PENSION REFORM AND INTERGENERATIONAL REDISTRIBUTION IN HUNGARY

- draft version -

The PIE International Workshop on

"Pension Reform in Transition Economies"

IER, Hitotsubashi University

February 22, 2003

Róbert I. Gál

(TÁRKI Social Research Centre, Budapest); gal@tarki.hu

Géza Tarcali

(European Centre for Social Welfare Policy and Research, Vienna); tarcali@euro.centre.org

1. INTRODUCTION*

The predecessor of the current Hungarian pension system, established in 1929 as a funded plan, collapsed during World War II. After the war it was redesigned as a pay-as-you-go financed unfunded scheme. Step-by-step it replaced alternative institutions, the family in particular, in providing income for old-age. By the 1980s it reached a high level of maturation with near-universal coverage, generous replacement rates (over 60 percent) and low retirement age (55 for women, 60 for men).

It succeeded in protecting the old from utmost poverty through the transformational crisis in the 1990s. While pensions lost value relative to wages, and while real pensions decreased substantially, other sources of income for the inactive declined much faster. Consequently, the relative income status of pensioners improved significantly during the 1990s (Spéder 2000). This made the pension system very attractive for older workers: the actual retirement age dropped due to early retirement and the loss of control over disability retirement. The rapid growth of coverage in a shrinking economy diminished the range of pensions creating further disincentives to work. The administration of pensions also proved successful. While most firms changed ownership in the process of mass privatization, and the number of companies exploded, the pension agencies managed to collect and redistribute a significant part of GDP even though with declining efficiency.

Indeed the system proved to be too successful in some sense. Being the only institutional system settled and at the reach of policymakers, it absorbed a disproportionate part of the labor market crisis of the early transition years. It offered an escape route to hundred thousands of workers from the labor market who cannot be redirected to the labor market any longer. This undermined the long term stability of the system and induced an extensive reform in 1998.

In Sections 2 and 3 we outline the reform package and its implementation. In Section 4 we show our results on the effects of the reform on the long term sustainability of the system. Finally, in Section 5 we complete the analysis with retrospective data which allows us to derive conclusions on the intergenerational redistribution in the pension system.

* We are grateful for comments and contribution to András Simonovits, Rudolf Borlói, Béla Janky and two unknown reviewers. All the remaining errors are ours.

2. THE 1998 PENSION REFORM

A comprehensive reform package (Law on Eligibility and Contributions to Social Security and Private Pensions 1997/80 Law on Social Security Pensions 1997/81 and Law on Private Pension and Private Pension Funds 1997/82) was passed in 1997 and came into effect on January 1, 1998.[1]

By the contributions law, employers' pension contributions were to decrease from 24 percent of gross wages to 23 percent by 1999 and 22 percent by 2000. In contrast, employees' contributions were to increase from 6 percent to 7 percent by 1998, 8 percent by 1999 and 9 percent by 2000. The social security administration was instructed to establish a personal contribution register from 1999.

The private pension law established a new pre-funded and defined contribution type of second pillar managed by private companies. Fund membership was made optional for those who had earned pension rights in the old system but mandatory for new entrants to the labor market. The option was left open for 20 months. Voluntary switchers were allowed to return their full contributions to the social security. The funds were to get about 20 percent (6/31) of the contributions of those who switched, which should have grown to about 25 percent (8/31) in two years. So no full opting-out was allowed. The second pillar covers only longevity risk. Fund members who get disabled can return to the first pillar by returning their savings to the social security. By this, they can fully recover their eligibility in the first pillar. Alternatively, they can also leave their savings in the fund. In this case, however, social security pays only 75 percent of what would have been paid otherwise as disability pension.

Hungarian pension funds have a special property rights structure (see Rocha, Gutierrez and Heinz 1999). They take the form of mutual savings associations, so members are not clients but co-owners of the fund. Funds are managed by the board of directors and supervised by the board of supervisors. Both bodies are elected by the general assembly of the members. Funds can be either open or closed but the same set of regulation applies to both types. The funds release quarterly and annual report which are partly standardized by regulation. They are obliged to give annual information to the fund members on the state of the personal accounts. The funds are also controlled by external actors such as a custodian and the State Financial Supervisory Authority which can release and withdraw fund licenses.

[1] An analysis of the 1998 reform see in Simonovits (1999), Müller (1999),, Marin, Stefanits and Tarcali (2001), Rocha and Vittas (2002) and Augusztinovics et al (2002).

The social security pensions law enacted reforms in the first pillar. It changed several elements of the old-age entry pension formula. Degressiveness in the imputation of earnings to the pension base will be phased out gradually. The accrual rates in the pension scale will be made linear from 2013, with 1.65 percent of lifetime earnings for every service year for those who stayed in social security with full contributions and 1.22 percent for those who partially opted out. According to the transition rule, the reduction in the accrual rate from 1.65 percent to 1.22 percent was calibrated to the rate of partitioning of contributions ($1.22/1.65 \approx 1-(8/31)$). However, benefit reduction has been extended to include service years earned prior to the reform, when all contributions were paid to social security. In this way, in addition to the obvious elimination of a sizable part of the implicit pension debt, the legislators wanted to assure that the actual age limit of switchers would be low.

Also from 2013, the pension base will be shifted from net to gross earnings while pensions will be made subject to income taxation. As for established pensions, the net wage indexation was to be replaced by the so-called Swiss indexation after a transition of two years (in 1999 100 percent of net wage index, in 2000 a 30-70 percent mix of consumer price index and net wage index, and finally from 2001 a 50-50 percent mix of the two indices). Rules of the survivors' benefits also changed. In addition to the own right pension, a widow has also been eligible for the widow benefit since 1998 which is 20 percent of the pension of the deceased spouse. The law also confirmed the raising of retirement age legislated but suspended before. According to the new rules, the retirement age for men was raised from 60 to 61 in 1998 and to 62 in 2000, whereas for women it was raised by one year every second year and will reach 62 in 2009.

3. IMPLEMENTATION

The 1998 pension reform was the result of a number of compromises.[2] However, political dispute on the pension system has not ceased and the rules have kept changing even after the legislation, in particular as the incoming government, elected in 1998 just after the new funds were set up, voted against the reform a year before while it was still in opposition.

In 1999 the indexation differed from what was originally planned. Backward-looking indexation was replaced by forward-looking indexation, which was unfavorable for

[2] On the political economy of the pension reform see Müller (1999), Orenstein (2000), Nelson (2001) and Vanhuysse (2001). On the comparison of East European and Latin American pension reforms see Müller (2002).

pensioners. In 2001 and 2002, however, pensions were raised faster than dictated by the indexation rule. Contributions were also reduced from 31 percent of gross wages in 1998 to 28 percent in 2001, 26 percent in 2002 and 26.5 percent in 2003.

As for the second pillar, contributions paid to the private funds were not raised to 8 percent of gross wages after two years but were frozen at 6 percent without adjusting the accrual rates in the transition rules. From January 2003 the distribution of contributions between the two pillars were re-regulated again due to another change in government. Currently 7 percent goes to the funds. The new government, elected in 2002, also promised to raise this level to 8 percent from 2004.

The official projection suggested about 1.3-1.5 million mandatory pension fund members, while the true figure was about 2 million, roughly 50 percent of the economically active population (including the unemployed), of whom 93 percent were voluntary members and 7 percent were mandated (new entrants into the labor market). The deadline of voluntary switching was August 1999, however from January 2003 those under the age of 30 can again opt out to the mixed system (for new entrants it is mandatory). Although voluntary members were allowed to return to the social security with their full contributions till December 2000, and this deadline was prolonged to December 2002, the number of those who returned remained marginal, under 90 thousand. New entrants are mandated to choose a fund, although for one year, in 2002, membership for the newcomers was made optional. In the same year, mandatory members were also allowed to return to social security. The return option is still open to those who were new labor market entrants in 2002 and joined a fund in that year but it will be closed by December 31, 2003.

36 mandatory funds started its operation in 1998 but this number has been reduced by mergers and acquisition to 21 by 2001. The market is rather concentrated which is typical in markets dominated by open funds. Funds with a backing of large banks or insurance companies had the best chance of survival (Augusztinovics et al. 2002)

4. EFFECTS OF THE REFORM ON SUSTAINABILITY OF THE SYSTEM

We examine the long term effects of the pension reform using the framework of generational accounting. This technique[3] is aimed at quantifying financial tensions invoked by the current situation of the redistribution system. The essence of the method is to break down net taxes by cohorts, and project these values, the current age-tax profile, into the future. Given a few additional assumptions on the growth of productivity and the discount rate, as well as population forecasts, the level of contribution levied on future generations by the present net tax profile projected into the future can be determined so as to meet the inter-temporal budget constraint. The latter is simply a zero-sum constraint stating that someone (descendants in the absence of others) must defray possible over-spending of the present. To put it more precisely: the present value of future net contributions of current and subsequent generations has to be equal to the present value of current government debt and future government expenditures.

Generational accounting reduces the role of expert forecasts for future trends to a minimum, its aim being to quantify tensions present in the current situation. Thus, besides predictions on population and institutional changes set in the pension acts in advance, no other estimated trends will be considered. Changes expected in employment, the practice of granting disability pensions, the proportion of entrants to higher education, age-earnings profiles, or personal income taxation, will be omitted. For all these variables a predictive model needs to reserve clear and explicit assumptions - generational accounting, however, is not predictive.[4]

The output of our calculations on the Hungarian generational pension accounts is a vector of dollar amounts. The entries of the vector indicate the difference between the present value of contributions expected to be paid by a generation throughout the remainder of their lives, and the present value of the benefits they are granted. Following on from the method that neglects past contributions and benefits, such a calculation suggests that the elderly are net beneficiaries, while active cohorts are net contributors to the system.

Obviously, this outcome in itself is a sterile one. However, three approaches arise which may render the data fertile for analysis. The first is to perform not only forward-looking, but also retrospective calculations, that is to take account of former contributions and

[3] See the first example of generational accounting in Auerbach, Gokhale and Kotlikoff (1991). A theoretical background and international comparative results in connection with the method are found in the book of Auerbach, Kotlikoff and Leibfritz (1999). Regarding methodological questions refer to the web-site www.generationalaccounting.com, for the study of Cardarelli, Kotlikoff and Sefton (1999) and Raffelhüschen (1999).

benefits as well. Given such data, intergenerational redistribution can be measured. We will present the results of such retrospective data in Section 5. The second procedure is that of international comparison. If the same method produces different distribution curves for different countries, this fact again informs us of intergenerational redistribution.

Finally, by comparing the new-born cohort with the as-yet unborn (who are treated as a unified age group), we obtain a measure of generational imbalance in the system. The method involves the assumption that changes in taxes and benefits apply only to future generations, whilst current generations are to pay taxes in accordance with the present distribution of the net tax burden. Consequently, an imbalance value indicates how much more (or, in a fortunate scenario, less) future generations have to pay for the same benefits, or how much less benefit they have to settle for (or how much more benefit they may receive) while paying the same taxes as those who were born into the original age-profile of taxes and benefits, and have their whole career ahead of them.

The measure of imbalance reflects the long-term sustainability of the system of redistribution. In this sense it is a relative of the amount of implicit debt (Holzmann, Palacios and Zviniene 2001). On the other hand, the imbalance gives an indication of intergenerational redistribution only to a limited extent, partly because it is forward-looking with no retrospective data and partly because it neglects the alternative of current generations footing the bill of imbalance.

Generational accounting is supposed to extend over the entire government budget, including taxes on income, consumption and property, as well as pensions, family assistance, education, health care, and all other public programs. The work edited by Auerbach, Kotlikoff and Leibfritz (1999) contains such calculations for 17 countries. Recently such accounting has been undertaken in Hungary as well, covering the complete system of redistribution for the year 1996 (Gál, Simonovits, Szabó and Tarcali 2000). Many of these studies consider reforms in public finance or public services. It is less common to do generational accounting on specific institutional reforms.[5] Such calculations are more complicated because reforms are frequently not immediate, but rather they describe an agenda for future action. For this reason it makes sense to carry out generational accounting separately for pension systems in countries such as Hungary, where pension legislation sets the intended steps of institutional

[4] Generational accounting, as indicated by the name, is accounting rather than economics. See Fehr and Kotlikoff (1999) for generational accounting in a general equilibrium context.

[5] For exceptions see Auerbach, Gokhale and Kotlikoff (1991b) on Medicare, Boll, Raffelhüschen and Walliser (1994) on German social security or Bonin, Gil, and Patxot (2001) on Spanish pension reform.

reform in advance. Moreover, the pension system alone was responsible for almost 40 percent of the generational imbalance in 1996.

Generational pension accounts without pension reform

Data on social security contributions was obtained from two samples taken from personal income tax declarations for the year 1998, provided by the Tax and Fiscal Inspection Office (tax office in short, the Hungarian equivalent of the Internal Revenue Service). The first one comprised a 0.5 percent random sample of employers' declarations of employees' income comprising 10,874 cases, the other was a 1 percent random sample of self-declarations with 21,305 cases. Since our benefit data derives from the year 2000, the tax data for 2000 as estimated from the tax office file was used by multiplying taxable incomes by the rate of gross wage increase. We considered employers' and employees' contributions paid either to the first or the second pillar as pension revenues. We did not include, however, in the calculation government transfers to the Pension Insurance Fund (PIF).

The benefits were estimated from a 1 percent sample of pensioners stratified by so-called main benefits (in the Hungarian system, a person may receive different benefits, e.g. old-age pension as well as survivor benefit simultaneously). The sample, consisting of a total of 31,487 individuals, was supplied by the Central Administration of the National Pension Insurance (CANPI).

Our calculations of the no-reform scenario suggest that the Hungarian public pension system was unsustainable in the long-term without the comprehensive reform package of 1997. For this run we take into account only a single reform measure, raising retirement from 55 to 58 for women and 60 to 62 for men. These are the reform steps that came into effect by 2000, the base year for our calculations. In view of a deficit in social security (exclusive of contributions lost to the new private funds and topped-up from central budget funds) amounting to $445 million[6], with the prospect of significant demographic deterioration, such a long-term imbalance came as no surprise.

[6] This amount differs from the 71 million deficit indicated in the balance sheet of the PIF, since we used a different list of revenues as well as expenditures. Since we consider social security a closed system, only contributions are taken as revenues, general taxes are not (except for those that cover contributions lost to the private funds). On the expenditures side we took into account certain services not financed by PIF but the government, although they are part of the pension system For more details on the problems of defining the pension budget see Gál and Tarcali (2003).

We present generational pension accounts in Figure 1. The bold curve in the figure begins with a sharp decline. The per capita account of future generations is \$15,300, while that of the zero year old is a mere \$1,400.[7] This difference provides the most important index of generational accounting. If deficits in the system are devolved entirely on to the as-yet unborn, they will be burdened with making \$13,900 more lifetime contributions than those who are already in the system but have their whole careers ahead of them.[8] This line suggests an extremely severe internal tension.

Figure 1
Generational pension accounts without and with pension reform
(2000 present values)

Age -1 refers to future generations
bold curve: generational pension accounts without pension reform
regular curve: generational pension accounts after pension reform

[7] In an earlier study (Gál, Simonovits and Tarcali 2001) we used estimations for the pension budget of 2000 since the actual figures had not been published yet. The estimation proved to be too pessimistic in the light of the actual figures: it indicated a further percentage point budget deficit in the base year. In addition, we also used a slightly different list of revenues and expenses which added to the above effect. The difference between estimation and reality significantly influences the generational imbalance, which is a very sensitive measure anyway, but it had only a minor effect on other conclusions such as the effect of the pension reform and its particular elements on the long term sustainability of the system.

[8] For the sake of comparison, the monthly net industrial wage was about \$220 in 2000.

Note that the unreformed system is inefficient even for the newborn. This rises further with age, as older children receive orphan benefits for an ever-shorter period. The greatest net contributors are the 24-year-olds. In practice they no longer receive orphan benefits, neither yet old-age nor disability pensions. For them it would require the immediate payment of a lump sum of more than $7,020 to equalize lifetime contributions and benefits. This does not mean of course, that the current 24-year-old will necessarily end up worse off than the new-born generation. The careers of these two generations could only be compared if the account for the 24-year-old was calculated from the moment they were born as well.

For the 39-year-old, the account turns negative, i.e. they may start to expect more benefits from the system than contributions they have yet to make. Contributions and disbursements fall into balance at such an early age because without reform the time remaining before retirement is only nineteen years for women and twenty-three for men, and disability pensions and other forms of early retirement reduce the active period even further.

Generational pension accounts favor the 59 age bracket the most. They have reached the point of paying almost nothing into the system, whilst they stand to withdraw $20,440 over their remaining period in the pension system. We should note that this observation is not appropriate to describe redistribution among current generations. It is reviewed to serve as a base for the evaluation of changes produced by the introduction of respective reform measures.

In the above calculation, we took a look at how large the generational imbalance would be (apart from minor modifications to the retirement age) if no reform had taken place. Below, in the second run, not only are future demographic developments taken into account, but all aspects of institutional changes, Swiss indexation, the effects of further raising the female retirement age from 58 to 62; the phasing-out of degressiveness in the benefit formula[9]; the introduction of a new scale of accrual rates replacing the current one in 2013; the replacement of tax-free pension with taxable benefits and finally, partial pre-funding.

The impact of the pension reform on generational pension accounts

[9] The pension formula is called degressive since it cuts from higher income brackets. So in the process of calculating the starting pensions the lowest bracket of the net income is taken in full, the second lowest in 90 percent and so on.

The second (thin) line of Figure 1 demonstrates that pension reform considerably reduced the severe imbalance originally prevailing in the system.[10] The deficit of future generations fell from $15,300 to $1,160 (see the figures in Table 1). Most of the related costs are borne by the current active generations, although, to a lesser extent, primarily due to Swiss indexation, current pensioners also bear some of the costs. As mentioned before, this and all subsequent remarks about the effects of reform on intergenerational redistribution are

[10] Benczúr (1999) and Rocha and Vittas (2000) came to similar conclusions whilst applying different methods.

Table 1
Generational pension accounts for selected cohorts under different reform measures
(thousands of US dollars)

age of cohort	no reform	Swiss indexation	completed retirement age adjustment*	phasing out degressiveness from pension formula	new scale of accrual rates	partial pre-funding	complete reform
future	15,3	8,1	9,3	16,6	13,5	12,0	1,2
0	1,4	3,4	2,2	1,2	1,7	1,4	3,6
10	3,2	5,1	4,1	3,0	3,6	3,0	5,1
20	6,5	8,6	7,8	6,2	7,0	6,1	8,8
30	4,7	6,9	6,5	4,4	5,4	4,4	7,7
40	-1,1	1,1	1,3	-1,5	-0,2	-1,1	2,8
50	-9,9	-8,0	-6,6	-10,5	-9,9	-10,0	-5,4
60	-18,9	-17,6	-18,4	-19,2	-18,9	-18,9	-17,3
70	-14,3	-13,7	-14,3	-14,3	-14,3	-14,3	-13,7
80	-6,6	-6,5	-6,6	-6,6	-6,6	-6,6	-6,5
absolute generational imbalance	13,9	4,7	7,1	15,4	11,8	10,6	-2,4

Note: discount rate: 5%. productivity growth rate: 1.5%. real interest rate: 4%. population projection: Central Statistical Office Demography Research Institute.

** Completed: the calculation started from 2000, so it does not take into account the effects of previous retirement age increases.*

subject to restrictions due to the assumption of generational accounting that all imbalances are covered by future generations. This does not contradict to the previous sentence. We compare two distinct computations and separately both are built on the assumption mentioned. A comparison of the resulting accounts gives some hints on intergenerational redistribution. Should the inter-temporal budget constraint of the model be supplemented with annual budget constraints, not only future generations, but all current generations would be made to defray the annual deficit on the basis of the current profile of net general taxes. By aggregating the annual supply of deficit (or redistribution of surplus) for all years, the redistributive effect of pension reform on any generation can be precisely determined.

Besides the main result that long-term financial tensions decreased, another important conclusion is that in spite of the significant changes (on the baseline assumptions) the system still falls short of a clear balance. Newborn and future generations are expected to remain net contributors to the system, i.e. their contributions will produce negative real returns.

The introduction of the new rules on indexation into an expanding economy substantially alleviated the imbalance in the system. The sole beneficiaries of the change are future generations. As far as they are concerned, their overpayment under the no-reform scenario of $15,300 falls to $8,090 which is itself still high. For all other generations Swiss indexation reduces the amount of prospective pensions. The balance of contributions and benefits for the new-born rises from $1,400 to $3,420. Since the difference between the accounts of the zero-year-old and future generations is cut from both sides, the generational imbalance reduces from $13,900 to $4,670. This still does not represent a balance, it simply serves to diminish the disadvantage that the yet unborn have compared to the new-born.

The new indexation rule also raises the age at which individual contributions fall into balance with benefits. The age of the first generation that will take more out of the system in the future than it will contribute rises from the previous figure of 39 to 42. The 59-year-olds remain the greatest net beneficiaries, although they would receive a lump sum of just $18,990 in compensation for the loss of their annuities. Among pensioners, the effect of indexation diminishes with age, as it applies to shortening periods.

Completing the adjustment to the retirement age realigns generational imbalance from $13,900 to $7,050, a smaller alteration than that arose from Swiss indexation (though this may not be true for the impact of the full adjustment of the retirement age).[11] Future generations as well as the zero-year-olds are net contributors to the system. The as-yet unborn

[11] Note that these results are not additive, as each effect is compared separately to the pre-reform situation.

cohorts benefit from the higher retirement age, although practically no one else does. Net contributions of the zero-year-olds for instance, increase from $1,400 to $2,250 owing to the longer contributing period and shorter retirement, while for that of the greatest net contributors, i.e. those aged 24, rise from $7,020 to $8,530. As for the rest of their lives, the 42-year-olds are already net beneficiaries in the system. In contrast to Swiss indexation, the burden of raising the retirement age, being imposed as it is exclusively on the active generations, becomes more concentrated.

Legislators wanted the degressive nature of the benefit formula to be phased out gradually by raising annually the so-called degressive brackets by 8 percentage points above net income growth. By means of this discrepancy, the uppermost brackets will gradually "empty", and all income will eventually fall into the 100 percent bracket. In practice, we took the net contribution profile for the base year and raised the old-age pension of generations currently retiring each year at the above-mentioned rate.[12]

Phasing out degressiveness in the benefit formula, in contrast to the rest of the measures of the pension reform, does not diminish, but rather improves the position of all living, still active generations. Current pensioners are left unaffected. For future generations, however, phasing out degressiveness further increases the imbalance even though this change is not a major one. A further $1,290 is added to the original deficit of $15,300. Similarly, the gains of the current generations have no decisive impact on the balances emerging in default of the reform, either. The differences per generation vary from $180 to $750.

Of all measures of the pension reform, it is the effect of the new pension scale which is to replace the current one in 2013 that is the most difficult to quantify. In this case we cannot use the year 2000 pension profile, we need to modify it in accordance with the new scale. The new scale entails two significant changes. First, *accrual rates* (depending on the number of years of service) are new. They are specified by the law. Secondly, from 2013 the *pension base* (which is to be multiplied by the accrual rate to obtain the starting pension) will be determined on the basis of *gross* estimated lifetime income, and the resulting benefit will be taxed as personal income. This is contrary to the rules in force at present and until 2012, by

[12] At this point we need to refer to a methodological problem, in particular the difference between the projection of current conditions and the projection of current changes. Considering changes occurring in the given year as a result of new retirements would effectively raise the average old-age pension of the given generations only according to the relative weight of entry pensions. However, in 1999 approximately only one third of the cohort reaching retirement age actually retired – the rest had retired early, that is, under the official retirement age. In order to avoid having the calculations distorted by one extreme year, data on the mean of many years' of new retirements is required. Unfortunately, no such data was available, so instead of the changes, the initial conditions were projected into the future at this point.

which firstly the net base of the pension is determined and then multiplied by the accrual rate to yield the net pension. The post-2013 accrual rates are lower than the current ones, i.e. where the net pension base is equal, a smaller pension will result. The fact though that the taxable part is initially reduced on the basis of these rates, and only subsequently is the rest taxed, results in a lower average personal income tax rate, which in turn pulls the post-2013 starting pensions closer the present ones.

In order to grasp the effect on generational accounting, we calculated how the ratio of the net starting pension compared to the final gross income changes. The first step was to calculate the ratio for the currently retiring generations, drawing on data from 1998 (the figures used in the calculation were *generational* averages, and not the averages of *those currently retiring*). The value of the replacement rate was 0.409; as a generational average, it cannot be compared directly with other replacement ratios.

The corresponding replacement ratio for the year 2013 can only be calculated in a number of steps. The *final* monthly gross wage is provided on the basis of monthly wages in the base year and the growth rate of productivity. For the *lifetime* monthly gross wage however, only a rough estimate can be given. We assumed that the ratio of the final monthly gross wage to the lifetime monthly gross wage remains the same as in the 1988-1998 period. This latter calculation was computed on the basis of Toldi (2000), using his Tables 3, 1.15, 1.16 and 1.17. The value in question came to 0,907, covering the period through 1998, where the monthly average of the gross indexed lifetime wage equaled approximately 90 percent of the final monthly gross wage. This was the value we used to obtain lifetime monthly gross wages from final monthly gross wages after 2013. This latter serves as the basis for determining pensions after 2013 with the new accrual rates.

The starting pensions generated in this way were reduced by the average personal income tax. In order to derive the latter, we calculated the retiring generations' average gross as well as net wages for the year 1998, from the available tax records.[13] From these, the average tax rate came out at 30.1 percent.

This was how we came to have figures for net starting pensions as well as final gross wages for each generation, on the basis of the new pension scale. The rate of the two, the post-2013 counterpart of the replacement ratio used above, took a value of 0.366. So to sum

[13] These wages are again *generational* averages, and do not necessarily equal the average final wage of *those imminently retiring*.

up, the new scale reduced starting pensions by an average of 10.5 percent for calculations based on 1998 figures.

This ratio was incorporated into the model in such a way that old-age pensions were cut by 10.5 percent on the profile of the base year for those generations whose members will already receive their pensions according to the new scale (i.e. those aged 49 and below in 2000). For this calculation also, we followed the method employed for the quantification of degressiveness, i.e. we applied the same rate for the entire generation, for the reasons specified in detail above.

The above methodological description also implies that the procedure, by which we used fully indexed wages to produce the lifetime gross wage, in practice solved the problem that, given decreasing inflation, partial indexation also exerts a depressing influence on the dynamics of starting pensions.

The beneficiaries of these changes are future generations, in other words, the introduction of the new scale improves the long-term sustainability of the system. The volume of changes roughly equals the impacts of phasing-out degressiveness, only one is positive and the other is negative. These two reform measures more or less cancel one another out, as far as the long-term effect is concerned. The same does not apply however to the intergenerational redistribution. While all active generations benefit from phasing-out degressiveness, the costs of the new scale will be borne exclusively by younger generations, those presently at the age of 49 or under. Those retiring in the decade preceding 2013 are the main winners from this discrepancy.

Partial pre-funding of the pension system – i.e. establishing private pension funds – raises a theoretical rather than methodological problem in generational accounting. A deficit evolves in social security, while capital is accumulated in the private pension funds. Both bear interest, therefore realistic assumptions are required regarding these interest rates.

According to our approach, the pension system (being an endowment life insurance combined with annuities) comprises two stages, accumulation and benefit payment, independent of whether the system is pay-as-you-go or funded. In the funded scheme, the period of accumulation is simply the accumulation of contributions in the course of one's active life. In a pay-as-you-go scheme the "fund" is the taxpaying capacity of the new up-coming generations that can be best approached by the covered wage bill as a proxy. Thus, accumulation is the process of bringing up and training new generations, enhancing the efficiency of their labor and collecting their payroll taxes. The optimal allocation of

contributions should depend on the comparative efficiency of these two kinds of accumulation provided annuities from the two schemes do not differ.

The empirical background for making assumptions on comparative efficiency is limited. We have data on the covered wage bill in Hungary only from the 1990s. The covered wage bill declined from 30 percent of GDP in 1992 to 25 percent in 2000, a fall that was not compensated for by the 27 percent growth in GDP over the same period. In contrast, the BUX-index of the Budapest Stock Exchange closed in the year 2000 at 7850 points (its CPI corrected value was 1860). It began at 1000 points in 1991. These trends reflect significantly higher rates of return on private savings as compared to public investments in terms of taxpaying capacity, although the 1990s may give a distorted picture. Between 1947, the first year of the pay-as-you-go scheme and 1990, the covered wage bill may have grown much faster whereas the stock exchange did not exist in the centrally planned economy. So without venturing into actual figures we came to a conservative conclusion, that a combination of pre-funding and private management of savings brings additional efficiency to the system assumed to be closed. As for real figures we based our assumptions on international experiences. We set the average annual returns of private pension funds at 4 percent (also covering additional administrative costs). This is a conservative assumption in the light of international comparison (see for instance, OECD 1998, 69).

In order to incorporate the increase in efficiency into the conceptual system of generational accounting, we needed to come up with novel solutions because the inter-temporal budget constraint, that is the very fact that the system is closed, is a fundamental component of generational accounting.

The extra efficiency brought into the system can be combined with the framework of generational accounting in two ways. One possible variation is that contributors paying the same volume of contributions receive larger pensions. This refers to a (theoretically pure) situation in which private pension funds make investments exclusively abroad, that is fund accumulations come to take effect only when the first, higher pensions are paid out from them. The other way to incorporate the surplus resulting from the increase in efficiency is to assume the same pensions defrayed from lower contributions, i.e. there is an increase in efficiency right from the beginning. In other words, we assume that the part of the contributions which flow into private pension funds will work more effectively, which is how it may be interpreted as increased contributions. In this case, the generational accounts of those already in retirement do not change, the net contributions of the presently active cohorts rise, and

consequently, due to the inter-temporal constraint, future generations face lower liabilities. It should be noted that both methods are extraordinary to generational accounting, and depart from the methodologies applied up to now, yet by these procedures one may grasp the net effect of pre-funding on the positions of future generations. The calculation below was carried out on the basis of the second variation mentioned above.

The emergence of private pension funds affects the position of social security from two angles. First of all, contributions are lost to private funds in proportion to the number of individuals who switch to private contributions and the magnitude of membership fees. Secondly, according to the rules of switching, disbursements will also drop with time for those who have switched over to the mixed system.[14]

In calculating accumulations to private pension funds we used a uniform retirement age (62 years). We assumed contributions to private pension funds to yield interest until the individual reaches the age of 62, then everyone collects the accumulated wealth uniformly in a lump sum.

The figures in Table 1 suggest that partial pre-funding, on the assumptions made, brings about a significant net improvement in the accounts of future generations. Where contribution rates of 6 percent of gross wages are paid to private pension funds, members of the as-yet unborn generations have to pay $3,350 less as compared to the case of no reform. The position of those born in 2000 remains practically the same as in the baseline case. Note that we have not provided estimates for prospective pensions, but for changes taking place in the balance of the pension system in consequence of any of the reform measures. Given contributions of 6 percent of gross wages, the difference between the generational accounts of those born in 2000 and the future generations is $10,570, i.e. imbalance is reduced by $3,330 as compared to our baseline.

5. INTERGENERATIONAL REDISTRIBUTION

The measure of generational imbalance is based on a forward-looking calculation. If the process is completed with retrospective figures, i.e. former contributions and benefits are also

[14] Our model cannot take account of the possible effects on redistribution of mistaken switches and the government guarantee on benefits. In addition, as private pension funds only pay the private pensions of

taken into account, redistribution among generations can be measured directly comparing entire careers. If there are 'looser' and 'winner' cohorts, they can be sorted out.

The most frequently used way of comparison is calculating the *internal rate of return* (IRR), a kind of discount rate that equalizes the present value of life-cycle contributions with the present value of life-cycle benefits. Another way is to calculate the *benefit/tax quotient* (PVB/PVT, where PV refers to present value) that projects the present value of life-cycle benefits to the present value of life-cycle contributions. It is also meaningful to find the difference of these two present values, the *net present value* (NPV). A fourth technique is comparing pay-back periods (PBP) or the length of time the representative member of a cohort has to wait after retirement to get back contributions. Finally, net life-cycle transfers can be compared to net life-cycle wages (see Leimer 1994).

Retrospective generational accounting offers a more general context to the mechanism of intergenerational redistribution. Neither IRR nor PVB/PVT nor NPV suggest information on long-term sustainability of the system of redistribution (there is no zero-sum constraint to be met). Generational accounting does. Moreover, the above indicators can be derived from the data matrices constructed for generational accounting.

We calculated retrospective contribution-data from 1950, the year the pay-as-you-go system was implemented to 1999 broken down into age groups similarly to the base year. Since we were working with incomplete data we had to make several simplified assumptions in order to draw up yearly age profiles (see the details in Gál and Tarcali 2003).

The results coincide with international experience and show significant redistribution favorable to the first generations that enter the system. We noted the extent of the PVB/PVT values on the left Y-axis in Figure 2, while the right-hand side Y-axis shows the present value of lifetime net contributions for individual age groups for the year 2000.

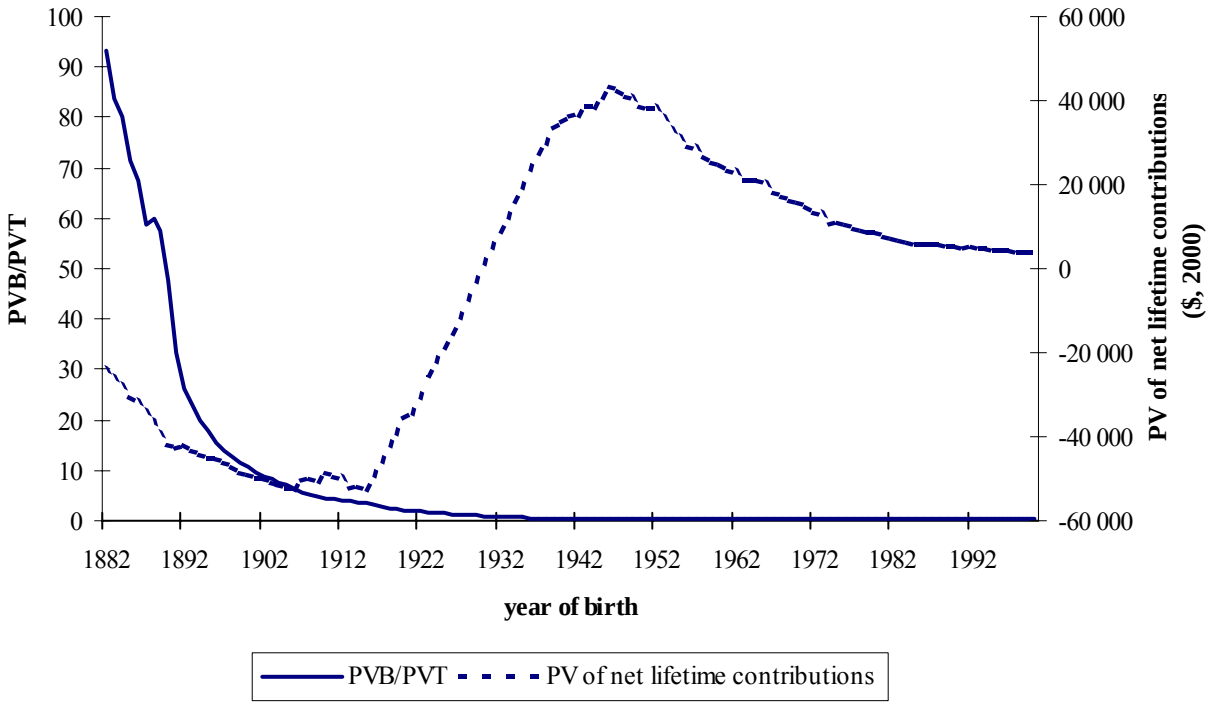
The figure clearly shows that those born after 1880, the first to enter the system, approximately 50 year-groups, came out winners in the pension system. The deeper the curve, indicated with dotted line in the figure, sinks into negative regions the bigger the lifetime-pensions compared to lifetime-contributions, that is the larger the net profits (the dotted line curve has to be measured at the right axis, where, the 0 point is elsewhere than at the left axis). This profit increases for the first 20-25 years continuously. Later it decreases yet remains profitable up to the now 70 year olds. From there on however, the system is a lose for every

---

old-age pensioners, and as prescribed by the transitional regulations presently in force, the accumulations on individual accounts of disabled fund members are transferred to PIF, we followed the same procedure.

year-group. The largest net lifetime-contributors are those born between 1940 and 1955. The loss will continually decrease for those younger than them.

Figure 2
PVB/PVT and net lifetime contributions in the Hungarian pension system by birth cohorts (year 2000 present values)



It is safe to say that the majority of today's living population, including a sizeable portion of pensioners are losers in the pay-as-you-go pension system. This conclusion naturally is only true for the representative individuals of year-groups. If we calculate lifetime net contributions according to gender or earnings we would most certainly find more winners, however losers would foot a bigger bill.

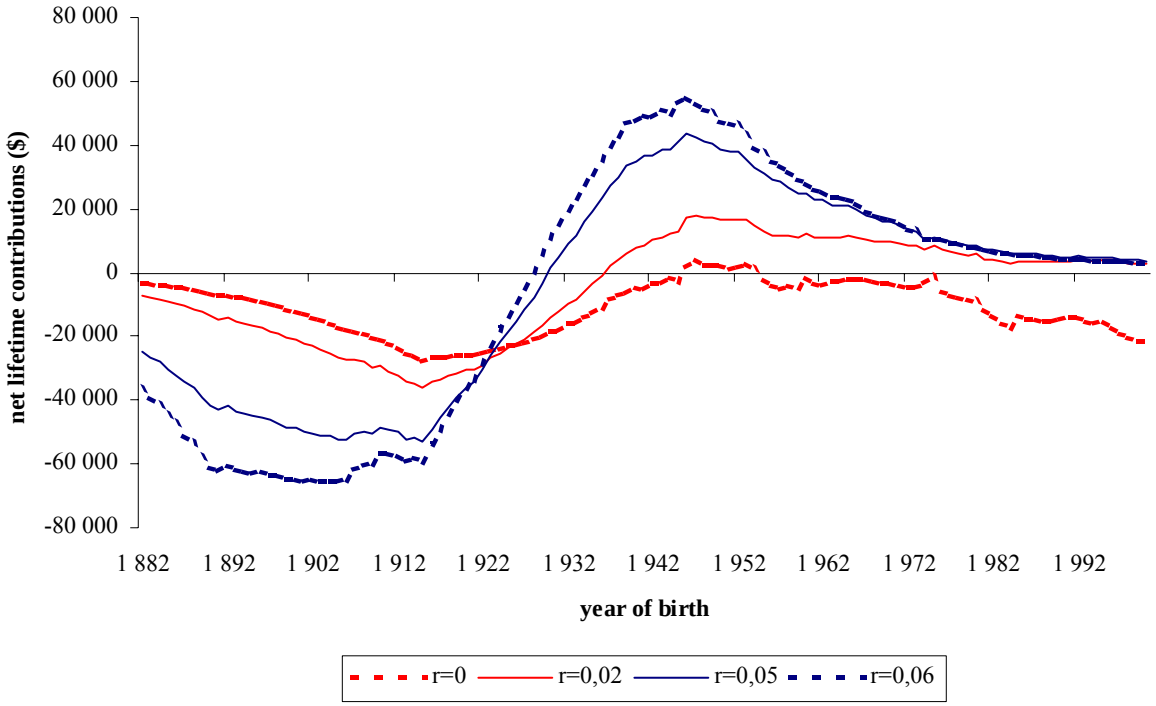
Compare these with the results of a simulation of the American pensions system,[15] you will see that the trend is the same in both systems. The first generations to enter the system receive significant benefits for their minimal contributions. According to the solid lined curve in Figure 2 Hungarians born in the 1880s received at least 55 fold returns, while those born in 1882 received over 90 fold returns. However, since the service period was quite short for the first to enter the system, pensions were only significant in comparison to contributions made.

[15] See Geanakoplos, Mitchell and Zeldes (1999).

Those entering immediately on their heels had lower returns but their net balance was the highest. These age groups were those that during their service years only had to pay small pensions to the first-comers, while they themselves enter retirement after relatively long active service. As a result average pensions inevitably increased quickly while the system was maturing; yields for the younger generations first decreased, then ran at a loss.

The net present value of lifetime-contributions depends to a substantial degree on how old a generation is during the year which serves as base for discounting and not just on how old they were when the system was established. Contribution and pension flows in the life of a generation are not parallel, first contributions have to be paid and then a pension can be claimed. As a result, for a number of cohorts this or that stage of life is closer to the base year of calculation, thus discounting has a different effect. Contributions by those who enter the system first are enlarged by discounting more than their pensions. The larger the discount rate, the larger the profits they realize seem. Exactly the opposite applies to those generations born more or less after 1980, whose active and retirement period will take place after the year 2000. Pensions are discounted more for them than contributions, that is why higher discount rates increase their losses. The lifetime net contribution for those year-groups born between them changes from year to year. Figure 3 displays the lifetime net contributions with various discount rates.

Figure 3
Net lifetime contributions in the Hungarian pension system by birth cohorts using different discount rates (year 2000 present values)



The figure shows that larger discount rates increase profits and losses both. In extreme cases, if we veer from discounting (r = 0), and calculate contributions and pensions in 2000 real value, then everybody is a winner, with the exception of those born between 1946 and 1954 and even their loss is low. This also coincides with the results from the American simulation.

Changes to the rate of growth for productivity does not significantly influence redistribution effects for those already born. We ran the model alternatively with 1 and 2 percent annual productivity growth rates in addition to running it with the underlying 1.5 percent rate. However, while discounting also influences the magnitude of lifetime net contributions retroactively, changes in productivity only has future effects. Thus, pressure on the active cohorts increases slightly if productivity grows faster than 1.5 percent per annum, and the balance for future generations improves. So, the assumption about the rate of productivity growth primarily effects the indicators on the sustainability of the pension system, that is, the generational account of people yet to be born, and the generational imbalance between the accounts of the 0 year olds and future generations.

The same applies to changes to the net contribution profile. As we indicated in footnote 6, pension revenues and expenses, and consequently the balance are far from being unambiguous. In addition to the above mentioned basic case we tried two alternatives as well. If we add the interest on overdue payments and the reimbursed pensions mistakenly paid out to the year's contribution revenue, the starting balance and with it, the long term balance improves. At the same time taking the two items mentioned into consideration, with the exception of future generations this will cause only marginal changes in the lifetime net contributions of any year-group. That is to say, measures of future imbalances are rather sensitive even to small changes in the starting up profile whereas redistribution results are robust. In the base case we ignored the interests on overdue payments and reimbursed pensions mistakenly paid out because, even though they are part of the contribution flow, they do not belong to the given year.

We also examined how lifetime net contributions would transform if we were to take into consideration the entire sum for pensions and pension type services paid by the government budget; not just the so called employment policy pensions, temporary benefits and regular social benefits. The balance sheets improve according to expectations. This improvement reaches a 1 percent value of the accounts for those under 30 years of age then increasingly grows for those under 20 to 3 percent and to 7 percent for those under 10, while the increase for the new-born is 6 percent. However, the balance for future generations deteriorates significantly.

Tests of robustness allow for three conclusions. Firstly, definition and modeling conventions are necessary in order to reach the quality of results suitable for establishing political decision and for international comparisons. Secondly, generational accounting, as a measurement technique for the long term sustainability of the budget system is much more sensitive to changes in the start up age profiles or in the model parameters, than as a measurement of redistribution effects. Our redistribution results are quite robust. Finally, in concord with our earlier observations we experienced that at every real value for parameters significant intergenerational redistribution appears in the Hungarian pension system.

Methodological and empirical results of this research program are not the final word on the topic. Firstly, the intergenerational redistribution taking place in the pension system – though the extent is interesting in and of itself – does not necessarily show the same direction as redistribution in other sectors of the state organized intergenerational transfer chain, such as family support programs and education.

Secondly, the intergenerational redistribution in the state organized intergenerational transfer chain is not a flawless indicator for complete redistribution between age groups of its own. This merely shows that an increasingly larger segment of intergenerational transfer flows through various state agencies. Theoretically it is possible that the state merely squeezes the family out of the transfer chain without increasing the redistribution.

Thirdly, results of empirical research on redistribution provide only raw data for the social debate. We would not like to make redistribution itself appear faulty. The intergenerational transfer chain could serve as a type of intergenerational social security, which disperses the risks of external shock, stock market crisis, military defeat or invasion by a foreign power between those actually alive and later generations. This type of social security however, needs to function with such rules that make it clear as to under what conditions, how long, to what extent and which generations shall support which other generations. It would be wise to finance this type of support within a separate institutional system via special taxes set for such and to carry it out within the framework of special laws.

References

Auerbach, A. J., Kotlikoff, L. J. and Leibfritz, W. (eds.) (1999): *Generational accounting around the world*. Chicago and London: University of Chicago Press.

Auerbach, A. J., Gokhale, J. and Kotlikoff, L. J. (1991a): *Generational accounts – a meaningful alternative to deficit financing*. Cambridge MA: NBER Working Paper 3589.

Auerbach, A. J., Gokhale, J. and Kotlikoff, L. J. (1991b): Social security and Medicare policy from the perspectives of generational accounting. Cambridge, MA: *NBER Working Paper, No. 3915*.

Augusztinovics, M. (ed.)(2000): *The post-reform scene*. (In Hungarian). Budapest: Közgazdasági Szemle Alapítvány.

Augusztinovics, M., Gál, R.I., Matits, Á., Máté, L. and Stahl, J. (2002): *The Hungarian pension reform before and after the 1998 reform.* ILO: Geneva.

Benczúr, P. (1999*):* Changes in the implicit debt burden of the Hungarian social security system. *NBH Working Paper Series 8.*

Boll, S., Raffelhüschen, B. and Walliser, J. (1994): Social security and intergenerational redistribution: a generational accounting perspective. *Public Choice*, 81, 79-100.

Bonin, H., Gil, J, and Patxot, C. (2001): Beyond the Toledo agreement: the intergenerational impact of the Spanish pension reform. *Spanish Economic Review* 3/2.

Cardarelli, R., Sefton, J. and Kotlikoff L.J. (1999): *Generational accounting in the UK*. NIESR: http//:www.niesr.ac.uk/niesr/discuss.htm#dp147.

Fehr, H. and Kotlikoff, L. J. (1995): Generational accounting in general equilibrium. In: Auerbach, A.J., Kotlikoff, L.J. and Leibfritz, W. (eds.): 43-71.

Feldstein, M. and Siebert, H. (eds.)(2002): *Social security reforms in Europe*. Chicago IL: University of Chicago Press. Forthcoming.

Gál, R.I. (2003): *Fathers and sons and grandsons. Intergenerational flow of income and wealth* (in Hungarian). Budapest: Osiris. Forthcoming.

Gál, R.I., Simonovits, A., Szabó, M. and Tarcali, G. (2000): Generational accounts (in Hungarian). In: Kolosi T., Tóth I.Gy. and Vukovich, Gy. (eds.): 433-59.

Gál, R.I., Simonovits, A. and Tarcali, G. (2001): Generational accounting and Hungarian pension reform. Washington DC*:* The World Bank. *Social Protection Discussion Paper Series* 0127.

Gál, R.I. and Tarcali, G. (2003): Intergenerational redistribution. In: Gál, R.I. (ed.). Forthcoming.

Geanakoplos, J., Mitchell, O.S. and Zeldes, S.P.(1999): Social security money's worth. In: Mitchell, O.S., Meyers, R.J., and Young, H. (eds.).

Holzmann, R., Palacios, R. and Zviniene, A. (2001): *Implicit pension debt: issues, measurement, and scope in international perspective*. Washington DC: The World Bank Pension Reform Primer.

Kolosi, T., Tóth, I.G. and Vukovich, G. (eds.)(2000): *Social report, 2000* (In Hungarian). Budapest: TÁRKI.

Leimer, D.R. (1994): *Cohort-specific measures of lifetime net social security transfers*. Washington DC: Social Security Administration Office of Research and Statistics Working Paper 59.

Marin, B., Stefanits, H. and Tarcali, G. (2001): *Learning from partner: an Austro-European view*.

Mitchell, O.S., Meyers, R.J. and Young, H. (eds.)(1999): *Prospects for social security reform*. Philadelphia PA: University of Pennsylvania Press.

Müller, K. (1999): The political economy of pension reform in Central-Eastern Europe. Cheltenham UK: Edward Elgar.

Müller, K., Ryll, A. and Wagener, H-J. (eds.) (1999): *Transformation of social security: pensions in Central-Eastern Europe*. Heidelberg: Physica.

OECD (1998): *Maintaining prosperity in an ageing society*. Paris: OECD.

Raffelhüschen, B. (1999): Generational accounting: method, data and limitations. In: European Commission (ed.): *European economy: generational accounting in Europe*, 17-28.

Rocha, R., Gutierrez, J. and Hinz, R. (1999): *Improving the regulation and supervision of pension funds: Are there lessons from the banking sector?* Washington DC: World Bank, mimeo.

Rocha, R. and Vittas, D. (2002): The Hungarian pension reform: a preliminary assessment. Forthcoming: Feldstein, M. and Siebert, H. (eds.).

Simonovits, A. (1999): The new Hungarian pension system and its problems. In: Müller, K., Ryll, A. and Wagener, H-J. (eds.): 211-30.

Spéder, Zs. (2000): Hungary: getting better and becoming more dissimilar. In: Stanovnik et al. (eds.): 53-95.

Stanovnik, T., Stropnik, N. and Princz, Ch. (eds.)(2000): Economic well-being of the elderly. London: Ashgate.

Toldi, M. (2000): Factors effecting entry pensions in 1998. (In Hungarian). In: Augusztinovics, M. (ed.) 116-54.