + \sum_{l=19}^P (\beta_l \times \bar{T}_l + \gamma_l \times \bar{E}_l + \delta_l \times \bar{H}_l)} \times (P - 19).$$

In the numerator of the fraction, the personal human capital investments in the subsequent generation are symbolized, in the denominator of the fraction the respective national average. Considering first the numerator, the total number of children reared by the parents during a whole life is symbolized by C . Annual expenditure for rearing a certain child c from the first year of the child's life y until the 18th year of life is represented by $R_{c,y}$. The investive part of the expenditure for child-rearing is quantified by the factor α that may differ depending on the year of life y of the certain child. It is important to point out that it is not only necessary to sum up the direct costs of child-rearing, but also to include the indirect costs of child-rearing that are also called opportunity costs. The highest expenses for child-rearing are not to grow up a child, but to spend time for a child that cannot be spent any more to work and to earn labour income. So, opportunity costs consist of the foregone income that cannot be earned any more due to the time that is needed for child-rearing. Again, not the whole foregone income can be interpreted as opportunity costs and an investment into the human capital of the subsequent generation because there is always an investive and a consumptive part. Therefore, approximations must be found that are represented here by the factor α for the investive part¹.

After summing up the human capital investments into the own children by child-rearing, it is necessary to add the remaining investments into the own and other ones' children. The taxes T from the investor's year of life l until his or her retirement at the point of time P must be added. It is supposed here that citizens start to pay taxes at the age of 18, but this supposition might be easily adjusted according to the economic reality of a society. Again, not all taxes revenues are used for the investments in the human capital of the following generations, so that the factor β must be multiplied with T in every year of life l of the taxpayer to represent the share of public expenditure for public education in the national budget that is financed by taxes (and not financed by government debt that will be paid by future generations).

There are also private expenses for the education of the own children E that might also be qualified as human capital investments to the extent of the share γ in every year of life l of the investor as well as there are expenses for health care H in every year of life l of the investor, especially medical care con-

¹ This Parameter can also reflect society's willingness to redistribute income between rich and poor parents.

tributions and taxes. Of course, only the expenses directed to the following generation can be added so this average share $\bar{\delta}$ must also be identified on a national level.

Summing up, the numerator consists of all the human capital investments into the following generation that are financed or realized by an individual during the employment period until the retirement. The denominator differs from the numerator only in so far as the national average human capital accumulation for R , T , E and H is calculated so that the fraction quantifies the individual human capital accumulation in relation to the national average. If the individual human capital investments are as high as the national average, the fraction equals one. If they are 20% less than the average, the fraction equals 0.8, as explained above.

As every individual invests at a different point of time, the end of the investment period – mostly the end of the tax payments – differs for every one, too. The longer someone invests, the higher the age of this individual who enters the retirement (P), and the more investment points he or she has accumulated, as the fraction must be multiplied by the number of years of life from the first investments (here assumed to be 19) to the last.

When the investment points are calculated, the monthly pension claim can be derived from them, too, after the multiplication with the actual pension value and the pension adjustment factor, as indicated in the equations above. After that, the aim is reached that only pension claims exist that are based on the human capital stock of the subsequent generation. The more an individual has invested in it, the higher his or her right to get a share out of the sum of labour incomes of the next generations, when he or she has entered the retirement period. The less an individual has invested, the lower are the pension claims.

The demographic development does not endanger the pension system any more because if a generation decides to invest less into the following generations, it must accept that the pension must be lower, too. This implies that the reformed public pension system does not prevent poverty any more in contrast to the World Bank recommendations because theoretically, claims can be naught if nothing has been invested. This danger obliges people to invest into the human capital of the following generation that makes an unfavourable demographic development less probable.

Another advantage of such a reformed unfunded pension system is that women can accumulate pension claims even if their professional career is unstable and often interrupted by times of child-rearing and unemployment. No widow pensions derived from the pension claims of their husbands are necessary any more because it is possible to receive pensions even if an individual has never worked. To break up the link between employment and pension claims is certainly desirable because of the fact that involuntary unemployment gets more and more common while involuntary lack of human capital investments is impossible because even infertile people can invest by paying taxes that are partially used for the education and health care of other ones' children.

So, it is worthwhile to overcome the problems of identifying exact human capital investments in favour of a new unfunded pension system that reflects the real economic relations between the three generations.

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