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**“Intergenerational Equilibrium of Pension Systems and other Social Transfers”**

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## **Intergenerational equilibrium of pension systems and other social transfers**

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### **Abstract**

The aim of this paper is to analyse the intergenerational equilibrium of pension systems and other social transfers (e. g. education, health care). We deal with the implicit public pension debt as a main source of the intergenerational imbalance. The analysis is based on the generational accounting, pension system reforms and the household budget data. The case of Polish pension reform of 1999 is examined as well as the household savings and household investment in human capital. We claim that private investments in education, science and health care of currently living generations reduce the intergenerational imbalance. Thus, household investment in human capital should be included into generational accounts similarly to the private investment in funded pension schemes.

Key words: generations, pension systems, pension reform, social transfers, households.

JEL: E21, G23, H55

## 1. Introduction

The intergenerational solidarity, justice, fairness or altruism is more a matter of philosophy than economics. Maximization of the individual's life-cycle utility depends, however, on relations with future and past generations (Heijden, Nelissen, Verbon 1995). An individual cannot fully insure herself/himself against unexpected shocks to her/his future income or other kinds of risk (natural disasters, wars, terrorism, demographic changes). An individual has to share risks of future developments within her/his own generation as well as with members of future generations.

Under favourable circumstances a generation can use assets or natural resources left or made available by past generations to maximize its present benefits, without taking into account the depletion of resources. Present generations can live at the expense of future generations notwithstanding the fact that their present consumption may be either reduced or excessively high as a result of the liabilities or assets accumulated by past generations. Redistributing resources across generations is a matter of a generational policy which is a zero-sum game (Kotlikoff, 2001). Thus, currently living generations should not add uncovered debts to future generations.

Intergenerational equilibrium of social transfers between generations (security systems, educational, health care) implies that successive generations will acquire the same level of benefits and bear the same costs of the social security system. The unbalanced intergenerational transfers result in disequilibria of the social security systems which become unsustainable in the long run.

Acting of myopic individuals would make the future generations pay more for similar social benefits as the current generations gain today. The implicit public debt emerge when the present value of future entitlements of currently living generations from the public social systems (pension system, education, health, social protection) is higher than the present value of their payments to these public systems. The implicit public debt has accumulated mainly in the pension systems and less in the health care and in education systems.

The implicit public debt arose due to the granting to the first generations of pensioners the pension benefits without the equivalent contributions under the redistributive pay-as-you-go pension system. As the pension system matures this implicit pension debt is growing additionally whenever the consecutive generations pay lower contributions than is the present value of their future benefits from the system. This was the case of many PAYG pension systems in Europe. The accumulation of the implicit public debt is similar to the accumulation

of the explicit public debt since the beginning of the nation to the present (Diamond, Orszag 2005).

With ageing of the population causing growing numbers of pensioners and fewer contribution payers and with high replacement rates the contributions to the pension systems have to be raised. But there are obvious limits to the mounting contribution rates in the level of earnings. That is why the redistributive PAYG pension systems have become actuarially not sustainable in the long run if the replacement rates, the working lifetime and the retirement length remain unchanged. To solve the problem of the actuarial disequilibrium in the pension systems the pension reforms have been undertaken throughout the world.

The reforms of pension systems cannot, however, wipe out the whole implicit public debt, though its reduction or seizing its growth is possible. We argue that the question of how to restore the equilibrium between generations requires a comprehensive approach taking into account other rights and obligations of living generations namely, educational and health care spheres. We claim that private investments in education and health of living generations help to equate the accounts between generations. We aim at presenting this approach as an extension of the concept of generational accounts.

The paper is organised as follows. First, the concept of generational accounts is presented. In the next section, the pension reforms aiming at restoring the pension system equilibrium will be examined based on the Polish pension reform. Further, households' saving, investment in education and spending for health care in Poland will be explored to show the interdependencies between these spheres and their relation to generational accounts. The last section concludes.

## **2. Generational accounting**

Generational accounting is based on the concept of an inter-temporal budget constraint of the government under the current fiscal policy. The inter-temporal budget constraint does not hold, if the present value of the government's projected future spending on goods and services plus its net liabilities are not met by the present value of projected future net tax revenues from living generations. Net tax revenues are referred to the income taxes paid by individuals net of the social security and welfare benefits obtained. Generational accounting depends on demographic projections and the assumptions about growth of productivity and the real discount rate. If the inter-temporal government budget constraint does not hold, the result is an intergenerational imbalance in the lifetime net tax burden facing present and future generations, which makes the present fiscal policy unsustainable. Taxing future generations at the same rates

as current generations would not be sufficient to pay for the government's future expenditures (Auerbach, Kotlikoff, 1991; Auerbach, Kotlikoff, Leibfritz, 1999).

The intergenerational imbalance comes from comparing the generational account of the lifetime net taxes of a newborn in the base year with the account (net tax burden) of a representative future individual adjusted for productivity growth. It is assumed that the base-year fiscal policy would be continued. The residual to balance this constraint is called inter-temporal public liability or intergenerational debt. The intergenerational imbalance (a positive inter-temporal public liability) consists of explicit public debt and implicit public debt. The latter is the sum of total demand on future budgets calculated from generational accounting minus the explicit public debt.

Inter-temporal public liability is a broader category than the conventional meaning of a public debt. It is calculated in net terms (future taxes to be paid less expected benefits) whereas the public debt data are commonly provided as gross data. The intergenerational imbalance embraces not only the official public debt in financial assets, but also all future net claims on budgets caused by the pension system, health care, welfare policy etc. The inter-temporal public liability is mainly implicit.

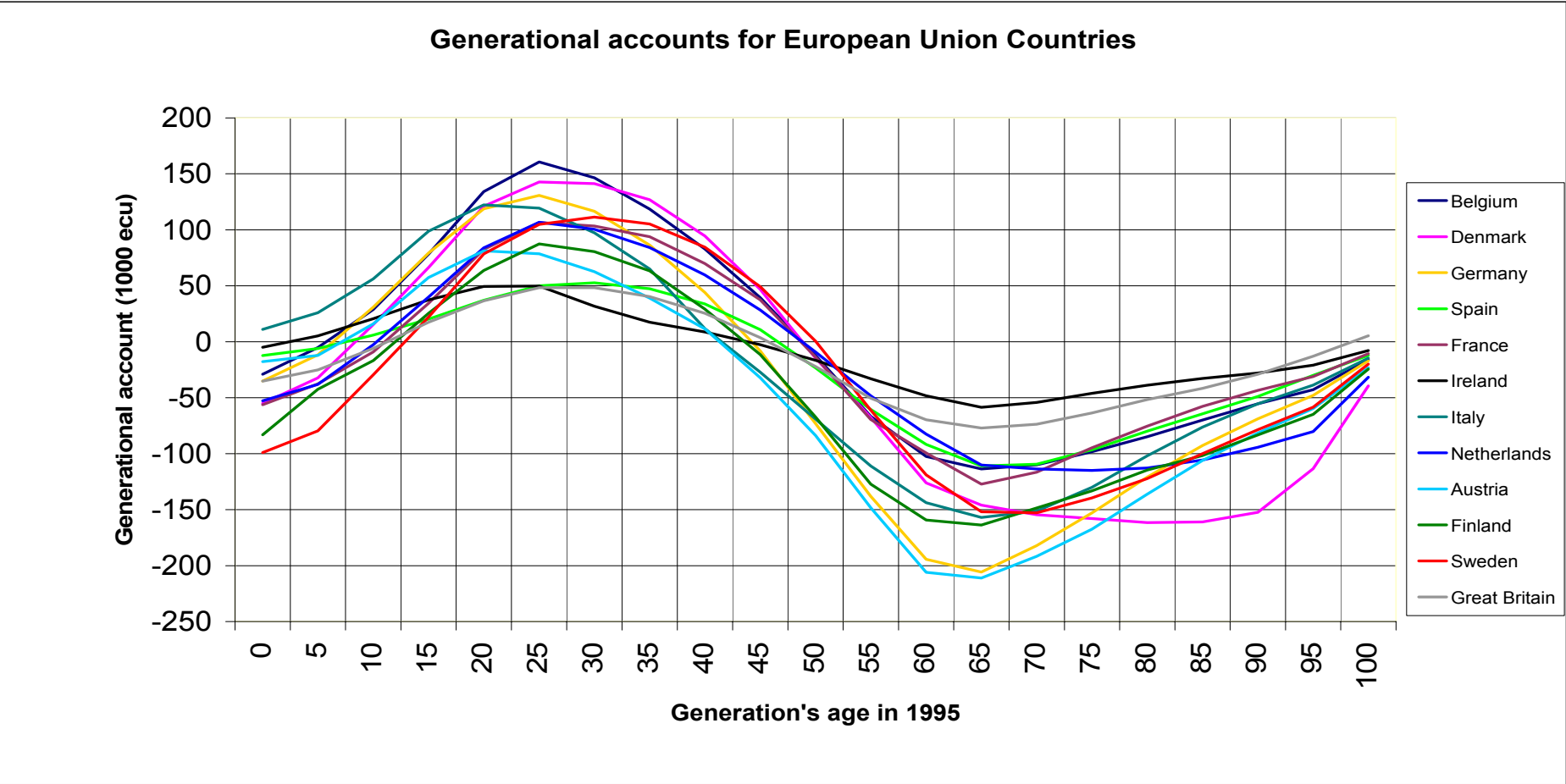
By comparing net tax burdens of the present and future generations, the generational accounts allow to measure the net inter-temporal effects of a change in fiscal policy in order to make it sustainable. The simulations concern either a change of the tax burden on present generations, or a change of the tax burden on future generations, or a change of the total tax burden on present and future generations.

Generational accounting draws on a Ricardo-Barro equivalence theorem. According to the Ricardo-Barro equivalence rule the government bonds sold to individuals do not constitute a net wealth, as the total government debt must be paid by future generations. If the private sector raises its savings at a rate corresponding to the rate of increase in the government debt, the national saving rate does not change and the Ricardo-Barro equivalence holds. In practice, private sector does not balance wholly the increases in the national debt and the fall in national savings due to budget deficits. The effect of a growth of private savings on public debt increases is around 0.5-0.6 on average in the OECD countries (Liberda, 2000, 48). The increased public debt is left to future generations.

The account of each generation represents the value of its rest-of-life net tax payments to the state. For the whole population the generational account is a sum of net tax payments by age. Future payments are discounted to the base year. A negative value of the generational account means a net transfer from the state to the members of the generation (cohort).

Figure 1.

**Generations' rest- of- life net tax payments to the state in the European Union countries**



Generational accounts for 12 EU countries: Belgium, Denmark, Germany, Spain, France, Ireland, Italy, Netherlands, Austria, Finland, Sweden, UK. Source: Estimation based on: Generational accounting in Europe, 1999, *European Economy* No. 6.

A positive value of the account is a sign of the net taxes flow from the generation to the state. The net tax is calculated as the present value of all taxes and contributions due from a generation minus the present value of future benefits.

The observed life cycle profile of the taxes paid and benefits obtained demonstrates prevailing of benefits (health, schooling) in the young age. The rest-of-life net tax payments are the highest at the start of the working life (around the age of 20-25 years). The positive value of the rest-of-life net taxes to be paid is decreasing later to reach zero at the break-even point around the age of 45-50 years. After a break-even point the successive generations, aged more than 45 years, receive on average more benefits than they pay in a form of taxes and contributions. The present value of future benefit payments is higher than a present value of taxes due till the rest of life.

Table 1. Generational Accounts, 1995, (thousands of US dollars)

<b>Country</b>	<b>Newborns (1000 \$)</b>	<b>Future generations (1000 \$)</b>	<b>Absolute generational imbalance (1000 \$)</b>	<b>Proportional generational imbalance* (%)</b>
<b>United States</b>	86.3	130.4	44.1	51.1
<b>Japan</b>	143.4	386.2	242.8	169.3
<b>Germany</b>	165.0	316.8	151.8	92.0
<b>Italy</b>	114.2	264.8	150.6	131.8
<b>Canada</b>	113.8	114.0	0.2	0.0
<b>Thailand</b>	8.3	1.0	-7.3	88.0
<b>Australia</b>	79.6	105.2	25.6	32.2
<b>Denmark</b>	84.0	124.0	40.0	46.9
<b>Netherlands</b>	110.0	193.8	83.7	76.0
<b>New Zealand</b>	57.3	55.3	-2.0	-3.4
<b>France</b>	151.5	222.8	71.3	47.1
<b>Norway</b>	106.3	173.5	67.2	63.2
<b>Portugal</b>	61.8	98.7	36.9	59.7
<b>Sweden</b>	184.3	143.5	-40.9	-22.2
<b>Argentina</b>	22.7	36.1	13.4	58.6
<b>Belgium</b>	93.5	147.8	54.2	58.0
<b>Brazil</b>	14.3	27.0	12.7	88.8

\* Percent of GA of newborns

Source: L. J. Kotlikoff, W. Leibfritz, 1999, An international comparison of generational accounts, in: A. J. Auerbach L. J. Kotlikoff, W. Leibfritz, eds. *Generational accounting around the world*, The University of Chicago Press, Chicago, 78-80.

If the generational account of a newborn is balanced the generation does not leave debts for future generations. In most of the EU countries the generational accounts are roughly

balanced with a small average negative value for a newborn in the EU. It means that, assuming the continuation of fiscal and welfare policy, the newborn in the EU will receive during her/his life more benefits than she/he will pay in a form of taxes and contributions.

Table 1. presents the generational account of the lifetime net taxes of a newborn in the base year under current policy and the net tax burden of future generations calculated by subtracting from the present value of all future government consumption (minus government net wealth) the present value of remaining net tax payments of living generations. By comparing those two accounts we come at the generational imbalance. It is shown in absolute terms and as a percentage of the generational account of the newborn. The last column says that the lifetime taxes paid by future generations will be in some cases much higher than projected taxes of newborns. Japan and Italy presents the most severe disequilibrium, and Germany is also at risk of a generational imbalance. Canada and New Zealand lead a sustainable generational policy and Sweden is leading in fair behaviour towards future generations but tough towards the newborn.

If current policy causes an increase in public debt, it does not suffice for the living generations to save and transfer their savings to future generations for paying back this debt. To be fair towards future newborn the living generations should also tend to reduce the accumulated explicit and implicit debts, from which they have benefited in the past or want to benefit in future.

To be fair toward future generations it is not necessary that total public debt (explicit and implicit) is paid out in a foreseeable future. The debt should be minimised during the life span of many generations. What matters for the living generations is the growth of the economy that allows for a rise in savings. The growth of income is the main determinant of the growth of savings. But for the intergenerational balance not only private savings are important. Public savings are also crucial, especially in public pension system, which should be rationalized first. If the economy grows, and the state budget is disciplined (held under control), then the generational fund is not a zero-sum game, but represents increasing wealth of the present and future generations.

To minimise the loss of wealth that may result of taxing for future generations tax rates should be smoothed in the long-run. If tax rates were equal in the long run public spending had to be kept in limits and the society could not live at the expense of future generations. However, there are macroeconomic shocks that can affect the intergenerational balance. Main shocks may come from: adverse demographic developments (falling rates of natural growth, ageing, falling fertility, migrations (Barr, 2002); politics and social unrest; managing of systems and

institutional arrangements of social life. Demographic trends can be affected by an individual only to a very limited extent (through migrations, increased fertility) and only in a long run.

### 3. Demographics matters

Ageing signifies a change of the population structure due to a rise in longevity and a decrease of fertility. The pyramid like structure of the population is changing into a hut like shape, as the more numerous generations of the baby boom of 1945-1955 are getting old. In many countries the second boom of children of the first baby boom, born in 1965-1980, will retire by 2030-2040, leading to a dramatic increase of the share of old generations in total population by 2050. Due to a much lower fertility after 1985-1990, the base of the population pyramid is shrinking drastically. In many countries (Spain, Italy, Germany, Eastern and Central Europe) it looks graphically like if the population pyramids were to fall down (Figures 2-5).

Figure 2.

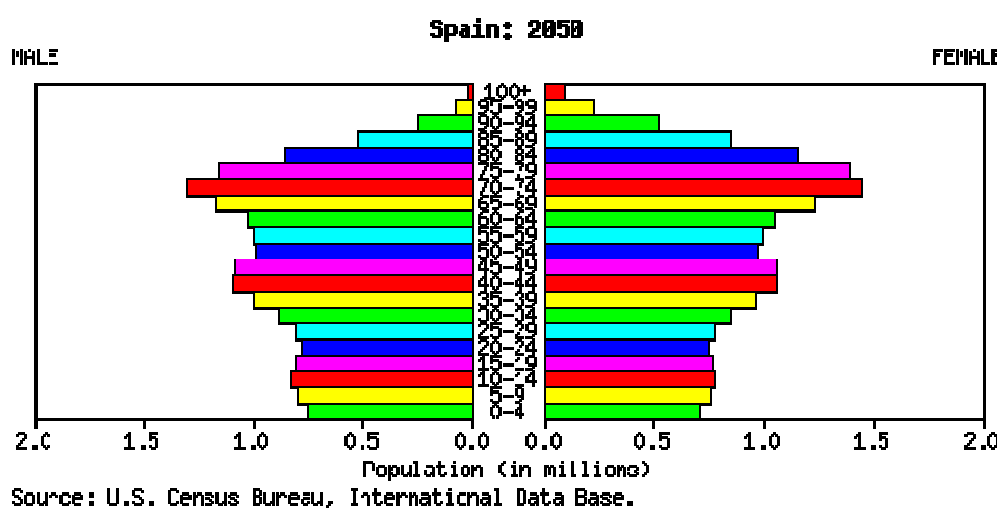


Figure 3.

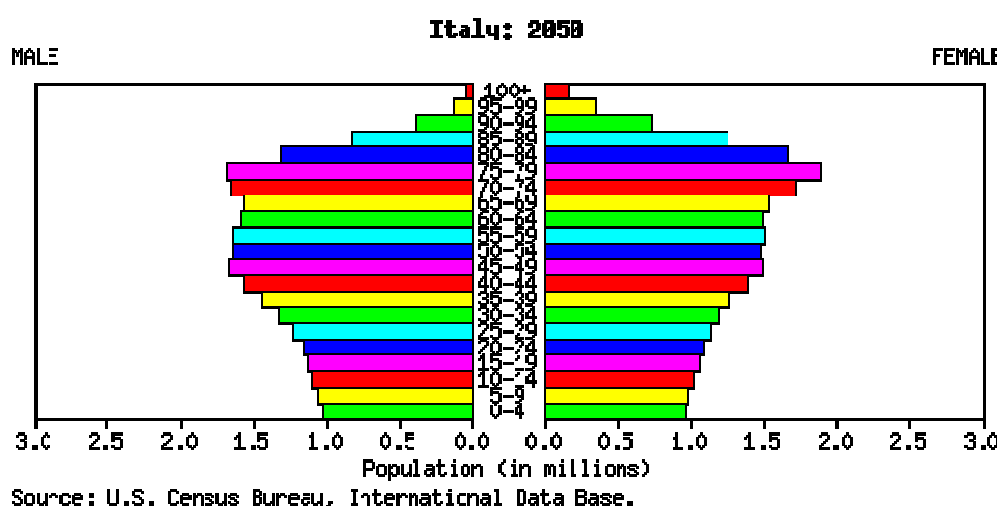


Figure 4.

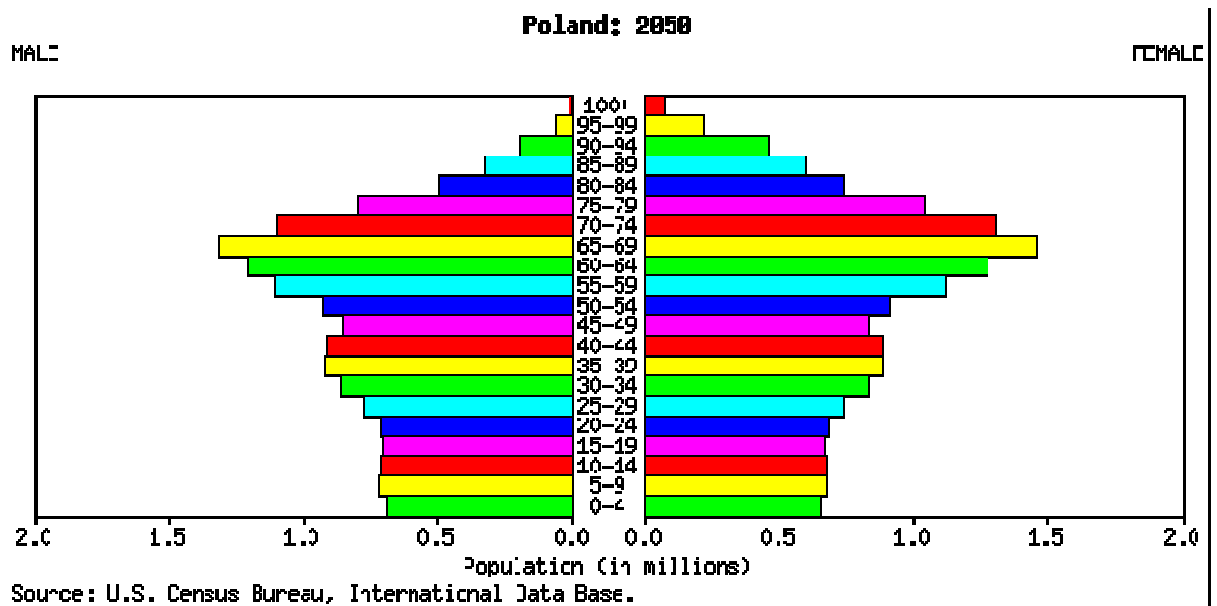
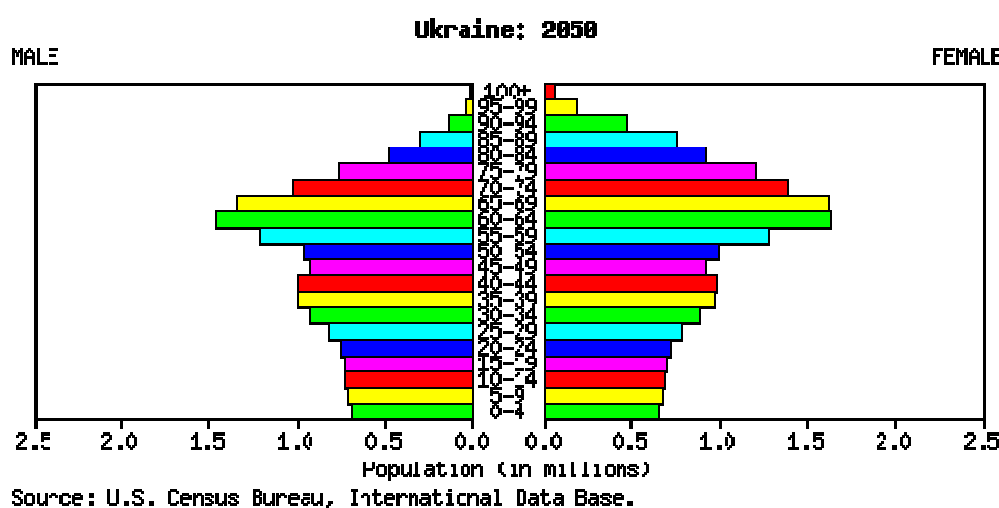


Figure 5.



Ageing aggravates the generational disequilibrium by causing faster growth of the implicit pension debt. Generations living in the first decade of the twenty-first century are facing disequilibria of pension systems that aroused as a result of introductory gifts and promises that were granted for the first generations by the time of creating PAYG systems, as well as unfavourable demographic trends that started later on. Increasing demographic dependency ratios are caused by demographic changes of the last three-four decades of the twentieth century: falling fertility rates and increasing longevity of life.

First generations of pensioners did not accumulate sufficient funds for their future pensions. The introductory gift was given to first generation entering PAYG systems. Such gift is repetitively given to all those generations who, at the time when they are active, pay

contributions that are lower in relation to those prevalent at the time when they retire (Oksanen 2001). Welfare policies and generosity of state pension systems (PAYG) caused growing interest of large social groups to rely only or mostly on public pension systems disregarding the need to increase private saving for their own retirement (Barr 2002).

The implicit debt that emerged in the public pension systems as a result of above trends concerns almost all societies, exceeding gross domestic product of respective countries by a factor of 1 to 3 (McMorrow, Roeger 1999; Gomulka, Jaworski 1998; Liberda 2000). Implicit public debt of pension systems is the present value of future pensions to be paid to individuals already born and entitled to benefits under the present social security systems. If the present generations are to behave fair towards future generations they should not add to this implicit pension debt but tend to reduce it. This cannot be done during the life span of one generation but should be shared with future generations because the debt is too high to be paid out in a short time.

Ageing leads to increased demographic old age dependency ratio and demographic youth dependency ratio as well as economic dependency ratio (the ratios of old and young generations to the economically active generations or to the labour force). The welfare policy and generosity of the pension systems as well as the political pressures added to a rise of the so called system dependency ratio of the pension systems (ratio of beneficiaries to contribution payers). This last category reflects the effects of past and current social security policy that allowed for growing number of beneficiaries of public mandatory pension systems without strict account for obligations of future pensioners to pay proper contributions.

In Eastern and Central Europe countries it was not only a common free riding as elsewhere. A very high system dependency ratio occurred due to using the social security system for avoiding political tensions (by entering into the disability schemes), and after transition, for easing a violently rising unemployment problem. The harsh outcome is that both those features of the social security systems: very high shares of the disability pensions and of the early retired pensioners push the costs of the pension systems upwards. And they do that for very long periods because these two groups were relatively young when they first entered the pension system.

To restore actuarial equilibrium the pension systems have been reformed in most countries. The pension reforms follow mostly the three pillar model outlined by the World Bank (1994). It aimed at reforming the PAYG redistributive system that was mostly defined-benefit and not fully earning related. The reformed PAYG system was to form the first pillar. In some countries (Sweden, Poland, Italy) the PAYG pension system was reformed into the notional

defined contribution pension system that is fully related to earning during the whole working lifetime. However, it is notional in a sense that contributions, that are not invested on the financial markets but paid to the pensioners, are recorded on books and indexed by the notional interest rate related to the growth of the total wage bill. The second pillar consists of the mandatory funded types of the pension systems with defined contribution formula allowing for actuarial equilibrium. Third pillar consists of fully funded voluntary funds.

The replacement rates in the mandatory public pension systems of the PAYG type are kept at relatively high levels. In OECD countries it is at the level of two thirds of the average pre-retirement net earnings for a person earning an average wage. The lower replacement rates of about half of the net average earning for average earners are only in the United States, United Kingdom and in the flat rate systems of Ireland and New Zealand as well as in Mexico and Korea (OECD, 2005, 52).

The currently living generations can also contribute to reduce the intergenerational imbalance by transfers to their successors in a form of investments for education, science, health care, environmental protection and for creation of social capital.

Investment in human capital is a matter of intergenerational relations as well as of relations within generations. The effects of accumulation of human capital (new knowledge, new technological frontiers) generally last longer than the effects of the pension indebtedness (long after the death of respective authors and their generations). To behave fair towards other generations it is required that all potential abilities and talents of the whole population are revealed and developed. Thus education, training and research co-financed from public sources should be made accessible to members of less privileged groups, no matter how much they strive for educating themselves (Sen 1992; Roemer, Veneziani 2001).

For that purpose the investment in human capital should be treated in economics and in statistics as capital formation rather than consumption. This was not the case till the emergence of the so-called green accounting in national statistics. The green or adjusted accounts of national statistics have been gaining importance among researchers and policy advisers but less among politicians. To measure the consumption of available resources accurately the concept of genuine savings was developed by the World Bank in the 1990s (Hamilton, Clemens 1999; World Development Indicators 1999-2005; Liberda 2003). Genuine savings consist of net national savings adjusted positively for investment in education and negatively for implicit rent from depletion of natural resources and air pollution. In effect, the net increase in capital stock (net genuine savings) in particular economies owning natural resources is much lower than savings traditionally calculated from national accounts. Hence, fair behaviour in

intergenerational (and also international) perspective would consist not only in not consuming the quasi-monopolistic rent from natural resources but in investing it in alternative sources of energy, education or information.

Net public investments in health care and social protection (unemployment benefits, maternity, transfers for aged persons) affect overall budget balance and public indebtedness left for future generations. Private investments in health care of members of one generation for themselves and for members of future generations ease the budget constraint and intergenerational imbalance.

The same is true for households' savings. Private savings are main variables that allow for fulfilling the requirements of the Ricardo-Barro equivalence rule.

### **3. Pension system matters**

It is more an art than a technique to institutionally design the required changes of social security systems to make them closer to current income – expenditure equilibrium. Poland started reforming the existing pay-as-you-go (PAYG) pension system in 1999.

Ageing of population in Poland was due mainly to falling fertility and less to moderately rising life expectancy. The dramatic fall of fertility of young women in Poland after 1990 was determined by the sudden transition to the market economy. Young generations were challenged by very competitive surrounding to educate fast and to make career. And they were benefited financially for extended working time and for the professional success. But that was in conflict with the family building. In effect, fertility rate fell from 2.0 in 1990 to 1.25 in 2002 causing fast increase in the old age demographic dependency ratio in Poland.

However, the demographic dependency is not the only reason of the implicit pension debt in Poland. The system causes of growing costs of the pension system were very important: generosity of the PAYG system, rent seeking, contribution waiver for farmers.

After transition the pension system had been used as a solution to unemployment problems and restructuring of the Polish economy. An early retirement provision has been widely used in Poland for 55 years old women and 60 years old men. Farmers had been covered by the social security system without having paid contribution earlier, as an act of justice, to compensate for their supplies of food products at low, regulated prices under the former centrally planned economy system. Farmers pay very low, almost negligent contributions receiving the so called farmer's pension at the level of two thirds of the average worker pension. The state took over care of old farmers from their families without contributions from them.

Rent seeking takes peculiar forms in Poland. Besides free riding by obtaining the disability pension, some people buy small farms (of minimum 1 hectare) only to avoid paying high social security contributions.

Table 2.

Demographic forecasts for Poland

Year	2002	2010	2020	2030
<b>Life expectancy (years)</b>	74	77	79	<b>80</b>
<b>Population structure by age in %</b>				
<b>0 -17 years</b>	23	18	16	<b>15</b>
<b>18-59/64 years</b>	62	65	61	<b>58</b>
<b>60/65+ years</b>	15	17	23	<b>27</b>
<b>Fertility ratio</b>	1.25	1.10	1.20	<b>1.20</b>
<b>Old age demographic dependency ratio (%)</b>	24	26	38	<b>46</b>
<b>Net migration (in thousands)</b>	-18	-24	-20	<b>-16</b>
<b>Population (in million)</b>	<b>38.2</b>	<b>37.9</b>	<b>37.2</b>	<b>35.7</b>

*The retirement age in Poland is 60 years for women and 65 for men.*

*Old age demographic dependency ratio is the relation of the population in the age of 60/65+ to the population in the age of 19-59/64*

Source: Population Projection of Poland until 2030, Central Statistical Office, Warsaw, 2004, [www.stat.gov.pl](http://www.stat.gov.pl)

Out of the total number of 9.2 million retirees and pensioners in Poland in 2004 there were: 4.0 million retirees receiving regular retirement pensions, 2.2 million pensioners unable to work, 1.3 million family member pensioners, 1.0 million farmers' pensioners, 0.7 million farmers receiving inability pensions (Statistical Yearbook, 2005, p. 274). According to Social Insurance Institution (ZUS, 2005) there were 14.4 million persons insured and paying contribution in 2004 in Poland.

Due to the above trends the systemic dependency ratio  $D_s$ , (measured as the relation of beneficiaries of the pension system to the number of contribution payers) is very high in Poland (0.64). The demographic dependency ratio  $D_d$  (the ratio of cohorts in the retirement age to the working age generations) is much lower than the system dependency ratio (0.24). Thus, instead

of four persons working for one retiree, there is only one person and a half who work for one pension.

The pension reform of 1999 in Poland focused on partial privatisation of the pension system. A relative reduction in the share of the public part of the pension system was done by creating a funded scheme, out of one fifth of the mandatory contribution to the social security system (the second pillar). The funded pillar was made mandatory for persons below 30 years of age in 1999 and optional for those in the age of 31-49 years. Persons in the age of 50 years and over had to stay in the reformed pay-as-you-go system (first pillar).

The former PAYG pension system was made a notional public part of the new pension system (Góra 2003). Contributions are recorded on individual accounts. Historical contributions that had been paid by each member of the system (accruals) have been summed up and allotted to individuals. The values of individual accounts are being transformed into annuities at the moment of retirement. The values of accounts are indexed using the rate of return equal to the rate of growth of the total wage bill. Individual accounts are a kind of virtual savings: sums recorded on these accounts are not financial ones (the paid contributions are spent for paying pensions) but they earn profits at a rate equal to the rate of growth of the total wage bill. This rate is a similar concept to the Paul Samuelson's notion of the generational rate of return. The values of individual accounts permit to calculate annuities at different retirement ages.

The funded pillar of the pension system, created out of one fifth of mandatory contributions by those who have joined it, is privately managed. A process of concentration of the pension funds in this pillar has been observed. Out of 18 Open Pension Funds (OPFs) that started with the reform, five took over the major share (three fourth) of contributions and participants of the funded pension system. The rate of return was to be determined in financial markets, but it is distorted for Open Pension Funds because OPFs invest most of their funds in government bonds that does not make them competitive (Tyrowicz, Mularczyk, 2006).

To compensate for ageing and the changing size of the consecutive age groups the technical demographic fund had been created in the pension system in Poland. However, this reserve would be insufficient for the fast growing pension payments due to ageing. M. Góra (2003) sees the solution to the generational disequilibrium in stabilizing at a constant level the share of GDP transferred to consecutive generations of pensioners. He calls this relation, misleadingly, the economic dependency ratio (it is misleading because the economic dependency ratio is used in literature for relation of old generations to labour force). The postulate is rational, but to fulfil this requirement all kinds of policy means must be utilized

concerning the working life time, retirement exit age, replacement rates, contributions, part-time working of pensioners etc.

From the point of view of an individual the pension reform did not bring a visible change. The contribution rate has not been changed since the time preceding the reform. It corresponds to 36.59% of individual wage. It was assumed that the mandatory contribution will not be reduced during the first 5-10 years of reform. After the reform the contribution was divided into the retirement contribution (19.52% of the wage) and the part for other social security purposes (17.07% of the wage) which made the accounts clearer (Security through Diversity, 1997). An opportunity benefit of the pension reform has been the stabilization of the contribution rate; otherwise it would have to be raised.

The pension reform caused certain transition costs, because a part of the contributions transferred to the funded system (second pillar) had to be reimbursed from the state budget to the re-distributional part of the system (first pillar). The gap was supposed to be financed by funds which had to be obtained from privatization of state enterprises and other assets. But the revenues from privatization diminished since 2000 due to an overall slowdown in the Polish economy, so that the government had to finance the unfunded gap from the budget deficit. The budget net borrowing draws on private savings lowering the macroeconomic saving rate.

There were some other costs of switching to the new pension system due to difficulties with introduction of computerised recording of contributions at the start of the reform (contributions were not recorded or not paid by participants due to errors in the accounts). The Social Insurance Institution had to take credits for current operations and was additionally subsidised from the state budget. In effect, the pension reform caused additional drain on budget financing and it had temporarily reduced national savings.

The implicit pension debt (the present value of all future pension payments to those entitled on the former PAYG pension system) will be paid out only in around 50 years. Till that time the system must remain partly unfunded, while its funded part will be growing relatively with the forthcoming young generations. The unfunded part of the pension system should thus (by its nature) be ruled by a demographic dependency ratio while the funded part would be mainly determined by the relation of the retirement length to the working life period, called a passivity ratio.

The costs of the unfunded part of the pension system in Poland should be determined by the demographic dependency ratio  $D_d$ , and the target replacement rate  $B$  (a relation of the average pension to the average wage) ( $C_r = B \cdot D_d$ ). The replacement rate is based on the historically attained 60% level of the average wage. It accounts around 70% of the average

wage for retirement pensions, 50% for disability pensions, 60% for family pensions and more than 40% for farmers' pensions (Statistical Yearbook, Poland, 2005, p. 274). It was assumed in the pension reform that the long term target replacement rate will be 50% in an unspecified period of time.

If the unfunded part of the pension system in Poland were ruled by the relatively low demographic dependency ratio then the cost of this pension system would be much lower than it is today when contributions are determined by the (two and half times) higher system dependency ratio leading to a very high contribution to the pension system.

The contribution level required by the funded pension system  $C_f$  is ruled by the passivity ratio  $m/n$  (equal to the ratio of the retirement period to the working life time) and the target replacement rate  $B$  ( $C_f = B \cdot m/n$ ). The passivity ratio is high in Poland due to a low effective retirement age, which is 57 years on average. The passivity ratio amounts to ca. 0.45. It seems rational to reduce the individual passivity ratio by extending the length of working life under conditions of rising life expectancy. Many professionals (professors, politicians, bankers etc.) already work very actively in the age above 65 years, increasing incomes and tax revenues of the state.

If the working life were lengthened in Poland by two years (from 38 to 40 years) by postponing the retirement time (from 57 to 59 years) together with rising life expectancy by one year (from 74 to 75 and), then the passivity ratio  $m/n$  would fall from 0.45 to 0.4. When the passivity ratio falls, the cost of the funded pension system (the contribution rate) is reduced, assuming the replacement rate is not raised.

Since in the reformed pension system not all expenditures are financed from contributions, the state budget has to finance the gap. In the year 2004, the budget subsidy to the social security system amounted to 30% of total expenditures for pensions and other social security payments (Statistical Yearbook, Poland, 2005, 633).

The pension reform in Poland was meant to reduce the inter-temporal imbalance of the pension system. But, six years after the reform was introduced, the social security system is not yet self-financed and is still over-bounded with the historically accumulated entitlements and other costs (many young pensioners and retirees, farmers' pensioners etc.). One of the last efforts to rationalize the public sector finance and to reduce the social security expenditures was undertaken in 2003 by J. Hausner, then deputy Prime Minister and Minister of Treasury, Labour and Social Affairs. It aimed at cutting the excessive social security expenditures by 2-3% of GDP, from 23% of GDP in 2003 to 20-21% of GDP in 2006. This effect was to be obtained mainly by slowing down the rate of increase in the number of new pensioners as well as

removing certain inconsistencies from the social security benefit system (raising the contributions paid by farmers; gradual increasing of the women retirement age, which is now five years shorter than that for men; revision of the disability pensions granted during last ten years etc.). The program was not realized due to a change of political power in Poland.

The change in fundamentals of the pension system coming from ageing of population (the baby boom generation would start retiring from 2006 onwards) and the historically grounded social structure of pensioners and retirees will affect the social security system during the next one – two generations. We project that the structural conditions of entering the unfunded and the funded parts of the pension system can become similar after 20-30 years. Till then the system dependency ratio would probably fall by a half (from the present very high level of 0.64 to around one third) and the passivity ratio will be reduced to a similar level (from the present 0.45). Till the years 2020-2030 the demographic dependency ratio is expected to reach the same level (of around 0.30 - 0.36). Then, there would be no difference in the opportunity cost of joining the funded or unfunded pension systems.

It is important to raise the public consciousness of intergenerational consequences of the structure and working of the present social security system. Other publicly financed welfare expenditures (health, education etc.) should be considered together with the social security costs in a spirit of generational accounts.

#### **4. Savings and investment in human capital of generations**

The crux of the problem of reforming the inter-temporal institutions like the social security systems is how individuals will react to cutting of benefits and rising costs of those systems. For the current sustainability of the social security systems and for future equilibrium in intergenerational transfers it is crucial whether the currently living generations adjust their life cycle consumption and saving profiles to account for the changes caused by reforms. If consumers behave as forward looking the private savings will grow compensating for the state budget borrowing caused by reforms. The private saving rates did not grow in most OECD economies during the last decade, and often the opposite was true in economies undergoing the reforms (Oksanen 2005; Liberda 1999, 2000; Schmidt-Hebbel, Serven, 1999; WDI 2004).

Partial privatization of the defined benefit pension system into the contribution defined system entails the transformation of the part of the implicit pension debt either into the explicit public debt or into additional forced or voluntary private savings. The idea of the second pillar was to keep the revealed part of pension wealth on the mandatory pension accounts till the time

of retirement. It has an important educational feature – consumers are faced with the right and obligation to be informed on the amount of their pension wealth, on investment opportunities and lastly on a return on the pension account. If the policy is conducive to potential savers they may add to those mandatory saving the voluntary savings for funded pension schemes or for other purposes.

A reform of the pension system can constitute a positive incentive for the households' savings rate if the present value of future retirement benefits (social security assets) is a decreasing share of individual's total lifetime wealth. A private savings rate is a function of income growth rate and a ratio of wealth to income. Individuals rationally expecting lower pension wealth decide to save more in order to cover this loss of wealth for consumption in the period of economic passivity. Or they may lengthen the working lifetime, thus adding to saving, without shortening the retirement time because they may expect their whole lifecycle to last longer.

Potential increase of non-compulsory savings is determined by households' ability to predict correctly the value of future pension payments from both the obligatory and the funded systems, the way in which these predictions affect the moment of retiring and whether individuals intend to leave bequest. The last factor is most difficult to assess.

The start of pension reform in Poland coincides with the slowdown of the economy rate of growth in 2001-2002. The fall of the macroeconomic saving rates after 2000 is mainly determined by the slow growth of GDP. Savings respond to the growth of the economy with a delay of about one year. Saving rates fell only slightly during the first two years of the pension reform, but this change during 1999-2000 could have been smaller. The national accounts data have been revised this year for 2000-2004 and, as in previous revisions, it might have affected saving rates up to 1-2 percentage points. Therefore it is difficult to find the effect of the pension reform on saving rates at the macroeconomic level.

Table 3.

**Saving rate and GDP growth rate in Poland in 1996-2004 (in %)**

Specification	1996	1997	1998	1999	2000	2001	2002	2003	2004
Savings as a share of GDP	19.4	19.6	20.7	19.7	19.0	18.0	16.1	16.6	15.3
GDP growth rate	6.0	6.8	4.8	4.1	4.2	1.1	1.3	3.6	5.3

Source: *Rachunki narodowe według sektorów i podsektorów instytucjonalnych 2000-2004*, GUS, Warszawa, 2006.

At the microeconomic level we looked at the behaviour of households which also reduced their saving but less than the whole economy. Based on the Household Budget Surveys

for 32 thousand of Polish households, we computed the saving rates and the expenditures for educational and health services. Below we present the results of comparing saving rates and investment for human capital in households at different age and gender of the household head.

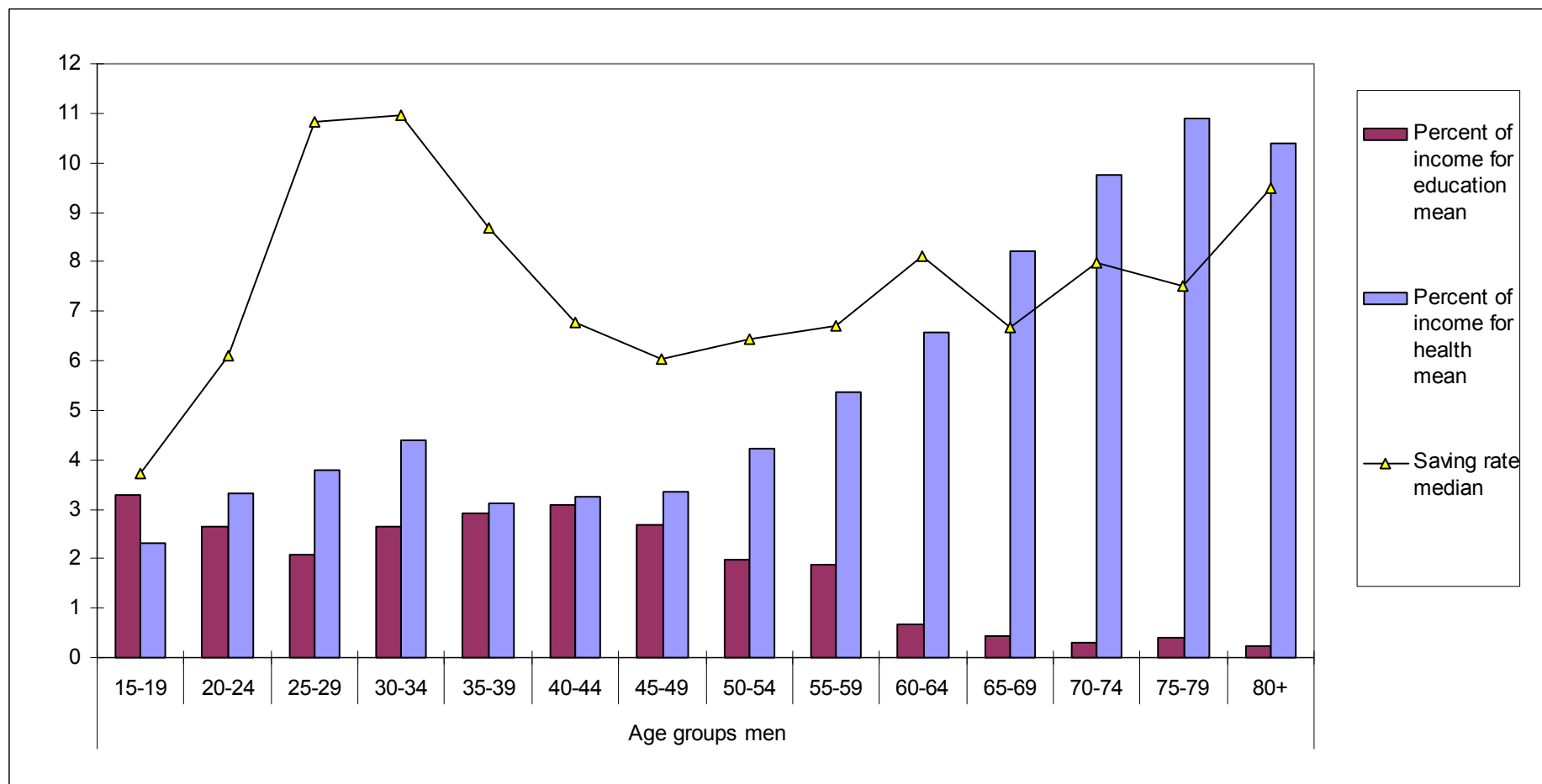
Figures 6 and 7 show the spending for private education and private health care in Polish households throughout the life cycle of the household head. Half of Polish households save voluntarily around 7 % of their disposable income. The households also invest in educating children and adults on average 2% of their disposable income and next 5 % in health care of members of the household. In households headed by women (about two fifths of all households) the average expenditures are slightly lower on average than in the households run by men, but spending in particular age groups are sometimes relatively higher than in the households with a male head. Households run by women report on average household disposable income lower by around 15% than the average whereas men headed households obtain incomes higher by 10% than the average income.

The median of saving rates in households headed by women was 5% on average, but savings are higher in young households in the age of 25-35 years. This is a specific feature of the saving pattern of Polish households. The same is visible in case of men headed households. The saving rates of young men in the age between 25 and 40 years are higher (around 9%-11% of disposable income) than in the case of women. The pre-retirement peak of savings is much lower and appears in the age of 50-54 years in case of women and in the age of 60-64 years in case of men. It is strongly related to the lower effective retirement age in Poland that is lower by 5 years for women. Households run by men save on average more (7.7%) than women.

In addition to saving Polish households invest quite a lot in education and health. The profiles of spending for education display an interesting picture. The highest are expenditures for education in the young age of 20-24 years and then in 30-44 years. The first is the period of investing in the own education by heads of households. There is an educational boom at the level of tertiary education in Poland. About half of total number of students pays fees for their education, though, according to Polish constitution, the tertiary education is financed by the state. The other very common educational expenditure is for learning foreign languages and for different types of training, including the post diploma studies.

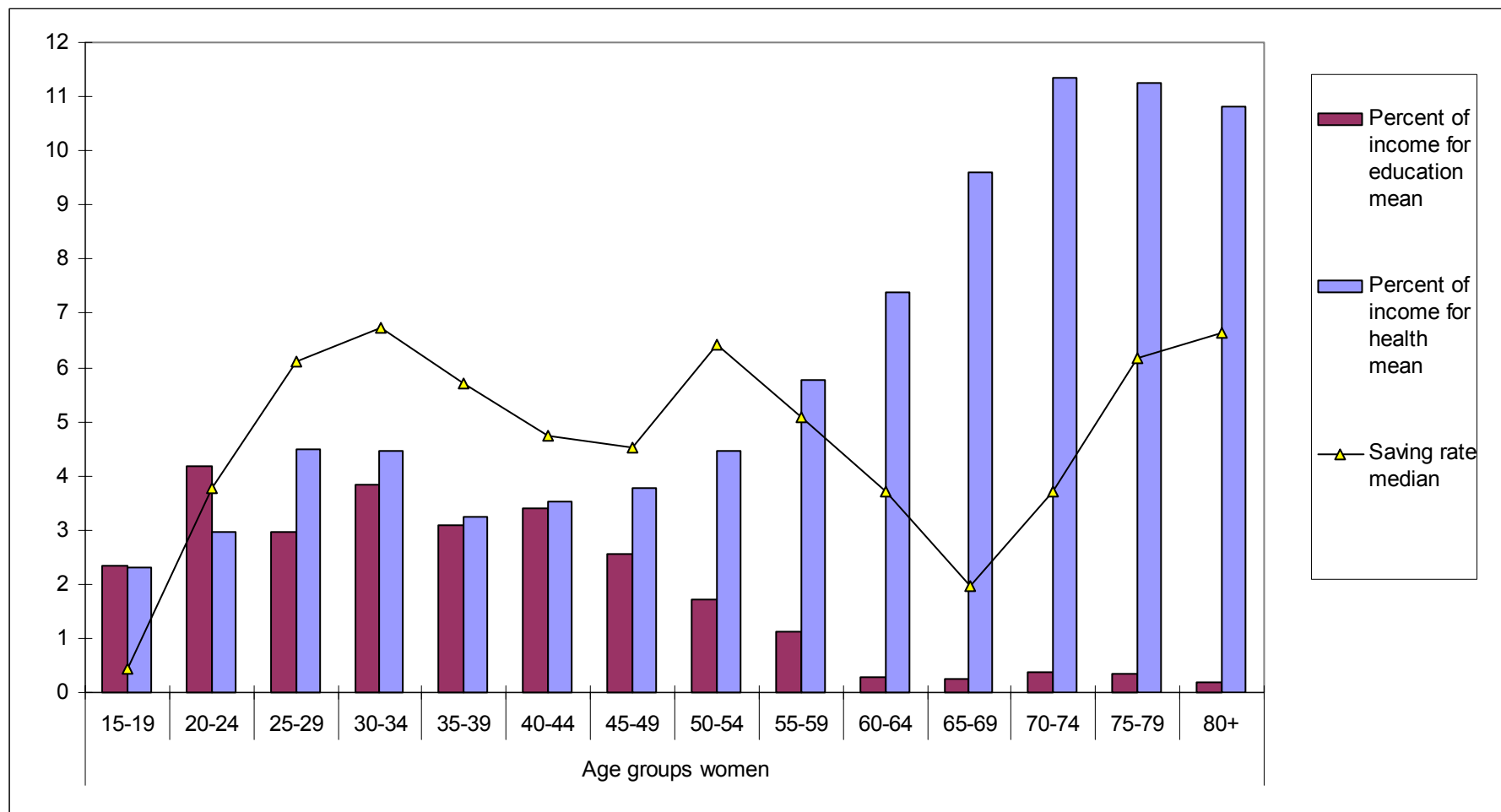
Households spending for education account for one fourth of the government spending for this purpose. If not the private investment in education Polish society would not have been well prepared for the transition of the economy to competition within EU and on a world scale.

**Figure 6. Men as heads of households: Saving rates and spending for education and health care (% of disposable income)**



Source: Household Budget Surveys in 2003, Poland, Central Statistical Office, Warsaw.

**Figure 7. Women as heads of households: Saving rates and spending for education and health care (% of disposable income)**



Source: Household Budget Surveys in 2003, Poland, Central Statistical Office, Warsaw.

As spending for education is mainly voluntary, the expenditures for health care is very often forced by the limited access to the public health system (long queues, overcrowding of hospitals, sometimes low quality of service due to a shortage of qualified staff or a lower service staff). Households spending for health care are almost of the same size as the government spending for this purpose. The relative expenditures for health care grow with the age of individuals. The main item of expenditures in the old age is for medicines, less for the doctor service. In the younger age the structure of the health care spending is more balanced. The social groups that spend more on health care in the old age are farmers and people living in small towns and villages due to the worse coverage of health service in those localities.

From Pictures 6 and 7 one can read that investment in education and health are substitutive to savings in the old age, when the budget constraint holds strongly, but are complementary in the young age. Young and maturing households both save and invest in human capital almost the same shares of disposable income (ca. 7 %). This investment is sizable in relation to a relatively low average income of Polish households. Total spending of households for human capital is slightly higher than is the sum of savings.

Voluntary investments in education and health care of the households can be treated as an alternative to saving for retirement. On the other hand, these expenditures form also intergenerational transfers, more in case of education but also in case of health. Spending on own health not only increases the quality of life, which is a value, but it releases public funds for other investments, thus raising public savings or reducing the public deficit.

Public spending for education was treated in the first generational accounts as public purchase. Only later it was treated as transfers to specific age groups. This changed the generational accounts profile but not the sum. But in neither case were the educational expenditures treated as investment that brings the positive rate of return. Expenditures for health are not treated as investment and it does have consequences for the shape and the value of generational accounts. We claim that these two groups of spending should be included into generational accounts similarly to the private investment in funded pension schemes and to investment in protection of natural environment. In spheres of health, education and environment protection, the currently living generations may leave uncovered debts for future generations. But they also invest in the name of future generations as is the case mainly in education and science.

Generational accounts have not yet been calculated for Poland. The missing data are on taxes by age of generations. The author desires to organize a group of researchers to finally calculate the generational accounts for Poland.

## 5. Summary and conclusions

Intergenerational equilibrium of social transfers between generations (security systems, educational, health care) implies that successive generations will acquire the same level of benefits and bear the same costs of the social security system.

The account of each generation represents the value of its rest-of-life net tax payments to the state. The lifetime taxes paid by future generations will be in some cases much higher than projected taxes of newborns. Japan and Italy presents the most severe disequilibrium.

Demographics matters. Ageing aggravates the generational disequilibrium by causing faster growth of the implicit pension debt. To restore actuarial equilibrium the pension systems have been reformed in most countries.

Pension reform matters. We project that the structural conditions of entering the unfunded and the funded parts of the pension system in Poland can become similar after 20-30 years.

In addition to saving households invest in education and health. We claim that private expenditures for education and health diminish the generational imbalance. Private investment in human capital should be added to generational accounts similarly to the private investment in funded pension schemes.

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