The ageing population and the associated challenges of the Slovenian pension system

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Abstract

The article presents an analysis of welfare effects in Slovenia, an analysis of supplementary pension insurance in Slovenia and an analysis of effects of the pension fund deficit on sustainability of Slovenian public finances. Stress was layed upon varying the parameters of the current Slovenian pension system and introducing mandatory supplementary pension insurance in Slovenia. It has been established that while young generations and new generations will lose from the pension reform, even complete implementation of the reform might not be sufficient to compensate unfavourable demographic developments. The volume of supplementary pension saving is insufficient at present in Slovenia to compensate the deterioration of rights from the first pension pillar. Not only is the participation in the (voluntary) second pillar insufficient, but especially the premia are too low. The level of expected deficit of the PAYG-financed state pension fund seems to be worrying, though higher activity level among the elderly would subsequently increase the volume of contributions to the first pension pillar, thus also reducing the state pension fund deficit.

JEL classification: C68, D58, D91, G23, H55, J32.
Keywords: general equilibrium models, PAYG, pension system, supplementary pension saving, sustainability of public finances, Slovenia, welfare analysis.

1. Introduction

Economic sustainability of social security systems is under severe pressure nowadays due to ageing caused by decreasing fertility rate, increasing life expectancy, increasing share of recipients of social benefits, and decreasing share of active population (*cf*. OECD, 2000; European Commission, 2001). These are the reasons for anticipated increase of traditional social security benefits and introduction of new types of old-age insurance. Among key topics of social security in Slovenia is therefore the development of sustainable, efficient and fair system of funding social security in the environment of expected further ageing of the population. Special emphasis is being put on the pension system due to its weight in the system of public finances; therefore it is also the focus of our research.

Due to increasingly perceivable unfavourable demographic developments it became obvious in Slovenia in the 1990s that the former pension legislation will not be able to sustain the pressure. This became distinctly obvious in 1996, when the state pension fund needed additional financing from the central budget for the first time. This was enough to start intense preparations for the Slovenian pension reform, which was adopted in the form of the 1999 Pension and Disability Insurance Act (PDIA) and is being implemented from 1 January 2000. With gradual implementation of the 1999 PDIA, the second pension pillar is becoming increasingly important on account of the first pension pillar. This means that people will become less dependent on the pension from the first pillar as soon as they retire. However, since the second pension pillar in mainly voluntary in Slovenia, there are reservations regarding whether the present amount of supplementary pension saving will be sufficient to compensate the deterioration of rights from the first pension pillar.

In the present analysis we are interested in the effects of varying the parameters of the current Slovenian pension system and introducing mandatory supplementary pension insurance in Slovenia on welfare of different generations and on sustainability of public finances. To achieve this, Slovenian economy is being analyzed with an overlapping-generations general equilibrium (OLG-GE) model, complemented with a generational accounts (GA) model. Stress is being laid on the Auerbach-Kotlikoff (1987) type OLG-GE model, which is the most developed version of computable general equilibrium (CGE) models. Namely, the model SIOLG 2.0 (Verbič, 2007; 2007a) makes possible analysis of intra-generational and inter-generational redistribution effects of potential effects of different strategies of public financing in order to achieve sustainable long-term economic growth and social development. It also enables monitoring and anticipation of effects of unfavourable demographic developments on the volume of social transfers to the population.

The aim of the present article is to evaluate three crucial questions regarding the Slovenian pension system. The first one refers to whether the burden of the pension reform will be born by the already retired generations and the elderly in general, or the young and future active generations. The second question relates to the volume of current second pillar saving in Slovenia and its significance for compensating the reduced rights from the mandatory pension insurance of insured persons and pensioners. The last question refers to whether the increased retirement age and the adjusted pension growth with respect to wage growth, enacted by the 1999 PDIA and its subsequent amendments, will enable long-term pension system sustainability.

It was established that while young generations and new generations will lose from the pension reform, even complete implementation of the reform might not be sufficient to compensate unfavourable demographic developments. The volume of supplementary pension saving is insufficient at present in Slovenia to compensate the deterioration of rights from the first pension pillar. Not only is the participation in the (voluntary) second pillar insufficient, but especially the premia are too low. The level of expected deficit of the PAYG-financed state pension fund seems to be worrying, though higher activity level among the elderly would subsequently increase the volume of contributions to the first pension pillar, thus also reducing the state pension fund deficit.

The outline of the article is as follows. In Chapter 2 the developments in the Slovenian pension system from the 1990s onwards are explained in some detail, while in Chapter 3 a short description of the OLG general equilibrium model of the Slovenian economy is presented. In Chapter 4 some of the simulation results are presented, with special focus on welfare effects in Slovenia, supplementary pension insurance in Slovenia and effects of the state pension fund deficit on sustainability of Slovenian public finances. In the final chapter we summarize the central findings of the article.

2. Representation of Developments in the Slovenian Pension System

The Republic of Slovenia inherited the legislation of its pension system, which was based on inter-generational contract and is therefore a pay-as-you-go (PAYG) system, from the former Yugoslavia. After Yugoslavia splintered into newly independent countries at the beginning of the 1990s, transformation from the workers' self-management to a modern market economy was initiated in Slovenia, thus requiring the formation of new markets and taking its rules into account. However, the consequences of bankruptcy of firms, economic recession and restructuring of the business sector, all resulting from economic transformation, were being "solved" contemporaneously in order to preserve social sustainability by mass early retirement.

After Slovenia's independence in 1991, the new pension legislation was adopted somewhat behind schedule in 1992, when the restructuring was for the most part already finished. Even the rise of retirement age was therefore not able to put the break on early retirement pressure. Because the price of additional years of service was low and therefore not consistent with the actuarial principles, purchase of additional years of service was a common phenomenon. Consequently, the increase in actual retirement age was modest and very close to minimum retirement age. The ratio between the number of insured persons and the number of pensioners has been relatively steady over the last decade (Stanovnik, 2002), although this stability is somewhat misleading for the new pension legislation introduced additional categories of insured persons[1].

Legislative modifications adopted in 1992 are partially responsible also for the large increase of pension expenditure of the PAYG-financed state pension fund, i.e. the Institute for Pension and Disability Insurance (IPDI), in the same year. Namely, with the new Pension and Disability Insurance Act the IPDI was compelled to pay contributions for health insurance for pensioners, hence contributing at least one additional percentage point to the ratio of pension expenditure to GDP. After 1992 the

[1] Evident examples of introducing additional categories of insured persons are "voluntarily insured persons" and "unemployed persons receiving unemployment benefits" for whom the contributions are paid by the National Employment Office.

pension expenditure, measured as percentage of GDP, somewhat stabilized at the level of 11 per cent. This could have been a sign of financial stabilization of the IPDI; however things took a drastic turn for the worse, as we will find out hereinafter. Until 1996 all extensive increases of pension expenditure were financed by increasing the pension contribution rate. As a result the (joint employer and employee) pension contribution rate ascended from 22.55 per cent of the gross wage in 1989 to 31 per cent of the gross wage in 1995. Finally, in 1996 the Government of the Republic of Slovenia decided to lower the employer pension contribution rate from 15.5 per cent of the gross wage to 8.85 per cent of the gross wage in order to increase competitiveness of the Slovenian economy.

The year 1996 hence represent a decisive moment, since until then financially autonomous state pension fund demonstrated a deficit for the first time, which has after that been filled up every year until 2004 with the so-called "generalized" transfers from the central budget in order to maintain social stability. Transfers of funds from the central government budget to the IPDI indeed existed prior to 1996, but were only intended for financing additional obligations of the government, such as pensions of farmers, policemen, customs officers and combatants of the World War II. Now the government actually committed itself to partially finance pensions, which were primarily established on actuarial principles and were before 1996 entirely funded with contributions of the active population. Until the economic transformation relatively favourable pension figures become insupportable in just a few years. One should certainly adjoin that the effects of demographic changes on the social security system are yet to be observed in the subsequent years.

The decrease of employer pension contributions was thus a "suitable" occasion for the extreme measure of transfer funding of the pension system. The insolvency of the pension system therefore passed by unnoticed to the general public, but the consequences of the pension deficit can be seen in the structure of the Slovenian budget, where there are fewer funds available for investments and for research and development. Yet the economic situation is commonly not perceived to be so pessimistic. The fiscal position was relatively favourable for the whole time and certainly the most promising among the new EU member states; the budget deficit was relatively low in the last decade despite the difficult situation in the first years of economic transition, hence the public debt increased only moderately.

The problem, which has by that time drawn attention of economists of the International Monetary Fund and the World Bank, was being properly addressed with the preparation of the White Paper on the subject in 1997, which led to the adoption of new PDIA in 1999. The implementation of this law started on 1 January 2000 and is to be finished in 2024. The pension system has become more complex than ever before; partially due to difficult negotiations in the government coalition, but mainly because of tiresome negotiations between management and labour (Stanovnik, 2002). The main characteristic of the new pension legislation in comparison with the former legislation is path-dependency, which appears to be a universal feature of predominantly gradualistic reforms of the Slovenian economic system. In addition, the transitional periods are lengthy, so the actual values of parameters of the present three-pillar pension system in Slovenia converge only gradually to the final values.

Statutory retirement age under the 1999 PDIA, which guarantees insured persons retirement benefits, dependent only on completed years of service (without deductions), is 63 years for men and 61 years for women. This criterion is to be increased from 58

years and 6 months in 2000 by 6 months per annum for men and from 53 years and 4 months in 2000 by 4 months per annum for women. However, an individual can retire already at the age of 58 and receives pension without deductions in case he or she fulfilled the full pension qualifying period, which is 40 years of service for men and 38 years of service for women. The transitional period terminates at the end of 2008 for men and at the end of 2022 for women. Minimum pension qualifying period is still 15 years of service. The retirement age can be decreased for every born or adopted child, brought up and supported by the insured person at least for five years.

There is more consideration given in the 1999 PDIA to actuarial fairness for the system of incentives and disincentives was adopted in case of retirement before and after fulfilment of retirement eligibility criteria, respectively. Namely, for all insured persons without full pension qualifying period, retired before completed 63 (men) and 61 years of service (women), the pension adequately decreases for every month missing until the statutory retirement age. If, on the contrary, the insured pension remains employed after completed statutory retirement age and full pension qualifying period, the pension adequately increases for every month, completed after the statutory retirement age. Incentives and disincentives are to be added or subtracted 1.5 percentage points of accrual rate for every year of service added or missing, respectively.

The calculation of pensions is less favourable for insured persons under the 1999 PDIA. Old-age pension is calculated from the pension base in per cent, depending on number of completed years of service; 35 per cent in case of men and 38 per cent in case of women for the first 15 years of service, and 1.5 per cent for each additional year of service irrespective of gender. Under the proviso that the insured person is not subjected to pension disincentives, the pension in case of full pension qualifying period amounts to 72.5 per cent of pension base, instead of prior 85 per cent (1992 PDIA). Since the pension base under the 1999 PDIA is calculated out of best 18 consecutive years of service instead of prior best 10 consecutive years of service (1992 PDIA), the decrease in pensions is even higher. However, the most complex procedures of the 1999 pension legislation are revalorization of pension bases and indexation of pensions (*cf*. Stanovnik, 2004). Revalorization of the pension base in the Slovenian pension system is a procedure of recalculating sources of pensionable income in the best 18 consecutive years of service using a vector of revalorization coefficients, in order to obtain the pension base. It is actually an instrument in the pension system, used for obtaining horizontal equity between existing and new pensioners. Indexation of the pension, on the other hand, is a procedure of adjusting retirement benefits to existent economic developments in the country using a complex set of rules, where consumer price index is the floor and wage index is the ceiling for the growth rate of pensions.

It has to be emphasized that in 2005 the Government of the Republic of Slovenia introduced several changes to the 1999 PDIA that were aimed at increasing the pensions (in real terms). The most important among then was the introduction of full indexation of pensions that is being carried out twice a year (in February and in November). Additionally, the changes of pension legislation include increases in the level of pensioner's recreation grant and lowering eligibility requirements of the widower's pension. These provisions, especially the introduction of full indexation of pensions, will undoubtedly have substantial negative long-term effects on controlling the expenditure of the system of public finances.

The 1999 PDIA introduced a number of elements that improved horizontal equity in the system (*cf*. Stanovnik, 2002). The gender divide regarding eligibility and benefits

was considerably narrowed. Not only were accrual rates equalized, but the eligibility criteria for women are now closer to those for men. Nonetheless, even greater emphasis was laid on the principle of vertical equity or "solidarity". Thus the ratio between two comparable pensions[2] can not exceed 4:1, which is less than the prior ratio of 4.8:1 (1992 PDIA). Instead of explicit minimum and maximum pension, the Slovenian pension system includes minimum and maximum pension base; the former is set nominally, yet amounted to approximately 62.5 per cent of average net wage in 2000, while the latter is four times the minimum pension base. A further redistributive element lies in the fact that social security contributions are not capped.

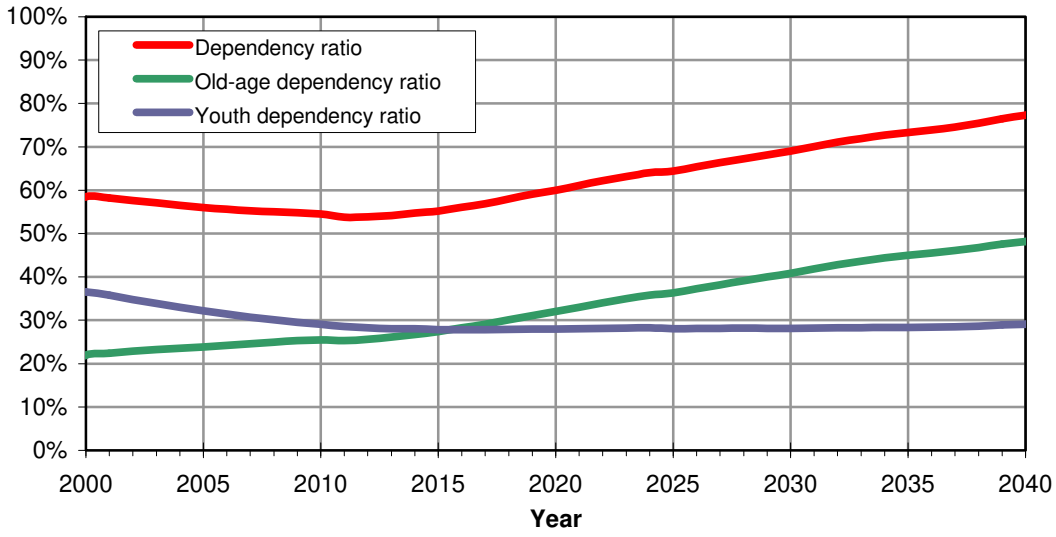
Another very important innovation of the 1999 pension legislation is the adjustment of pension growth of the existing pensioners to entry pensions of new pensioners, which amounts approximately to –0.6 percentage points per annum. This means that pensions of existing pensioners are being decreased, taking account of the lower pensions of new entrants. There was an initiative given to the Institutional Court of the Republic of Slovenia for constitutional review of this article, but the Court ruled in December 2003 that the article is congruent with the Constitution of the Republic of Slovenia. Such outcome is particularly important, since this modification of the pension legislation represent a large share of overall effects of the pension reform and has also a significant positive effect on managing expenditure of the pension system.

The younger existing and new generations will evidently have to pay higher contributions for the same or a lower pension. This will occur not only due to a fall in the replacement rate and the effect of partial indexation of pensions between 2000 and 2005, but primarily due to growth in the dependency ratio as a consequence of demographic aging (see Figure 1). Namely, the old-age dependency ratio, i.e. the share of persons above 64 years of age in the number of people aged 20-64, is projected to increase from 22.0 per cent in 2000 to 48.2 per cent in 2040. The projected overall dependency ratio will adjust accordingly, which means that the financial burden of non-active persons imposed on employed persons shall increase significantly. In addition, the younger existing and new generations will have to compensate relatively lower level of welfare with supplementary pension insurance.

The 1999 PDIA enabled the development of supplementary pension saving within the second pillar. In Slovenia the second pillar comprises supplementary pension insurance, which can be broken down to: (1) individual and collective, (2) voluntary and mandatory, and (3) based on employee or employer payments. Following significant consolidation on the pensions market in the first half of this decade, the first and third classification can be taken as practically the same and one can speak of *individual supplementary pension insurance* as insurance based on employee payments, and *collective supplementary pension insurance* as insurance based on employer payments. Distinguishing between whether participation is mandatory and the type of scheme is somewhat more difficult; individual supplementary pension insurance is voluntary, while collective supplementary insurance may be mandatory or voluntary.

[2] Comparable pensions exist when two pensioners enter the pension system under the same conditions and both have full pension qualifying period.

Figure 1. Projected dependency ratio in Slovenia, 2000-2040



Source: Demographic projections prepared for SIOLG 2.0; own calculations.

According to the current pension legislation, the second pillar includes insurance companies and pension companies as well as the state. It covers private professional schemes financed from employee contributions and their employers. Participation in the first pillar is a condition for inclusion in the second pillar. The investment financing system represents the collection of funds in personal pension accounts with the purpose of providing the insured persons with an additional pension on reaching a set age, or in other cases defined in the pension scheme. Monthly contributions gain interest at an agreed rate, or based on the profit the fund manager generates from investments. There is a minimum return requirement for pension funds, requiring them to provide at least 40% of the average annual interest rate on long-term government bonds.

Insured persons participating in voluntary supplementary pension insurance can claim tax relief, if the pension scheme is on the approved list at the Ministry of Labour, Family and Social Affairs. According to the Act, value added tax is not paid on premia, and they are also exempt of 6.5% of insurance service tax. The tax relief on a premium paid by an insured person works by reducing the personal income tax base by the amount the insured person paid for voluntary supplementary pension insurance. However, the reduction of the personal income tax base is limited. The premium an employer pays for an insured person is not counted in that person's income tax base. The pension is included in the income tax base in the year in which the beneficiary receives payment of the pension, while premium paid by the employer is recognised for tax relief on corporate income tax, but they do not count as wages paid nor are contributions paid on them. Experience to date with collective schemes indicates that employers finance most of the premium or even the entire premium.

The pension scheme manager is eligible for reimbursement of input costs from premia paid, output costs and to an annual management commission. The input costs are calculated as a percentage of the paid premium, and reduce the paid premium. The output costs are calculated as a percentage of the surrender value, and reduce the surrender value. The commission for managing an active fund is defined as a percentage

of the average net annual value of mutual fund assets and reduces the fund's actual return. The Minister of Finance prescribes the maximum permitted percentages for these costs; at present these stand at 5.5% for input costs; output costs at 1%, and the management commission at 1.5%. Administrative costs are high therefore, though the trend is for them to fall.

The second pillar of the Slovenian pension system has undoubtedly undergone considerable growth, as in mid-2006 over half the active working population was already included in voluntary pension insurance. However, most of these insured persons were involved via collective insurance, while the individual pension saving segment is marginal. Civil servants represent a significant proportion, though they pay the minimum premium. Namely, in November 2005 439,280 insured persons were included in supplementary pension insurance, but 167,363 of them were civil servants with a minimum pension insurance premium. Overall, the key worrying indicator of progress in supplementary pension insurance in Slovenia is the value of paid premia. As this analysis indicates, there is a large gap between the actually paid premium for supplementary pension insurance and the target premium value that would enable compensation of effects of the pension reform on the welfare of the elderly. Below the article will present the consequences this problem may pose in the future.

3. Description of the OLG-GE Model of the Slovenian Economy

The model SIOLG 2.0 is a dynamic overlapping-generations general equilibrium model of the Slovenian economy, based on social accounting matrix (SAM), data on demographic structure of the population, expected future demographic developments, characteristics of Slovenian households, and decomposition of households within generations (*cf*. Verbič *et al*., 2006; Verbič, 2007). The model has been developed with the very intention of analyzing the sustainability of the Slovenian public finances, though it can be used to analyze any part or any sector of the economy.

The starting points of the OLG-GE model are the life cycle theory of consumption by Modigliani and Brumberg (1954) and the permanent income hypothesis by Friedman (1957), which are actually special cases of the more general theory of intertemporal allocation of consumption (Deaton, 1992). Unlike in the Keynes's theory of behaviour of consumption and savings, based only on current income, in the OLG-GE model consumption and savings are derived from intertemporal optimization behaviour and are therefore dependent on full lifetime income. In the simplest case of unchanged income until retirement (*cf*. Modigliani, 1986), consumers save during their active lifetime and spend their savings after the retirement in order to maintain unchanged consumption. The retirement is therefore *raison d'etre* for saving.

Overlapping-generations general equilibrium models represent the pinnacle of dynamic CGE modelling. OLG-GE modelling was established and promoted by Auerbach and Kotlikoff (1987) and is based on detailed decomposition of the consumption side of the model. Namely, unlike in the Ramsey-type models the consumers live a finite length of time, but long enough to live at least one period with the next generations of consumers. Determination of consumers by their birth cohort enables analysis of inter-generational effects, which makes OLG-GE models especially valuable for analysis of tax policies, pension policies and other social policies.

Dynamic general equilibrium model SIOLG 2.0 comprises not only the standard model structure of a national economy, but also the demographic block and the pension

block, within the framework of which the first and the second pillar of the Slovenian pension system are being modelled. Since the model incorporates most of the contemporary techniques of the CGE modelling, the arrears in this field in Slovenia compared to the rest of the world have practically been eliminated. Namely, the model is build within the general algebraic modelling system (GAMS), which has become both most widely used programming language and most widespread computer software for construction and solving large and complex CGE models (*cf*. GAMS Development Corporation, 2007; 2007a).

Within the GAMS framework, the dynamic general equilibrium model is written in Mathiesen's (1985) formulation of the Arrow-Debreu (1954) equilibrium model, i.e. as a mixed complementarity problem (MCP). The key advantage of this formulation is the compact presentation of the general equilibrium problem, which is achieved by treating variables implicitly and thus significantly reducing the computation time for higher-dimensional models. Namely, the mathematical program includes equalities as well as inequalities, where the complementarity slackness holds between system variables and system conditions (*cf*. Rutherford, 1995a; Böhringer *et al*., 2003). Functions of the model are written in Rutherford's (1995) calibrated share form; a reasonably straightforward algebraic transformation, which nevertheless considerably simplifies the calibration of the model (*cf*. Böhringer *et al*., 2003; Balistreri and Hillberry, 2003). To solve the model, i.e. to achieve convergence, a recent version of the PATH solver (Ferris and Munson, 2000) is used, which is renowned for its computational efficiency.

Consumers live in the model according to their expected length of life, i.e. their life expectancy at birth. Assuming that the life expectancy is approximately 80 years and that the active lifetime period starts at the age of 20, there are 60 generations in each period of the model. There is a new cohort of consumers born in each such period, thus increasing the population, while at the same time a number of consumers pass away and decrease the total population. Consumers are observed in five-year intervals within households, which maximize the expected lifetime utility subject to their income constraints, where one has to put out the need to save for retirement and to support children. Households are differentiated in the model according to year of birth, income and size; within each cohort distinction is made between couple without children and nuclear family with two children on average, and five income profiles representing different income brackets. Consequently, there are ten versions of the model altogether, which facilitates analysis of intra-generational effects of different economic policies.

The volume of labour and the labour productivity growth are given exogenously. Changes in wages are reflected in changes of the labour supply. Consumption of households with children is additionally corrected due to extra cost per child, where the children are born in the childbearing age of the woman or, to be precise, the household, i.e. in the age bracket of 20-40 years. In the first ten years after retirement the household is comprised of two persons and afterwards of one adult. Saving decisions of households affect investment decisions of firms in the capital markets and thus future production. The effects ascribed herein have recurrent effects on product market through decreasing prices and on labour market through higher productivity, leading to higher wages and finally higher income of households. Both effects can be analyzed with a dynamic OLG-GE model quite straightforwardly.

The perfect foresight assumption in the forward-looking model specification implies the ability of households to perform intertemporal optimization of the present value of entire future consumption. In other words, the consumers have full information at their

disposal, adopt on average the right decisions and are familiar with future modifications of key economic indicators, which is the quintessence of rational expectations. They are able to anticipate new policies and to prepare themselves to future changes. The assumption of equilibrium in all markets and assumption of achieved sustainable economic growth enable analysis of different scenarios, which cause deviations from the reference growth path and changes in macroeconomic and microeconomic indicators. This is especially important when analyzing social security, because it makes possible projecting the effects of demographic changes on the social security system. For this we have three variants of demographic projections available; the low variant combines lower fertility with lower life expectancy and lower net migration, while the high variant combines higher fertility with higher life expectancy and higher net migration than in the reference medium variant.

On the other hand, the assumption of perfect foresight is also valid for firms, which maximize profits in the environment of perfect competition. Technology is given by the constant elasticity of substitution (CES) production function. The number of production sectors in the model is dependent on availability of the input-output table for the base year, which means that there are 60 sectors of the standard classification of activities (SCA) available for discretionary aggregation. Government spending is dependent on economic growth and growth of the population, and is financed with revenues from personal income tax, capital income tax, value-added tax and import duties. Sources of revenue of the Slovenian system of public finances represent various possibilities of funding different economic policies in the simulation phase of the modelling.

The modelling of the first pension pillar was designed to capture the key pension system parameters that are usually the subject of modification within pension reforms. The emphasis is on the cash flow of the mandatory pension insurance institution, the relationship between the pension base and pensions, and the process of adjustment of pension growth with respect to wage growth. The modelling of the second pillar is focused on the implementation of the liquidity constraint. For this purpose the so-called total pension was introduced, representing the sum of the pension from the first and second pillars, where at every point households adjust the scope of their labour supply and their current consumption towards a target total pension. This creates a certain volume of supplementary pension saving, which can be treated as mandatory supplementary pension insurance, if the target total pension is defined at a level dissimilar to the reference level.

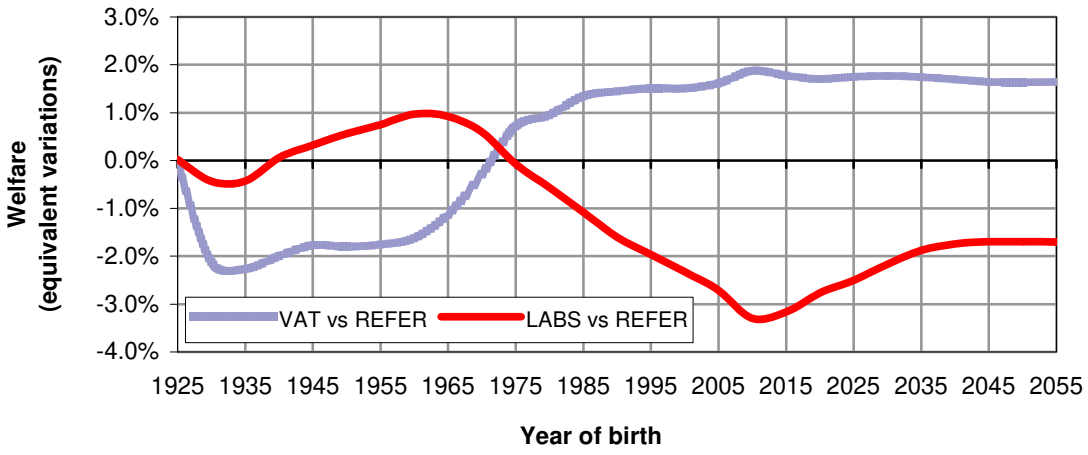
The dynamic general equilibrium model SIOLG 2.0 is closed using the Armington's (1969) assumption of imperfect substitutability, where the commodities are separated by its source on domestic and imported products. Demand for imported products is derived from cost minimization criterion of firms and utility maximization criterion of consumers. As regards the export side of the model, domestically produced products are sold at home and abroad, but are nevertheless treated as imperfect substitutes. Slovenia is assumed to be a small open economy, implying that the changes in the volumes of imports and exports do not affect the terms of trade. International capital flows are endogenous, given the intertemporal balance of payments constraint.

4. Results of the Simulations

We commence with an analysis of welfare effects in Slovenia, followed by analyzing supplementary pension saving in Slovenia, whilst the chapter is being concluded by analyzing effects of the IPDI's deficit on sustainability of Slovenian public finances.

For the purpose of welfare analysis we use the Hicks's equivalent variations (HEV) as a measure of change in the welfare of generations. Equivalent variations can be defined as the equivalent percentage change in full lifetime resources needed in the reference scenario to produce the same level of welfare under the counterfactual scenarios. A positive value means that a generation will gain from switching from the reference scenario to the counterfactual scenario. The inter-generational redistribution effects for the current pension system parameter values in Slovenia, i.e. retirement age of 60 years and full (100 per cent) indexation of pensions, are shown in Figure 2.

Figure 2. Welfare effects in Slovenia in case of applying different sources of financing the pension system (retirement age of 60 years and full indexation)



Source: Author's simulations using SIOLG 2.0.

A first glance at the Figure 2 shows that in case of funding the pension system with revenues from value-added tax (VAT), the future generations would gain. It is obvious that in this scenario the elderly would lose, as they have to pay more value-added tax in comparison with the reference scenario (REFER); they would be forced to bear a larger burden of the present value of public expenditure. In case of funding the pension system with revenues from labour income tax (LABS), all future generations would lose, as they alone would need to bear the burden of public expenditure.

Funding of the pension system with revenues from value-added tax appears to be somewhat better alternative than funding of the pension system with pension contributions, which can be explained as follows. Replacement of social security contributions with revenues from value-added tax improves financial situation of young generations for the consumption of the elderly is being taxed additionally. Since young generations have lower marginal propensity to consume compared to the elderly, after the tax reform their consumption decreases, whilst their supply of labour has to increase. Total consumption therefore decreases, whereas the total labour supply increases; savings increase and higher capital stock leads to higher GDP.

As value-added tax rate is raised over time, making consumption in the future more expensive, the value-added tax acts like a capital income tax. In case of funding the pension system with revenues from value-added tax, there is a substantial increase in labour supply. This is to a lesser extent also true in case of funding the pension system with revenues from labour income tax. People will not only work more, they will also work longer. The retired generations suddenly have to pay an increased tax on their consumption. As they live on their savings, the only way to keep their consumption at unchanged level is by providing additional labour to the labour market, i.e. by retiring later. Correspondingly, a raising labour income tax rate will change the relative intertemporal prices of leisure. The future price of leisure will fall relatively to the price of current leisure, inducing a substitution of future with current labour supply.

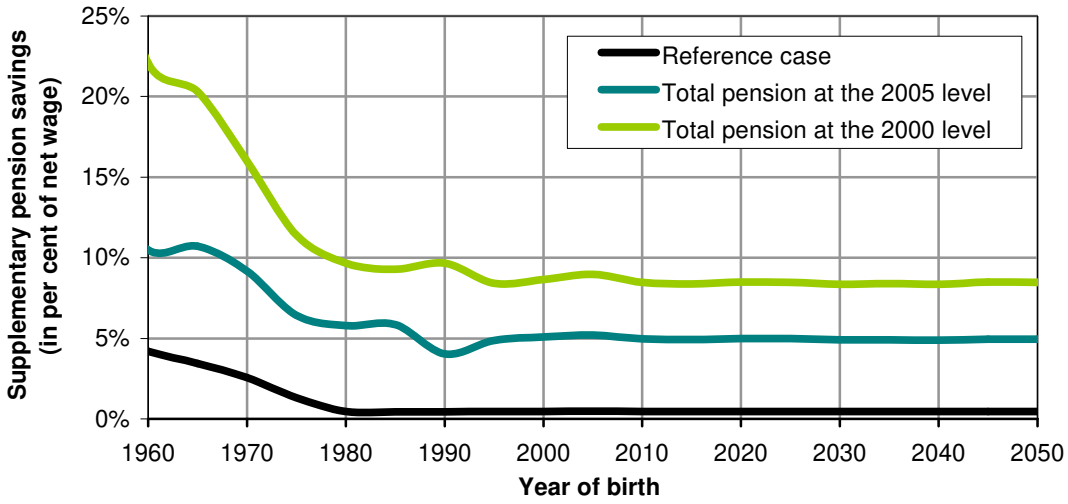
The reduction in the income of older generations as a consequence of the pension reform can by compensated by supplementary pension insurance. The level of savings required in the mandatory second pillar depends primarily on the amount of the target total pension, which comprises the pension from the mandatory pension insurance (first pillar), and the pension from the supplementary pension insurance (second pillar), and on mandatory pension insurance parameters. Those worth highlighting are the retirement age, and the wage indexation of pensions from mandatory pension insurance. A distinction must be made between saving in the second pillar, which is required to compensate for the overall effects of the 1999 pension reform (which only came into effect from 2000) on mandatory pension insurance, and saving in the second pillar which is only required to compensate for key changes in pension reform in 2005 (coming into effect in the same year). Both are defined in the model by the proportion of the net wage allocated to saving in the second pillar of the pension system.

Figure 3, which relates to the retirement age of 60 years and full wage indexation of pensions, indicates that second pillar saving required to achieve the given target total pension is falling along with reduction in household age, while it remains stable in the base period, and is constant for new generations of household. This is to be expected given the assumptions in the model (households start saving in the second pension pillar in 2000) that older generations have less time to compensate for the effects of the pension reform with additional pension saving, hence making the required saving level higher. Compensating for the total effects of the pension reform requires a higher level of savings that compensating for the changes in pension legislation alone, so the first liquidity constraint curve lies above the second. The saving required for the new generation to compensate for the total effects of the pension reform is 8.48% of the net wage, while compensating for the changes in the pension legislation from 2005 would require savings of 4.97% of the net wage. The reference saving in the second pillar is very low in Slovenia, which is in accordance with the supplementary pension insurance profiles constructed for Slovenia (Verbič, 2007, pp. 214-221).

Figure 4 indicates the changes required in second pillar saving by age cohort to achieve the required target total pension when raising the retirement age by five years, while retaining full wage indexation. It can be ascertained that the development of both liquidity constraint curves is similar to the preceding case, while the required saving level to achieve the given target full pension is significantly lower. Therefore, the saving required for the new generation to compensate for the total effects of the pension reform is 5.82% of the net wage, while compensating for the changes in the pension legislation from 2005 requires savings of 3.54% of the net wage. Increasing the retirement age by an additional year therefore reduces the additional second pillar

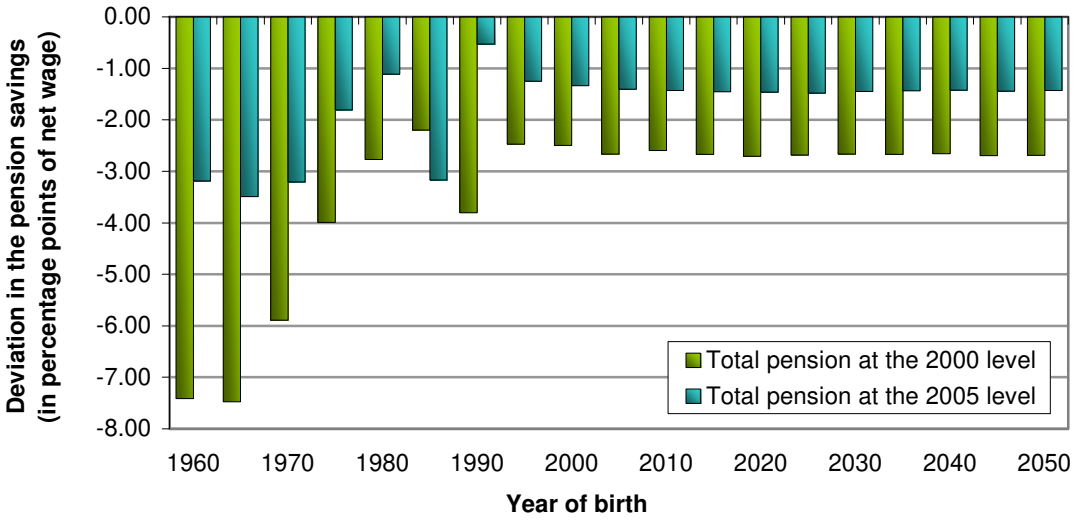
saving required to achieve the given target pension by 0.4 percentage points of the net wage.

Figure 3. Supplementary pension savings required in order to keep the total pension at the given level (retirement age of 60 years and full indexation)



Source: Author's simulations using SIOLG 2.0.

Figure 4. Expected change in the supplementary pension savings required in order to keep the total pension at the given level in case of increasing retirement age to 65 years and unchanged indexation of pensions



Source: Author's simulations using SIOLG 2.0.

The model simulations indicate that the pension fund deficit, with the current pension reform applying, i.e. given retirement ages of 61 (women) and 63 years (men) and full wage indexation, would grow to 9.9% of GDP by 2040. To understand the dimensions of the forecast growth in pension expenditure, it is sufficient to mention the

fact that over the period 1947 to 1951, when the pension system started functioning, the total proportion of the IPDI's funds in GDP was just 2.5% (Stanovnik and Kukar, 1995). Meanwhile, at the beginning of the 1990s, due to a drastic fall in the number of employees and the subsequent steep rise in pensioners, pension expenditure had already passed the 10% of GDP milestone, with the figure settling at around 13% of GDP following the implementation of the 1999 pension reform.

Table 1. Estimates of total balance of the state pension fund (in % of GDP) using different assumptions about retirement age and indexation level of pensions

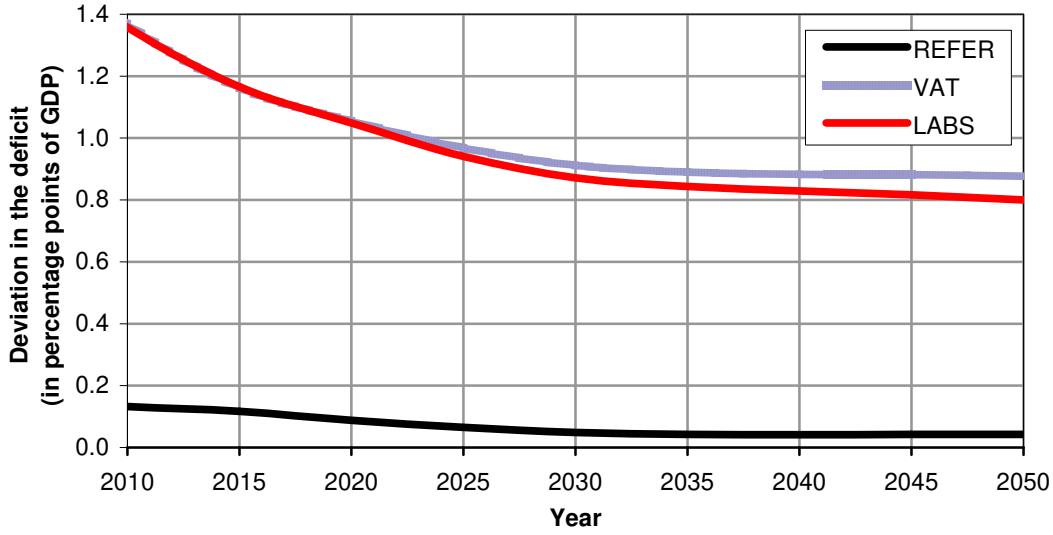
	2010	2020	2030	2040	2050
Retirement age of 60 years, 100% indexation of pensions	–4.1	–6.0	–8.9	–12.0	–13.7
Retirement age of 60 years, 80% indexation of pensions	–3.8	–4.7	–6.3	–8.5	–9.2
Retirement age of 61/63 years, 100% indexation of pensions	–3.6	–4.6	–6.9	–9.9	–11.7
Retirement age of 61/63 years, 80% indexation of pensions	–3.3	–3.5	–4.8	–6.6	–7.5
Retirement age of 65 years, 100% indexation of pensions	–3.0	–1.9	–3.8	–6.2	–8.1
Retirement age of 65 years, 80% indexation of pensions	–2.8	–0.9	–1.9	–3.5	–4.5

Source: Calculations using Generational Accounts model (2007); *cf*. Verbič (2007, p. 281).

It should be pointed out that the selection of the method for indexing pensions has an important impact on the pension fund deficit (see Table 1). In relation to the assumptions presented above, the transition from full to partial (80%) indexation of pensions to wage represents a reduction in the pension fund deficit in 2040 of 3.3 GDP percentage points. Increasing the retirement age has an even more beneficial effect on the pension fund balance (Table 1); the transition from a retirement age of 60 years to 65 years in the counterfactual scenario represents a reduction in the pension fund deficit in 2040 of as much as 3.7 GDP percentage points. Furthermore, the higher retirement age also defers the occurrence of an additional pension fund deficit by approximately ten years (Verbič, 2007, pp. 260-262).

At last, we are interested in the impact of a mandatory second pension pillar on the first pillar, i.e. the effect on the balance of cash flows of the IPDI. If employees increase second pillar saving, the value of their labour supply has to increase or they have to reduce the value of their current consumption. If the first option is selected, their gross income from the employment on which social insurance contributions (including pension and disability insurance contributions) are paid will increase, which could lead to a reduction in the IPDI deficit. As indicated by Figure 5, keeping the target full pension at the level before the 1999 pension reform came into effect would actually lead to this phenomenon. The pension fund deficit would be reduced due to the participation of employees in a (targeted) mandatory second pillar by between 0.80 and 1.38 GDP percentage points, depending on the year selected.

Figure 5. Expected change in the deficit of the Slovenian state pension fund in case of mandatory second pillar keeping the total pension at the 2000 level (retirement age of 60 years and full indexation)



Source: Author's simulations using SIOLG 2.0.

5. Conclusion

The burden of introducing the 1999 pension reform and its amendments will largely be born by the young active generations and future generations on behalf of already retired generations and the baby-boom generations that are starting to retire. Due to a fall in the replacement rate and the effect of partial indexation of pensions between 2000 and 2005 on one hand, but primarily due to growth in the dependency ratio as a consequence of demographic aging on the other hand, the younger existing and new generations will have to pay higher contributions for the same or a lower pension, while to compensate welfare with supplementary pension insurance they will have to reduce current consumption and increase their labour supply.

The volume of current second pillar saving in Slovenia is too low to compensate for the reduction in rights from mandatory pension insurance. It is not only the fact that inclusion in that form of insurance is too low, but especially the premia paid in are too low. The model simulations indicated that for a retirement age of 60 the saving required for the new generations to compensate for the total effects of the pension reform is approximately 8.5% of the net wage, while the changes in the pension legislation from 2005 can be compensated by savings of approximately 5.0% of the net wage. The reference (voluntary) second pillar saving of the present new generations amounts approximately 0.4% of the net wage on average.

Clearly, alternative forms of saving for old age are not developing quickly enough to successfully deal in the long term with the problems of an aging population, so Slovenia will require additional measures at a number of levels to normalise the state of the pension system. The 1999 PDIA introduced incentives for retirement saving in funded systems, which could be subject to modifications. Another possible solution to deteriorating economic circumstances of the elderly could be to reduce the difference

between the minimum and maximum pension base by raising the former and reducing the latter. This would enable insured persons from lower income brackets and compel insured persons from middle and higher income brackets in Slovenia to save "voluntarily" for retirement in the context of the second pension pillar.

Ultimately, enacted additional pension insurance, i.e. mandatory second pension pillar, could assist in the move towards a more rational reallocation of life-cycle consumption and a more optimal labour supply. The consequent increased activity by insured persons in the labour market would also lead to a greater volume of contributions for mandatory pension insurance, which would reduce the pension fund deficit. Should the increase and prolongation of activity turn out in the future to be insufficient, the enacted increase of retirement age (irrespective of gender) could remain the only reasonable alternative.

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