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PENSION POLICIES IN LITHUANIA – A DYNAMIC GENERAL EQUILIBRIUM ANALYSIS*

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ABSTRACT: We analyse the current state and the future prospects of the Lithuanian pension system and some proposed alternatives, using an open economy version of an Auerbach – Kotlikoff type computable general equilibrium model. The model is a dynamic numerical simulation model with an overlapping generations structure and an explicit pension sector. We analyse several adjustments of the current system, such as increasing the retirement age, changing both the basic part and the earnings-related part of the old-age pensions, and changing the benefit levels through indexation. The financing side alternative to the current contribution system is a partial switch to VAT. We also discuss privatization of the pension system. Finally, we analyse a proposal made by the Phare study group, consisting of six measures. We conclude that the proposal has positive long-run consequences and alleviates the current old-age poverty problem, with maximum losses to current taxpayers of the order of 2 – 3 % of the consumption stream during the remaining lifetime.

KEY WORDS: Pensions, dynamic CGE model, transition costs.

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TIIVISTELMÄ: Liettuan eläkejärjestelmän ongelmat liittyvät väestötekijöihin, maksujen välttämiseen ja vanhusväestön köyhyyteen. Tutkimuksessa analysoidaan järjestelmän kehittämisvaihtoehtoja dynaamisella yleisen tasapainon mallilla. Malli on avotaloutta kuvaava Auerbach - Kotlikoff -tyyppinen limittäisten sukupolvien numeerinen simulointimalli. Tarkasteltavia muutoksia ovat mm. eläkkeellejäämisiän asteittainen nostaminen, vanhuuseläkkeiden perusosan ja ansiosidonnaisen osan muuttaminen, indeksointisäännön muuttaminen, rahoituksen siirtäminen palkkaperusteisista maksuista osittain arvonlisäveron suuntaan sekä järjestelmän osittainen yksityistäminen. Tutkimuksessa analysoidaan myös kuudesta toimenpiteestä koostuvaa politiikkapakettia, jolla pyritään lievittämään köyhyysongelmaa ja samalla parantamaan eläkejärjestelmän pitkän aikavälin ominaisuuksia. Analyysin mukaan välitön köyhyysongelma lievenee, toimenpidepaketin vaikutukset ovat suotuisia pitkällä aikavälillä, ja nykyisten työikäisten kokemat siirtymäkauden hyvinvointitappiot jäävät pariin kolmeen prosenttiin, suhteutettuna loppuelämän aikaisiin kulutusmahdollisuuksiin.

AVAINSANAT: Eläkkeet, dynaaminen numeerinen tasapainoanalyysi, siirtymäkustannukset.

1. INTRODUCTION[1]

The ageing of the population has brought pension policies to the agenda in most developed countries. There is still some time before the ageing effects are felt in full, and policies should use this time to avoid situations where sudden and drastic changes to the pension systems must be made.

The threat of postponing necessary changes is bigger in transitional economies. Immediate pressing problems require the attention of policymakers. Still, the combination of a pay-as-you-go pension system and an ageing population, added with declining fertility, exists in these countries also. Poverty among the elderly makes the situation even worse.

Analysing the current state and the future prospects of the Lithuanian pension system and proposing alternatives is the aim of the research project "Lithuanian pension system: Alternatives and proposals for the future". It is financed by the Phare ACE 1996 program. The main results are reported in Phare Study Group (1999). This report contains a more detailed description of the analysis made by the computable general equilibrium model which was developed in the project. The model is a dynamic numerical simulation model with an overlapping generations structure. It is an open economy version of the Auerbach – Kotlikoff type of models, with an explicit pension sector. The model is described in Section 2.

Section 3 describes some features of the Lithuanian economy that are relevant for the pension policy analysis, both from a macroeconomic point of view and from a welfare and intergenerational distribution point of view.

Section 4 analyses two scenarios of retirement age. The first is already in progress in Lithuania, and will in 15 years gradually raise the retirement age for women from 55 to 60 years and for men from 60 to 62.5 years. The second scenario starts where the first scenario ends and raises the retirement ages further, to 65 years for both women and men. This scenario is also gradual and requires 15 more years.

Section 5 considers adjustments of the basic pension. We simulate changes in the benefit level and indexation. The financing side alternative to the current contribution system is a partial switch to VAT, which is analysed in section 6.

Section 7 discusses privatization of the pension system. Section 8 presents the simulated effects of a pension policy package proposed by the Phare Study Group. Section 9 analyses the sensitivity of the results with respect to some key parameter values.

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[1] The pension policy analysis in this report is a result of the joint work and discussions of the author with Romas Lazutka, Audrone Morkuniene and Svend E. Hougaard Jensen, the partners in the Phare research project. The author also wishes to thank Eija Kauppi for programming the model, Tarmo Valkonen for expert advice, and Anthony de Carvalho for helping with the language.

2. THE MODEL

2.1 Modelling pension policies: the intuitive ideas

Life-cycle behaviour has a central role in this study. Working-years and years after retirement are parts of most lifecycles, and both must be kept in mind when one thinks about how a pension system affects man's life. Pension contributions are paid during the working period, and these contributions are used to finance the benefits of the payer or other people. The benefits are received after retirement. When studying who gains and who loses when a particular change in the pension system is made, the effects during these both phases must be taken into account for a person who is a worker when the change is made. Those already retired feel the consequences only as pensioners, but the effects vary also among them due to e.g. differences in expected remaining lifetimes or wealth. The effects vary among the workers because the rules of the pension system may depend on age and working history, wealth and indebtedness vary, work efficiency and wages are not the same for all, etc.

Pension systems also affect behaviour. If, for instance, there were no pension system, most people would prepare for old age in one way or another. Because working when old and tired does not provide subsistence, some way of support must be arranged already when younger. This may be a generational 'contract': workers support old people by paying benefits in money or in kind, and after these workers have retired new generations support them. Another alternative is to save for one's own retirement years. In both cases one earns the future pension by working, and the working years and the retirement period are two parts of the whole.

We model man as a rational agent. Whatever happens, people try to behave sensibly from their own point of view. Sense here refers to the aim towards as high welfare as possible. Welfare is defined to depend on two factors, consumption and leisure. Working is assumed to be no of joy as such; it is done only for the remuneration which is used to buy consumption goods. Whenever something unexpected happens in the economy, a pension policy measure is taken for instance, people will reconsider how much to work and consume. In this rethinking process views and expectations concerning the future have a large role.

Firms are a way to organise productive activity. They are auxiliary tools that exist to facilitate the exchange of work efforts for consumption goods as effectively as possible. Besides work input, productive capital is also needed: machines and equipment. They are financed by savings or borrowing. The ownership of firms is in the hands of households and people. The distribution of ownership is outside the scope of this study, as is also income distribution. But income and wealth by age groups is important in our model, and pension policy effects by cohorts are central in what follows.

The firms also aim at rational, forward-looking behaviour. Their target is to maximise the value of their shares, which is thought to be in the best interests of their owners. This simple maximising goal leads to interesting and complex decisions in different situations.

Lifecycles, rational behaviour, and pension policy effects by age groups are thus in the kernel of this study. The rest is technique. Unfortunately, the technique places severe restrictions on how these central issues can be handled. We hope, however, that the reader shares our view that this modelling approach brings about insights and thoughts so interesting that they more than offset the irritation caused by unrealistic assumptions and simplifications.

2.2 Main features of the model

The Lithuanian OLG model is of the same type as the well-known Auerbach – Kotlikoff (1987) model, though adapted for an open economy. There are five sectors in the model:

- a household sector, where households choose their consumption of goods and leisure by maximising expected lifetime utility subject to three constraints: a lifetime budget constraint, a liquidity constraint, which prevents net financial wealth from being negative at any point in time, and a time constraint per period.

- a forward-looking value-maximizing firm sector, which chooses the optimal path of investment, use of labour and intermediate goods and produces the domestic good which can be exported and which is an imperfect substitute for the imported good.

- a government sector, which collects taxes and produces public services which are provided free of charge and are not taken into account in individual utility considerations.

- a state social insurance institution, which pays the pensions and collects contributions from the employers.

- the rest of the world, with which goods can be traded and capital interchanged. The domestic interest rate is equal to the world interest rate.

In some simulations a sixth sector is introduced: a private pension sector with voluntary or mandatory fully funded pensions.

The model includes four markets, which balance every period: the labour market, the market for the domestic good, the market for the imported good, and the capital market. The model is described in Lassila (1999).

3. LITHUANIA: POINTS OF DEPARTURE

3.1 Demographic developments

The population of Lithuania is about 3.7 million in 1998. Figure 3.1 shows some projections about the size of the population in the coming decades. The range is wide, from e.g. 2.5 to 3.8 in 2050. The projections are based on different assumptions concerning fertility. The trend in fertility during the 90's is alarming: total fertility rate has declined from 2.0 in 1990 to 1.43 in 1996, and seems to be still declining. The increasing population share of the elderly is presented in Figure 3.2. For a pay-as-you-go pension system, all these developments are indeed worrisome.

Figure 3.1. Population in Lithuania
projections with different birth rates

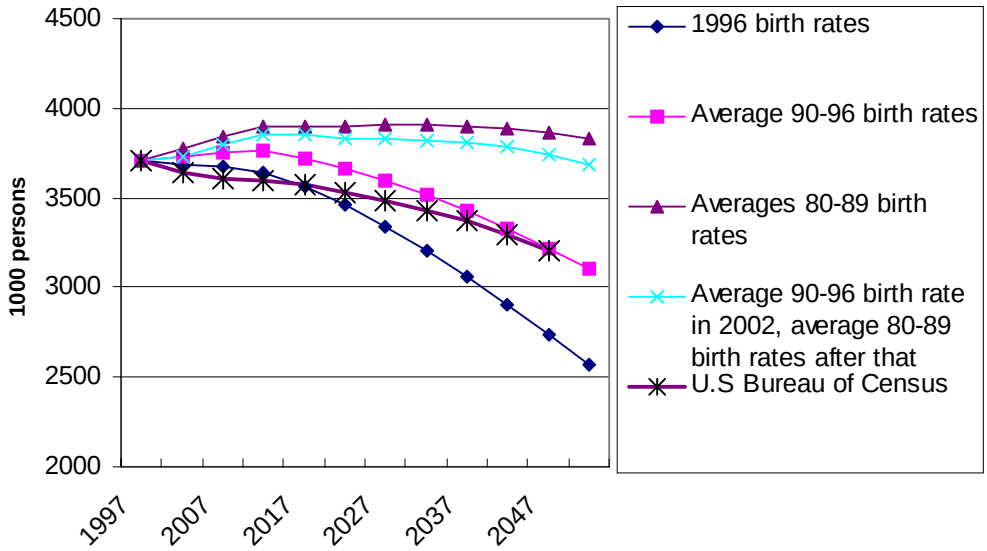
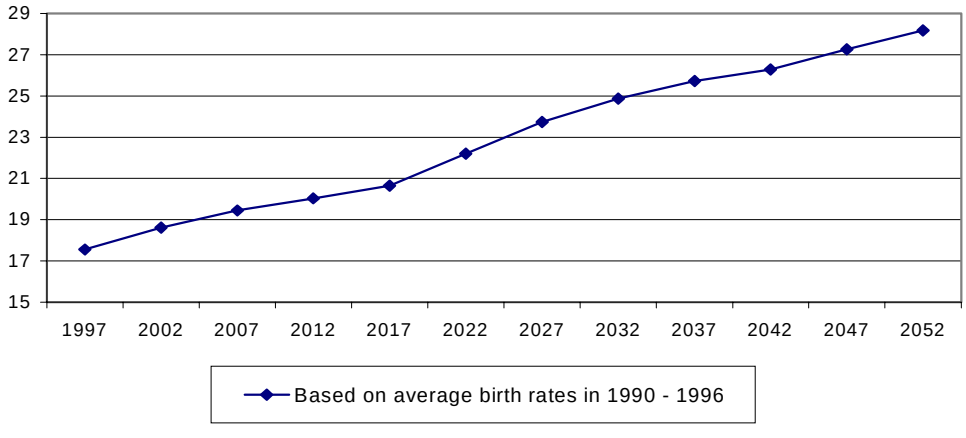


Figure 3.2. Age 60 and over: share of population, %



The effects of ageing

Figure 3.3 shows some simulated consequences of the demographic developments. It is based on average birth rates in 1990 – 1996. Two most important features are changes in labour supply and changes in the worker – pensioner ratio. Labour supply will increase during the next 15 years but decline after that. The increase in the share of pensioners will increase pension expenditure. The capital stock mimics total labour supply. Production and consumption follow suit.

The wage rate is a mirror image of labour supply, and shows the increase in the capital – labour ratio. This increase follows from the assumption that foreign demand does not show similar features, or to only a lesser degree, as the Lithuanian population. Consumer prices follow wages.

The fiscal burden on old-age pension expenditure that comes from ageing is around 5 % of the wage bill in 2050.

In the box up right the upper curve expresses the effects of ageing on old-age pension financing. The lower curve shows what happens to the state's transfers to households. Both are expressed as a per centage of the wage bill. Together they show that pension expenditure increases quite a lot and, if the contribution rate is not changed, the state has to cut other expenses accordingly.

3.2 The public pension system

The Lithuanian pension system comprises social insurance pensions paid from a separate state social insurance fund independent of the national (state and local) budget, and state pensions and social pensions financed from the state budget. Social insurance pensions depend on the amount of social insurance contributions paid and are payable to people previously employed under labour contracts and self-employed persons. They constitute the largest part of the Lithuanian pension system. In 1997 its outlays were 28.6 per cent as compared to the state budget. The state budget finances special pension schemes for military and police servants, national resistance victims, and distinguished persons. State pensions may be paid along with social insurance pensions. Social pensions are paid in some cases when a person is not eligible for other types of pension. State pensions accounted for 1.8 per cent and social pensions for 0.8 per cent of the state budget.

The current social insurance pension consists of the basic pension and the earnings-related supplementary component. The old-age pension formula is as follows:

$$\mathbf{P = B + 0.005*S*K*D,}$$

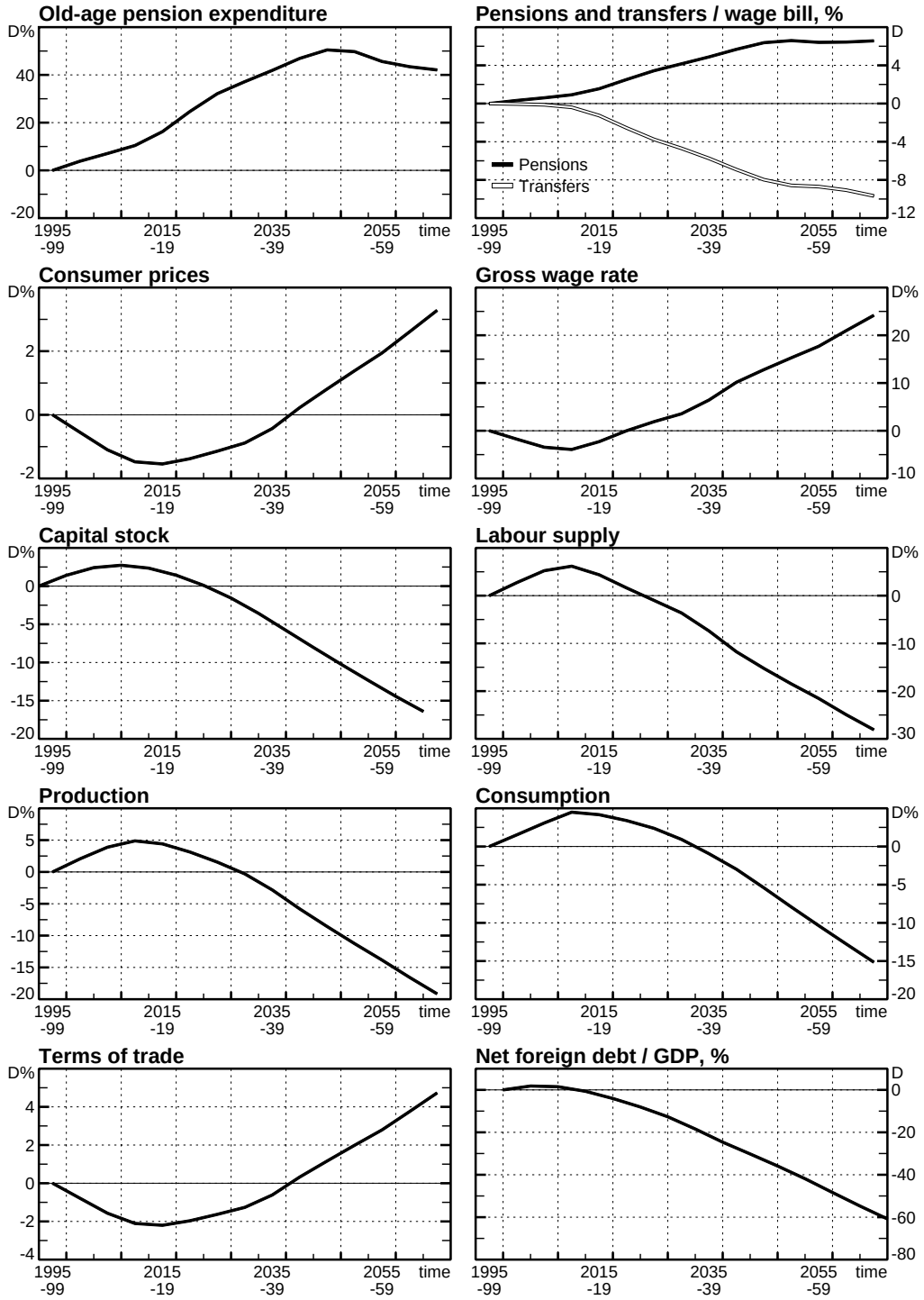
where

B stands for basic pension (or part of it if the recipient does not have the obligatory social insurance period);

S stands for a person's social insurance record of working under labour contract,

K stands for the ratio of the annual income earned by the insured to the country's average annual wage income,

Figure 3.3. Effects of the projected population development



Deviations from a constant growth path
D = absolute deviation
D% = per cent deviation

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D stands for the insured income which is calculated as the average of the earned income from which pension insurance contributions are collected in the country, as well as of sickness, maternity and unemployment benefits. The State Social Insurance Board approves the annual and quarterly average insured income.

The ratio 0.005 means that 0.5 per cent of the monthly wage of the employee is added annually to the supplementary component of the future pension.

The basic pension is almost flat. It's size is set by the government and cannot currently be lower than 110 per cent of the minimum subsistence level (MSL). The MSL is adjusted for inflation at times and is used as a basis to determine other social benefits as well.

The supplementary pension component is calculated separately for every individual according to an established formula. The pension formula is designed so that the basic pension reflects inflation, and the supplementary pension reflects the rise in incomes. Thus, pensions are indexed for inflation and an increase in wages and salaries.

The law does not require one to terminate employment in order to qualify for state social insurance pension. On the contrary, working pensioners who have reached 65 years of age or more can draw a full old-age pension. Younger individuals who have the obligatory social insurance period and earn not more than 150 per cent of the official minimum wage are also eligible for full pensions. Those who earn more are entitled only to the basic component.

3.3 Coverage decline

The right to old-age pension is linked to three mandatory criteria. Old-age pension is granted if the person fulfils these requirements: 1) reaches the official retirement age; 2) has a state social insurance record for at least 15 years; 3) has social insurance coverage for at least three years within the last five years or was insured for the whole last year or if a person's insurance record is at least 35 years.

The last requirement causes the greatest concern for it implies that, in order to preserve the right to pension benefits, a person must work until the retirement age. Those who cannot satisfy this requirement must have a 35-year insurance period, a condition which is difficult to fulfil for people with employment gaps and for part-time employees. Because of this criterion, a part of the elderly population may forfeit the right to pension, for in the current circumstances people of pre-retirement age are frequently dismissed and find it hard to find jobs or requalify. Ineligible persons will have the right to apply for municipal support, which is extended for a limited period of time after the living conditions of the applicant have been investigated.

The number of workers insured by the pension system has declined since 1991. There are at least two features behind this phenomenon. Some people have dropped out of the labour market completely, and some have moved into work in the grey sector, and have stopped paying income taxes as well. No estimates of the relative role of these features are available. The share of income taxes in the state's budget dropped drastically, from 31 % in 1996 to 24 % in 1997 even though GDP grew by 5.7 % in 1997 and unemployment declined. However, this is not a very good indicator of tax eva-

sion. The basis was broadened and rates were raised for excises and VAT. But since income tax receipts declined also in absolute terms, something changed in the taxable base.

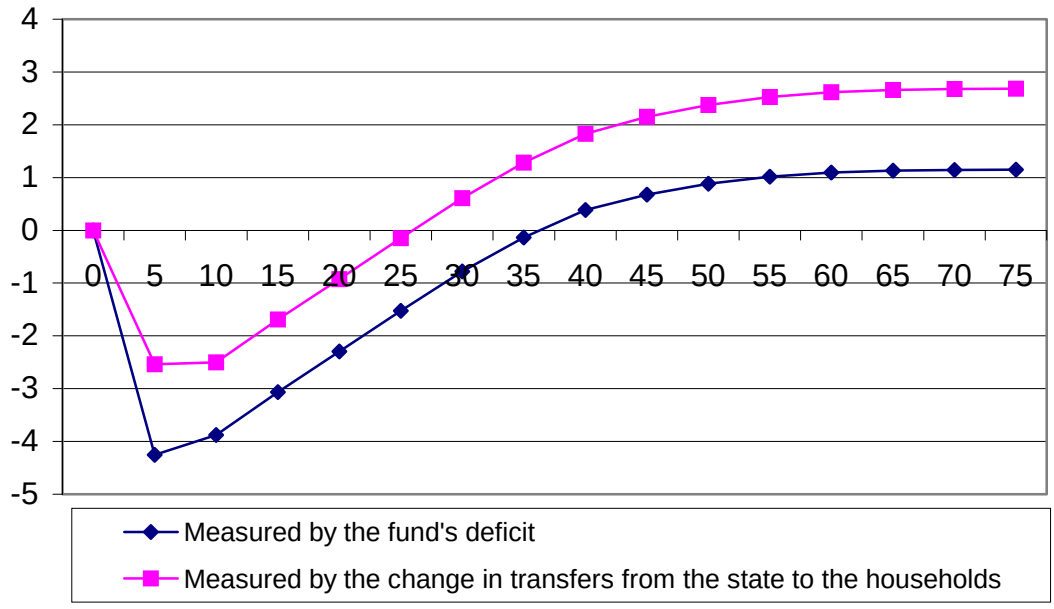
Whatever the reasons are, the number of recipients of pensions and other benefits from the state social insurance fund will decline accordingly in time. This creates a financing problem, because contributions have already declined but benefits are declining only gradually.

The following simulation illustrates and quantifies the "coverage" problem.

It is assumed that the number of workers and employers paying contributions dropped permanently to 2/3 of what it was earlier. The size of the drop is estimated from Chart 1, by Polnius, in the Problems section. Gradually, this becomes visible also in the old-age pensions, both in the basic parts and the earnings-related parts. They eventually drop in the aggregate by the same amount as the contributions. This drop is about 28 %, not 1/3, because the wage level increases.

Other outlays are mostly for short-term, disability and survivor's benefits. Entitlement to these benefits is connected to the contribution records. Those workers not paying contributions lose benefits and outlays consequently fall. The right to the short-term benefit disappears immediately while the right to disability and survivor's pension (as well as old age) depends also on the accumulated contribution records in previous periods. The simulation assumes that the size of these benefits also drops to 2/3 of what it would otherwise be.

Figure 3.4. Coverage decline: two fiscal measures
per cent of wage bill



The chart above show two estimates of the effects of coverage decline. The first estimate concerns the deficit and surplus of the social insurance fund. In the simulation it was assumed that the state balances the fund's budget. The lower line expresses the

deficit as the amount the state has to pay to the fund, as a percentage of the wage bill. The initial deficit is about 4 %, and declines to zero in 30 years. After that there is a surplus, due to the increase in the wage bill and the assumption that outlays other than old-age pensions were permanently reduced by one third, whereas old-age pensions and contributions only dropped by 28 %.

The surplus is a result of the general equilibrium effects. These effects are more pronounced in the upper line, which shows the change in the amount of transfers the state can pay to households, again as percentage of the wage bill. These transfers are the budget-balancing item in the government's budget. As a measure of the state's deficit, it shows smaller negative numbers than the amount the state pays to the fund. The difference comes from the increase in tax receipts due to the favourable overall change in the economy that the coverage drop brings about. The drop is, after all, similar to a cut in average PAYG pension benefits, and people react by saving more and working more. The favourable tax receipt effects would vanish if the coverage drop is accompanied by an increase in income tax evasion.

If the other expenditures of the social insurance fund were assumed to be unchanged in total, there would be a long-run deficit amounting to 1 - 1.3 % of the wage bill. These expenditures were 83 % in relation to old-age pensions in 1997. As a result, the social insurance fund's deficit was, after the drop, about 6 % of the wage bill. It gradually declines; after 20 years it is 3.5 - 4 %, and in the long run 1 - 1.3 %. These huge deficit figures are overestimates; the right to these other benefits also declines when the contributions stop.

Estimating the size of the deficits by a complete model requires the specification of the endogenous budget-balancing variables. In the simulations above we assumed that a) the state covers the fund's deficits, and b) the transfers from the state to the households balance the state's budget. So there actually were no real deficits in the simulations. Had we assumed that contributions would adjust to balance the fund's budget, the estimated "deficit" of the fund would also have been different, probably smaller. The state's situation would of course be very different, as it would not need to cover the fund's deficit.

4. INCREASING THE RETIREMENT AGE

4.1 Retirement and working

The retirement age, after which a person can receive old-age pension benefits, was 55 years for women and 60 years for men in Lithuania in 1994. Since 1995 it has been increased by four months every year for women and by two months for men. In 2009 women's retirement age will be 60 years and men's 62 years 6 months. There is also a plan to continue the increase at the same speed until 2024, when both women's and men's retirement age will be 65 years.

The effects of retirement age rules on labour supply depend on the possibility of continuing working and earning wages while receiving pensions. Lithuanian social insurance pension scheme allows one to receive wages and pension at the same time. But restrictions are applied to those who are under 65 and receive more than 1.5 times the minimum wage. They lose the earnings-related part of the pension but can still get the basic pension.

According to the World Bank, the pension formula doesn't create sufficient incentives to work longer. "Full-career workers receive no additional credit for added years of service under the years-of-service basic pension. For workers who remain in the workforce beyond the statutory retirement age, the actuarial adjustments for delayed retirement may be too low". (The World Bank, 1998)

Table 4.1. Population Employment Rate by Age Group (1997; in per cent)

Age group	Total	Males	Females
50-54	73.4	77.6	69.8
55-59	53.3	72.8	38.0
60-64	24.1	35.5	15.8
65-69	9.5	11.7	8.0
70+	5.3	8.4	3.9

Source: Statistical Yearbook of Lithuania. 1998.- Vilnius, 1998.

Table 4.1 shows, however, that it is not uncommon to continue working after the retirement age. The level of pensions is rather low. The loss of the earnings-related pension part is small if we compare it to the extra income from labour market. There are enough incentives to work in retirement age and the pension scheme does not restrict working as much as it does in many other countries. It is then likely that many people will suffer from an increase in the retirement age: they miss the pension income from the lengthening period, but no actual restriction concerning working is removed.

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In the following analysis, labour supply between the ages 20 and 70 is endogenous. People in the age groups 55-59, 60-64 and 65-69 participate in the labour market de-

spite being past the retirement age. Labour supply in those cohorts resembles the participation rates, when supply is measured in hours. It is assumed that the elderly are not as efficient as younger cohorts, so labour supply in effective units is rather small in these older cohorts. The efficiency is reflected in the lower wages they receive.

What does ”increasing the retirement age” then mean? One, it cuts off pension payments to those age groups that are younger than the new retirement age but older than the previous age. Two, it increases earnings-related pensions as more years add the 0.5 per cent in the formula. Both of these increase the supply of labour. The third effect is that the period when working diminishes pensions gets shorter, so not only do new pension rights accrue but also old negative effects vanish. This holds on aggregate, not necessarily on the individual level. The fourth effect, which comes into force in time, is that when those generations that have earned pension rights according to the new age go past the retirement age, working then reduces these higher pensions, and this makes working less rewarding and thus reduces labour supply in these age groups. Thus the increase in the retirement age affects more incentives than restrictions on decision-making. The incentive effects encourage almost everybody to work more. There is also a pure income effect, as the basic part of the pension is paid during a shorter period.

4.2 Macroeconomic effects of increasing the retirement age

Initially, the retirement age is 57.5 years, the average of 55 for women and 60 for men. A gradual increase in this age to 61 years and 3 months is put into force. It reflects the ongoing change of increasing women's retirement age by 4 months and men's by 2 months each year. The change occurs during three five-year periods. In each period the retirement age increases by 1.25 years.[2] The second alternative postpones retirement even further, to 65 years for both men and women. As can be expected, the effects are similar to the earlier case, but greater in magnitude and take a longer period to materialise.

The simulations show rather small effects on labour supply. Labour supply increases about 1 per cent at the most and about 0.9 per cent in the long run. If the retirement age is increased to 65 years, the increase in labour supply is twice as large, 2% at the most and 1.5% in the long run.

The increase in retirement age improves the fiscal situation of the social insurance fund. This is mostly due to the cut in the basic pension payment period, as the retirement age is raised. The contribution rate may be reduced. The size of the possible reduction is mainly determined by the relative amount of the population that belongs to the relevant age groups. The fall is also affected by the work efficiency in those groups. The size of pension benefits, the number of people covered by the system, the share of employers paying the contributions and the share of employees paying their contributions also affect the outcome. The cost-saving effect is estimated to be 3 percentage points of the annual wage bill when the change is completed and the average retirement age for men and women is increased to 61 years and 3 months. If the re-

[2] Although the model uses five-year unit periods, the retirement age can be within one such period (see Lassila 1999a).

tirement age is increased to 65 years, the contribution rate falls by 6 percentage points in the long run.

Usually a positive impact on investments is attributed only to funded schemes. Simulations show that it is possible to have an influence on investments in the PAYG scheme by changing the retirement age as well. However, the impact on savings and investments can be very different. It depends on the behaviour of the persons in pre-retirement age. If the increase in retirement age repeals the former restrictions to work, people feel that removing the working constraint makes them richer in the life-time perspective, and younger cohorts want to spend a part of that wealth increase immediately. That leads to decreasing household saving and increasing foreign in-debtedness.

However, if the official retirement age does not restrict the possibilities to work, which seems to be the case in Lithuania, the increase in retirement age will have the opposite consequences. Now the increase in retirement age shortens the period when pensions are paid, and is thus a way to cut benefits. People respond to this by saving and by working more. Part of the savings goes to the domestic capital stock, part goes abroad and net foreign debt declines or net foreign assets accumulate.

After the increases in labour supply the capital-labour ratio is no longer optimal, and investments increase accordingly. Increased consumption and investment leads to a current account deficit and an increase in net foreign debt. The terms of trade deteriorate slightly.

Table 4.2. Macroeconomic effects[1)] of increasing the retirement age

	5 years	10 years	50 years	150 years
Increasing the retirement age from 55(women) and 60(men) to 60 and 62.5				
Old-age pension expenditure	-4.0	-9.0	-14.2	-13.5
Contribution rate*	-0.9	-2.0	-3.2	-3.1
Wages	0.4	0.8	1.8	1.6
Consumer prices	0.0	0.0	-0.2	-0.2
Capital stock	0.2	0.4	0.8	0.8
Labour supply	0.3	0.6	0.9	0.9
Consumption	0.0	0.1	0.9	0.8
Net foreign debt / GDP*	0.3	0.3	0.1	0.3
Increasing the retirement age from 55(women) and 60(men) to 65 and 65				
Old-age pension expenditure	-4.0	-8.9	-30.1	-27.8
Contribution rate*	-0.9	-2.0	-6.7	-6.2
Wages	0.4	0.8	3.9	3.6
Consumer prices	0.0	-0.1	-0.3	-0.3
Capital stock	0.2	0.5	1.9	1.8
Labour supply	0.3	0.6	1.9	1.9
Consumption	-0.1	-0.1	2.0	1.9
Net foreign debt / GDP*	0.3	0.2	-1.0	-0.5

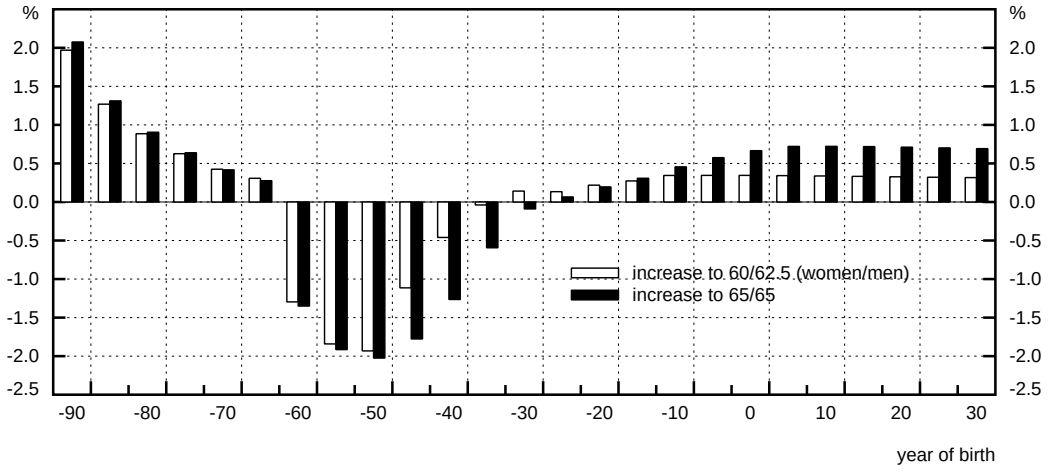
1) Per cent deviation (*=percentage point deviation) of simulation run from base run.

4.3 Intergenerational welfare effects

From the welfare point of view, the crucial thing is how great the increase in labour supply is. That depends on the effectiveness of those between 57.5 and 61.25 years of age. If they were as effective as younger generations the labour input would increase substantially. In this case everybody would gain, even those who suddenly have to work for more years than they earlier thought. They get a good wage income for the work they do, and it more than compensates the loss of pensions during the period until they reach the new retirement age. They suffer from reduced leisure for a while, but gain from the fall in the price of consumer goods in all remaining periods. But if their work efficiency is low - as in our simulations - their wage income is small, and their lifetime utility may decrease. The gains of all other generations are also smaller in this case. Empirically, this latter case is more plausible the higher the pension level is. But if the replacement rate is low, all cohorts may gain.

Changes in the possibilities of consumption will be different for the different generations of population. The simplest explanation concerns the advantages of current pensioners and the young generation. Current pensioners gain from the increase in retirement age. Consumer prices go down slightly due to the increased supply of domestic goods. The increase in wages is reflected also in pensions, which depend on average earnings. Younger workers gain, as do all future generations. They will fully benefit from higher wages, and also enjoy the interest incomes from higher household wealth. Older working-age cohorts suffer a little. They will not receive pension payments as soon as they had expected. They benefit from higher wages and lower consumer prices, but working more reduces leisure.

Figure 4.1. Changes in welfare from increasing the retirement age



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

The distribution of the gains or losses depends on how the surplus of the insurance fund is used. In the simulations described above it was used to lower the contributions, which is a natural assumption in the face of the ageing phenomena. An alternative would be to increase the benefits. The difference in the contribution rate policy

affects the wage level quite a lot. If the contribution is lowered, wages will be about 3% higher throughout than if the surplus is distributed as transfers. If it is used as transfers to all, the gains spread more evenly across cohorts. The overall gains are bigger when the contribution rate is lowered, because that encourages working.

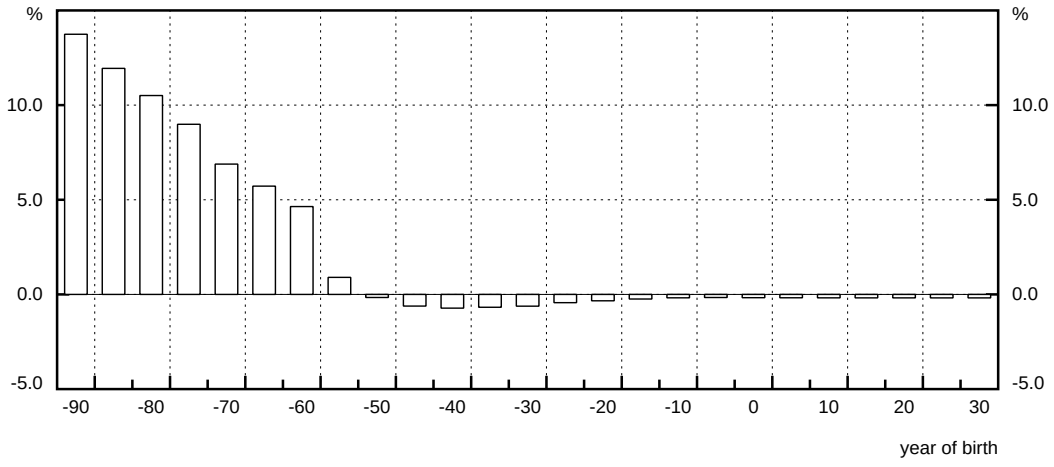
5. ADJUSTING THE BASIC PENSION

Benefit increases can be justified by the current poverty problems among the elderly. These problems will, however, diminish at least in absolute sense with economic growth. Ageing population and declining fertility also pose a definitive threat to the Lithuanian pension system. Thus it seems natural to consider increases that phase out in time. In the following, the basic pension is increased by 40 % and then indexed to the average of wages and prices for 20 years. If real wages grow on average by 4% annually, the relative level of the basic pension to wages is then roughly the same as before the initial increase. The basic pension is also made universal in the simulation.

The policy has notable effects on pensions, of course. Pension expenditure increases temporarily by over 30 %. The increase gets smaller in time but because the pension is now universal the expenditure increase settles to about 7 % after 20 years. The contribution rate behaves accordingly; the long-run increase is 0.9 percentage points.

The macroeconomic effects are small. Labour supply declines permanently, as the increased contribution rate leads to lower wages and thus creates an unfavourable incentive. Initially the decline in labour supply is steeper, due to the income effect on older workers; this decline is deep enough to result in a temporary increase in the wage rate. Capital stock is adjusted both to the lower level of labour input and to the very slightly higher domestic rate of interest, a result of the increased net foreign debt.

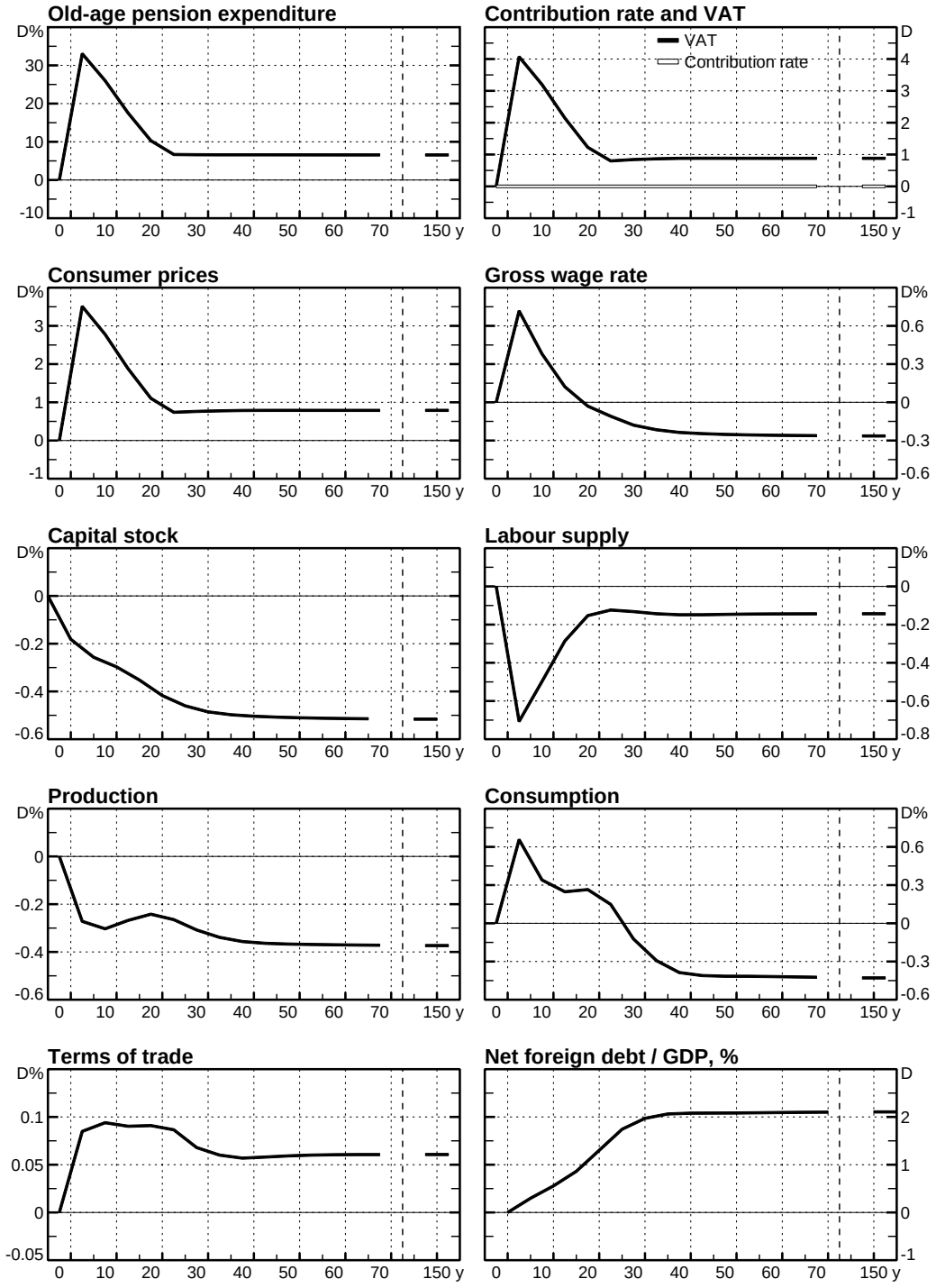
Figure 5.1. Changes in welfare by age from the basic pension policy



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

The biggest welfare gains go to current pensioners, which is to be expected. Also those near retirement gain, because they will be able to enjoy the higher pension for some time. Younger workers lose, as they have to pay the pension increase but, when they retire, the benefit level has already declined in relative terms. Figure 5.1. shows large gains for the elderly and small losses to younger and future generations. The visual imbalance between gains and losses is explained by the facts that there are relatively few old people and they have small incomes, and there are more people on the paying side who, in a rapidly growing economy, will have high lifetime incomes.

Figure 5.2. Effects of the basic pension policy package [1)]



Deviation of simulation run from base run
D = absolute deviation
D% = per cent deviation

1) The basic pension is made universal, increased by 40 % and temporarily indexed only partially to wages.

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6. FROM CONTRIBUTIONS TO VAT

The changes in the pension system need not consider only the benefit side. Also the financing structure merits considerations.

We simulate a shift in the financing structure. The employers' contribution rate is reduced by 9 percentage points to 21 %. The resulting decline in the social insurance fund's income is financed by the State, which increases the VAT rate and diverts a part of the receipts to the fund.

In the base case pensions are financed by proceeds of a payroll tax. The measure studied is to fix the payroll tax paid by the employers at a level that is 9 percentage points lower than the current level, and to compensate the revenue loss by transfers from the State to the social insurance fund. The State finances this by raising the value added tax rate and balances thereafter the budget with the VAT rate. This measure could be justified e.g. by a need to broaden the base of financing and to reduce the labour market distortions of taxation. A special justification comes from income tax evasion and contribution evasion: also tax evaders have to pay VAT.

The initial reaction in the well-operating labour markets to the decline of the payroll tax rate is a rise in wages, because the marginal product of labour has not changed. Real wages climb, however, markedly less due to the 5 percentage points increase in the value-added tax rate.

The permanently higher consumption tax also reduces the real value of the existing wealth and gives an incentive to the households to save more for their old age because part of the tax burden has shifted to the latter part of their life cycle. The result is that both consumption and saving increases. The economy ends up at a new equilibrium in which households have more wealth, the economy has less foreign debt, and the domestic demand is larger.

Table 6.1. Macroeconomic effects of switching from contributions to VAT

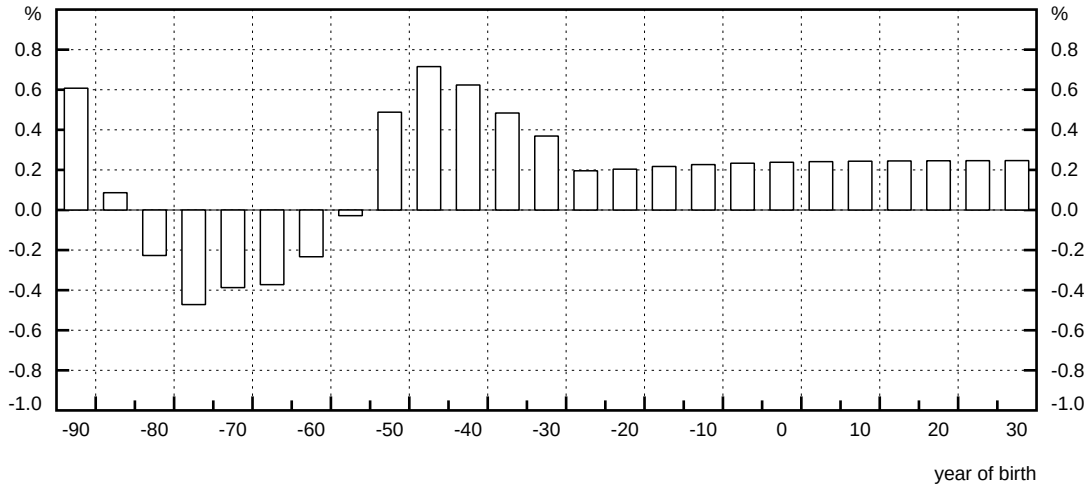
	5 years	10 years	50 years	150 years
Old-age pension expenditure	5.9	6.0	6.4	6.4
Contribution rate*	-9.0	-9.0	-9.0	-9.0
VAT rate*	4.8	4.9	4.9	4.9
Wages	5.8	5.9	6.3	6.3
Consumer prices	4.1	4.1	4.1	4.1
Capital stock	0.1	0.2	0.4	0.4
Labour supply	0.3	0.2	0.2	0.2
Consumption	0.6	0.6	1.2	1.2
Net foreign debt / GDP*	-0.1	-0.4	-1.3	-1.3

[1)] Per cent deviation (*=percentage point deviation) of simulation run from base run.

The generation-specific welfare effects are presented in the figure below. The lower real value of the existing wealth hurts the old generations most even though the purchasing power of their pensions rise because of the indexation on wages. The net ef-

fect is very sensitive to the relative roles of wealth and pensions. Current young and future generations gain more from the shift the higher the share of labour incomes. Overall, the average welfare effects are small.

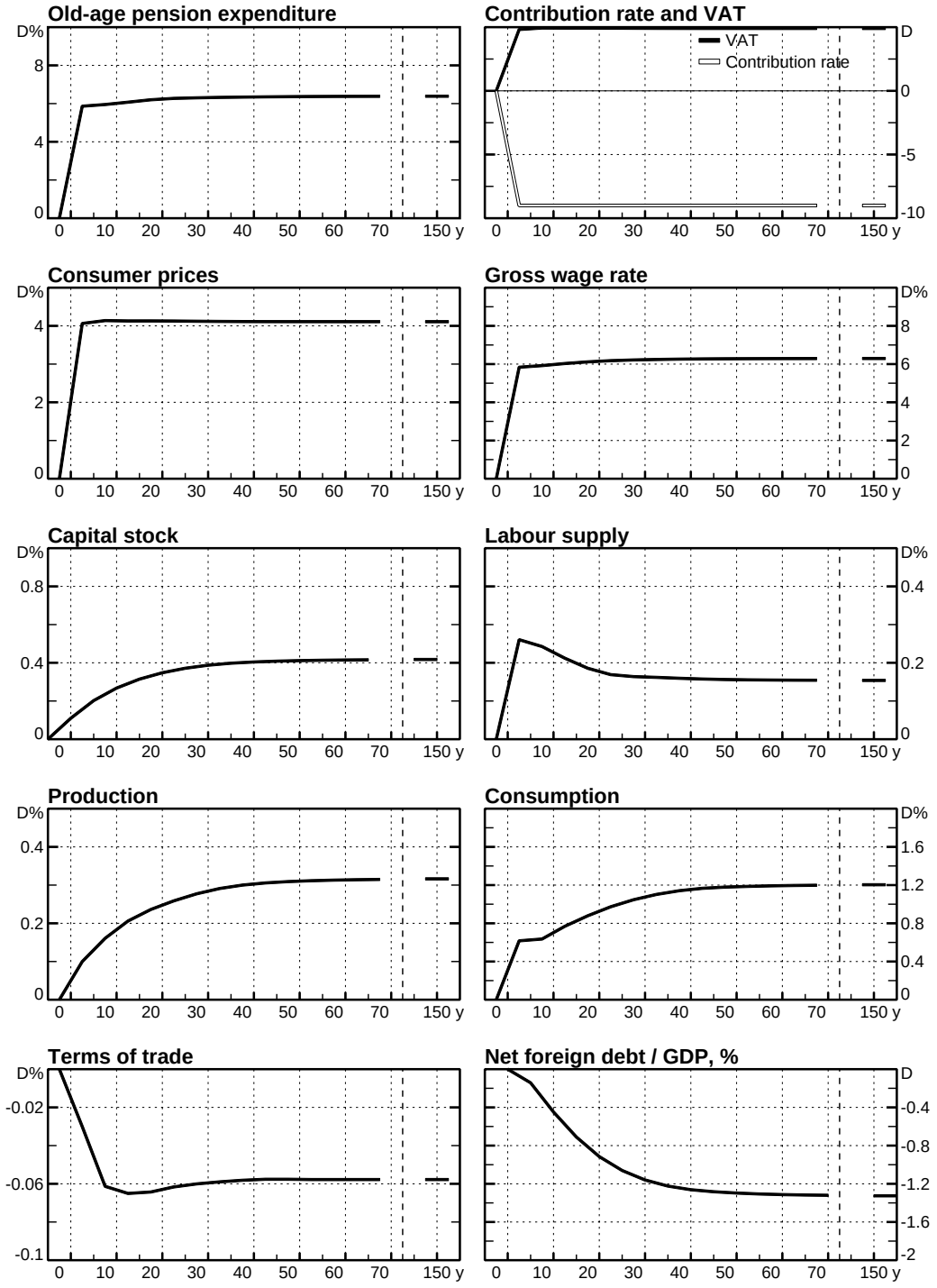
Figure 6.1. Changes in welfare from switching to VAT



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

These outcomes can be contrasted to the ones by Auerbach-Kotlikoff (1987). They produced qualitatively similar welfare and macroeconomic results with a shift from income taxation to consumption taxation. Most of the long-term welfare gains turned out to be due to the shift of the tax burden to the current wealth. The overall efficiency gains generated by the reduced tax distortion in labour markets were small. This result was confirmed by Fehr and Kotlikoff (1995), who decomposed the generational welfare effects and found out that the efficiency gains are at least for the current generations small compared to the overall utility changes.

Figure 6.2. Switching from contributions to VAT



Deviation of simulation run from base run
D = absolute deviation
D% = per cent deviation

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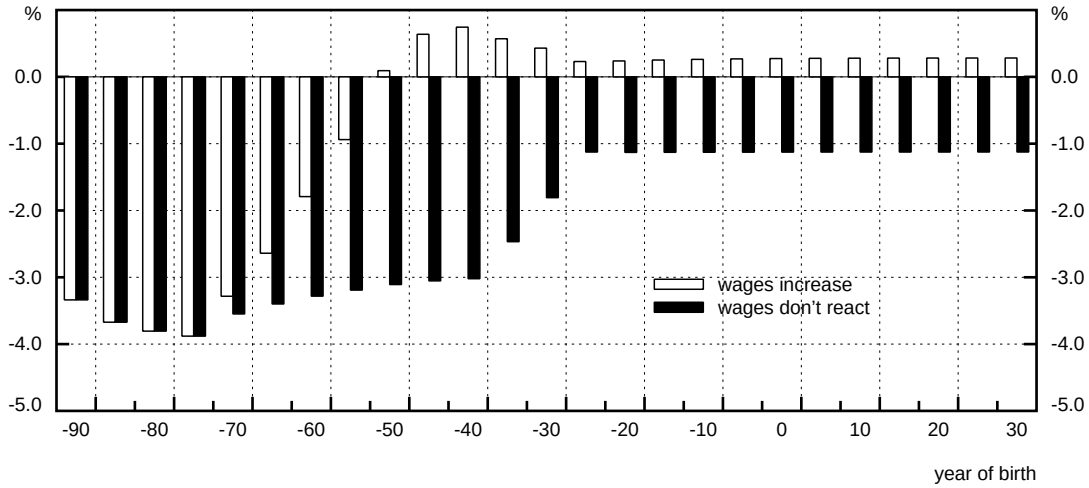
Welfare effects and tax evasion:

As VAT is harder to avoid than income taxes for workers and contributions for employers, we try to take this into account in the following welfare calculations.

Figure 6.3 depicts the welfare effects for those who neither pay contributions and get pensions nor pay income taxes. The left-side pillar assumes that they also benefit from the increase in average wages that comes about as contributions are reduced. As this is dubious, the right-side pillar describes the effects if their wages do not change at all because of this policy measure. The truth is probably in between, and it may well be that tax evaders suffer on average in all cohorts.

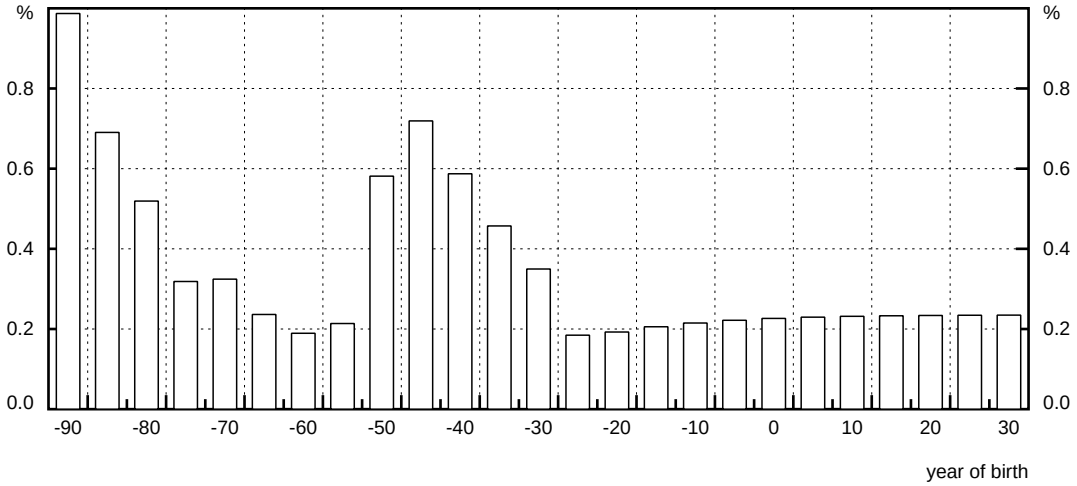
Figure 6.3. Changes in tax-evaders' welfare from switching to VAT



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

The next graph shows the effects on the welfare of law-abiding citizens. All cohorts gain, claims our model. Normal taxpayers have less financial wealth in the model than tax-evaders, and the increase in VAT eats less purchasing power off the wealth. They have less wealth because they know that they will receive pensions as old, and so save less for that purpose. If they are already pensioned, their pension incomes increase because the earnings-related parts are indexed to wages (average wage development in the economy). Tax and contribution evaders receive only other transfers, as taxpayers do also, and these other transfers are unindexed in the simulation.

Figure 6.4. Changes in taxpayers' welfare from switching to VAT



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

Notice that the welfare effects for the taxpayers are small. Their sign might also change if we use some other parameter values. But the difference between taxpayers and tax-evaders is probably robust. Income tax evaders pay VAT like other people, and it stands to reason that shifting taxation towards VAT, then, is good to honest taxpayers. The model points out two additional factors, the wealth difference due to saving for missing pensions, and the pension indexing effects. We have assumed no differences in rationality or preferences or work efficiency etc. except that concerning the willingness to pay taxes and contributions. What is crucial is what happens to wages in the grey market when contributions are reduced. The lower limit is that the wages do not change at all, because the decline in contribution rate doesn't directly affect those who haven't paid them in the first place. The upper limit is that wages in the grey sector follow the general wage development, as workers compare their wages with those of other workers. It is probable that the truth is closer to the lower limit.

7. PRIVATISATION

7.1 How to analyse pension privatisation with an OLG model

The privatisation discussion contains two main elements: moving from a public arrangement to a private one, and moving from an unfunded system to a funded one. The first discusses the efficiency and behaviour of two types of organisations, the second concentrates on the effects of financing the system and the links between contributions and benefits.

From an OLG-modelling point of view, only the second group of elements can currently be analysed. Institutional efficiency issues and different risks and their sharing are outside the scope of the model we use here. The model contains no risks and uncertainty, there are no institutional costs attached to running any kind of pension system, markets function perfectly, public sector behaviour is known in advance, and the arbitrage condition of every investor shrinks the expected rates of return of all assets to a common value. All these issues must be analysed outside the model, as is done in Phare Study Group Report (1999).

What features of privatisation does the model then capture? In the following, privatisation consists of three main elements. Firstly, the earnings-related part of the current social pension system is abolished. Secondly, the contribution rate is lowered by an amount corresponding to the earnings-related part of the pension system. Thirdly, a funded pension system is introduced, into which saving is mandatory. The simulations capture the effects of changes in incentives to work and save, the fiscal consequences and effects on macroeconomic outcomes caused by the changes in households' and firms' decisions, and changes in households' welfare by cohorts caused by the different economic conditions they face because of the privatisation policy.

Privatisation usually also contains the possibility of participating in a voluntary private funded pension system. In the model, however, this has no effects. As institutions are costless and all savings yield equal expected rates of return, savings in a voluntary pension sector just mix in with other household savings. We can think of the following simulations of either containing a voluntary pension system or not, the outcomes are the same.

Introducing a mandatory funded system, however, does make a difference in our model. Households can be liquidity constrained, in the sense that they cannot borrow against future income. Mandatory contributions reduce current disposable income, and for those households who would like to borrow but cannot they reduce current consumption. The savings in the private mandatory funded system are illiquid until they are paid out as benefits.

In Kotlikoff (1998), the analysis of privatisation in the USA requires the following measures in the model. Firstly, set the payroll tax which is used to finance public pensions to zero. Secondly, phase out the payment of public pensions in a desired schedule. Thirdly, decide what tax instruments are used to finance the pensions during the phase-out period and the possible interest payments from the government debt, if debt financing has been used also in the phase-out period. All these measures are also in-

cluded in our analysis, and in addition there is a fourth item: introduce the mandatory contributions to a private fund in a desired schedule. This fourth item is the consequence of the liquidity constraint discussed above.

We describe the various parts of privatisation separately.

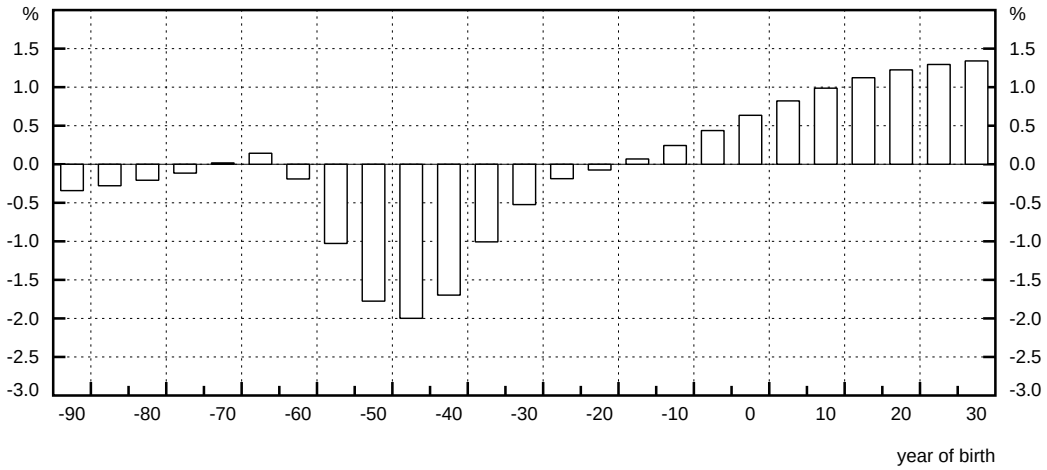
7.2 Removing the earnings-related part of the pension

In this simulation we cease to accumulate the rights for the earnings-related part of the pension. Old accumulated rights are honoured, and the corresponding pensions paid. No new rights accrue, however, and this comes as a surprise to everybody. We assume that transfers from the social insurance fund to the households, other than old-age pensions, are unaffected by this measure. The decline in pension expenditure allows lowering the contribution rate by 9 percentage points in the long run.

The transition towards the new equilibrium is slow and smooth. Initially, labour supply declines. This happens in all age groups except those above the retirement age. This is because workers have rationally discounted the future pension benefits that have accrued from working, and this wage-like thing now vanishes. It takes time before wages increase, which again encourage labour supply.

In time, labour supply shifts to older cohorts. For the young, the liquidity constraints are eased as wages grow. For the old, net remuneration from working increases as the earnings-related pension no more diminishes with working after the retirement age. Thus the age profile of labour supply responds to prices, the price of leisure here.

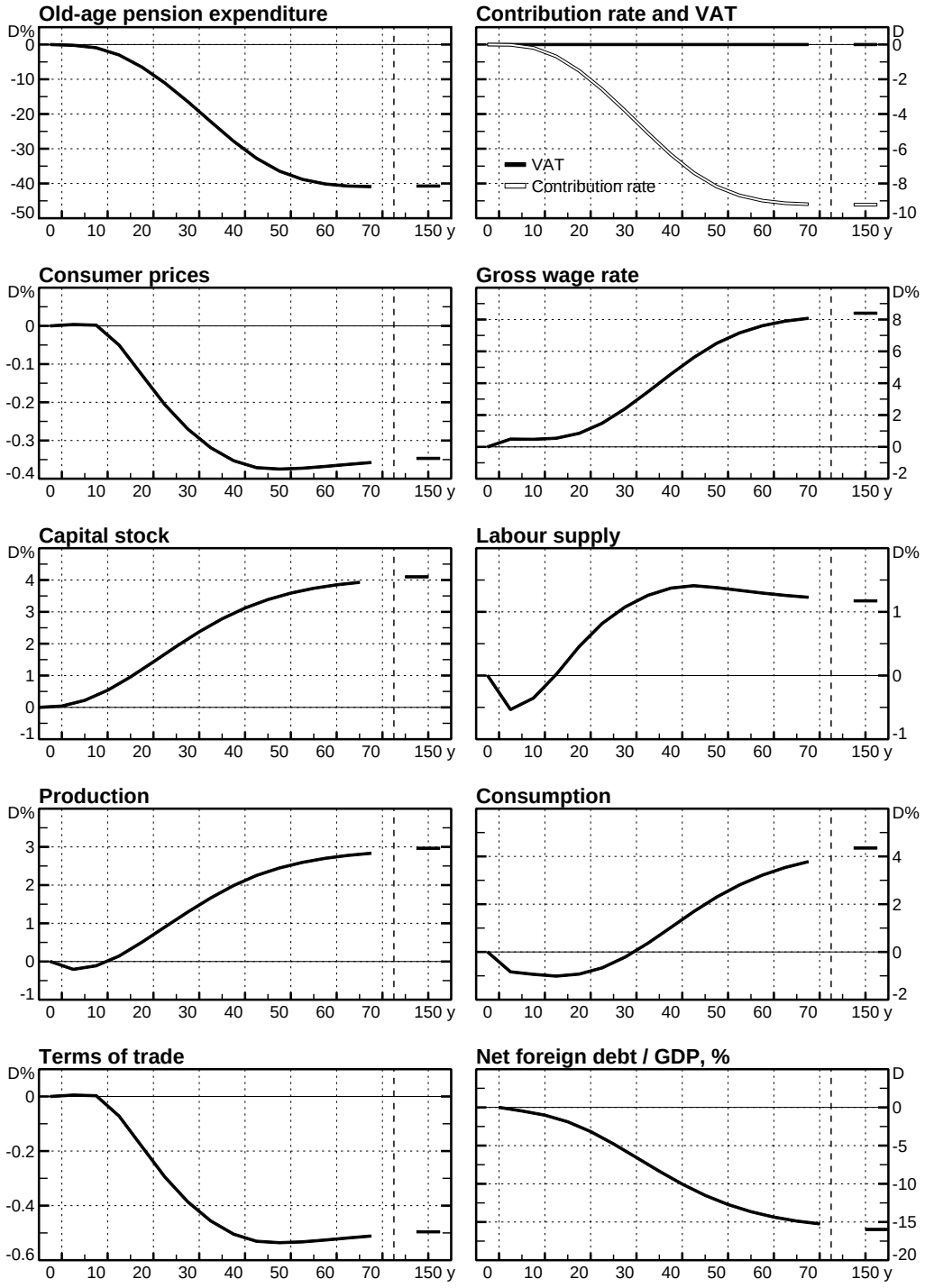
Figure 7.1. Changes in welfare from terminating the earnings-related pension



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

Why do some cohorts lose? They are at the prime of their work efficiency. By working a lot they could have built a sizeable earnings-related pension for their future.

Figure 7.2. Terminating the accumulation of new earnings-related pension rights



Deviation of simulation run from base run
D = absolute deviation
D% = per cent deviation

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Now this possibility ceases to exist. The effect is as if net wages were to decline just when they are working most. The increase in wages takes place only after several years, and does not console those cohorts. The decline in welfare is rather modest even for this group.

The long-term gain to future generations is sizeable, however. Essentially, people save for their old age more than before, which creates funds instead of the current unfunded system. This is one very important feature of privatization: people voluntarily compensate the removal of mandatory pension systems.

The next part of privatisation, switching towards VAT in pension financing, was already analysed in section 6, and is not repeated here.

7.3 Mandatory second pillar

Next, we add a mandatory second pillar. Workers pay a 5 % premium in the first period to a fund, and 10 % thereafter each period. After the retirement age the accumulated capital in their accounts is changed to an annuity. This feature is similar to Kotlikoff's proposal (1998c) and has solid economic justifications. The choice here, however, was made on modelling bases; it is simply easier to model the use of wealth this way if the analysis includes mortality in all age groups. The idea goes back to Yaari (1965), and is widely used in OLG models, see e.g. Broer and Westerhout (1997). As noted earlier, mandatory saving has a role here, because the households, especially the young, are liquidity constrained.

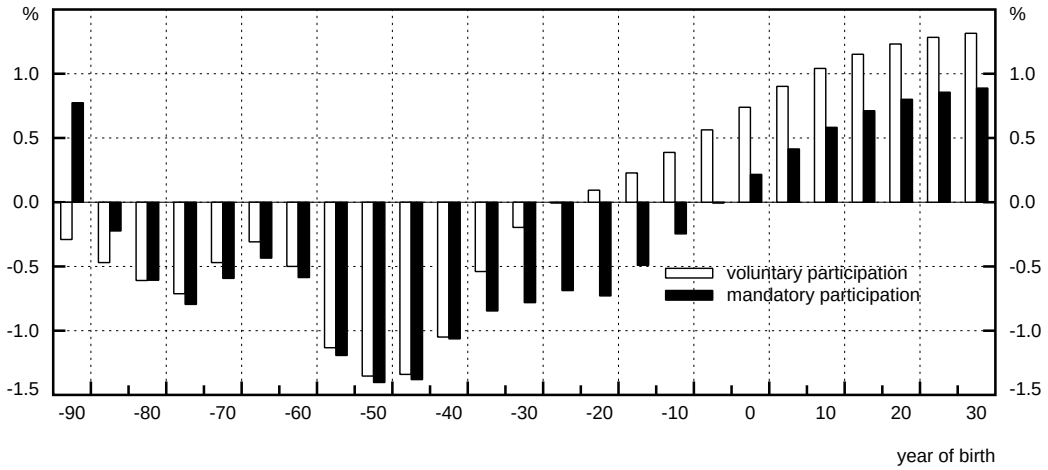
Macroeconomic consequences of mandatory privatisation are in general favourable. Simulations show a marked increase in investment and the capital stock, labour supply and the current account. Net foreign assets are accumulated (or debt falls, as in the figure). In the long run, consumption would be almost 10 % higher than in the base run.

But consumption declines initially for about 20 years. The transition period is not without welfare losses. Average welfare effects by cohorts are shown in figure 7.3. Again, old cohorts are on the left. For each cohort, the left-side pillar is the welfare change with voluntary second pillar, and the right-side pillar is the effect with the mandatory pillar.

A mandatory second pillar leads to lower welfare than a voluntary second pillar, according to our model. This follows rather directly from our rationality assumptions. Households make completely rational decisions, and adding restrictions to those decisions can only make the outcomes worse. As the restrictions also change the macroeconomic outcomes, it is of course possible that welfare increases by adding restrictions, e.g. due to the fact that mandatory pension saving makes future generations richer. In our simulations these effects were however dominated by direct effects from restricting households' decisions.

That there are any differences in welfare from mandatory – voluntary distinction is a result of liquidity constraints on households. Young households would like to consume more and borrow against future labour income. This is not allowed in our

Figure 7.3. Changes in welfare by age from privatisation



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

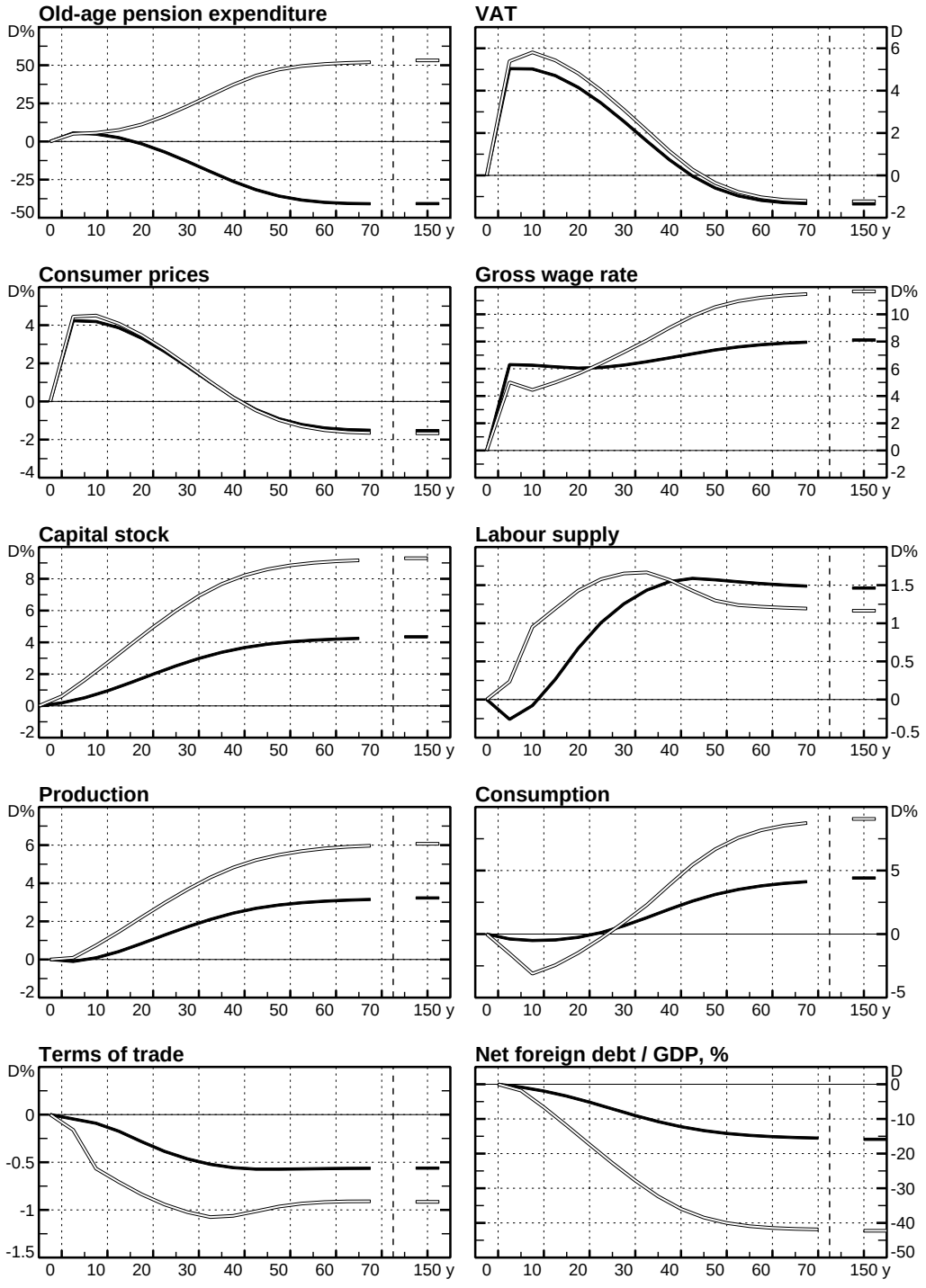
simulations. Mandatory pension saving reduces consumption and thus welfare in those periods where liquidity constraints are binding. Later in life the picture is reversed: households have more wealth and consumption possibilities than they would have liked from the point of view of evening out consumption over the whole lifecycle. Looking at periodic utilities, for many cohorts the effects of privatisation with a mandatory second pillar are such that they have less utility as young and more utility as old. The lifetime utility function weighs these periods together, so its specification and exact parameterisation may well be crucial to the sign of the overall effect. This kind of situation is difficult to assess: even though everybody may lose in the lifetime utility sense, there may be in every period more people who are happier than unhappier during the rest of their lives than they would have been without the change. Young people are unhappier, but as time passes and the liquidity is eased, they become happier.

An essential point is, however, that mandatory saving is required to prevent shortsightedness, to prevent people from saving too little for their old age. This feature is not present in our model, so the results do not include that viewpoint. Extreme myopia may be impossible to distinguish from rational free-riding, where people save too little and coolly expect others to take care of them when they are old. This feature is also not included in the model.

7.4 Using public borrowing during the transition

Privatisation with initial debt financing is the scope of the next simulation. The only difference between this and the previous analysis is that VAT is kept constant during the first 5-year period, and the state finances the transfers to the social insurance fund by borrowing. After period one, the debt is held at a new higher level (constant in ratio to GDP).

Figure 7.4. Privatisation with and without mandatory private funded pensions



Deviation of simulation run from base run
D = absolute deviation
D% = per cent deviation

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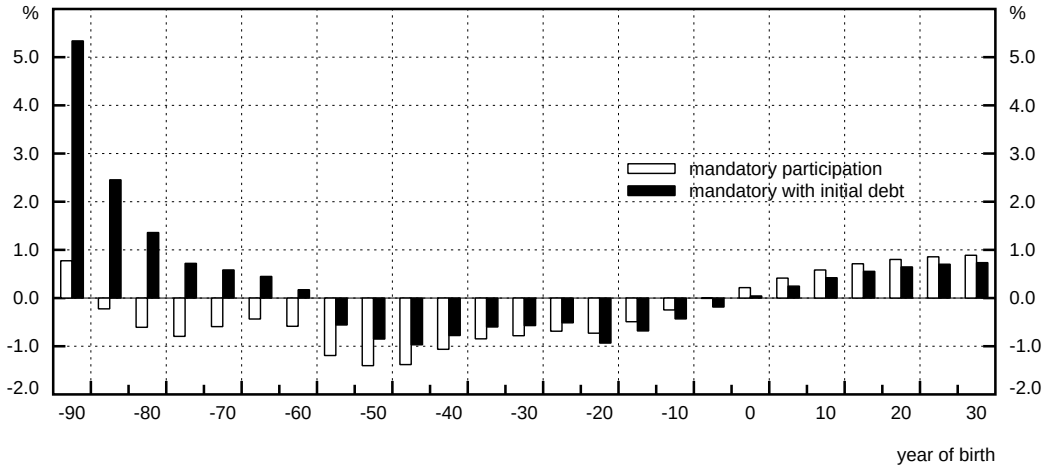
The macroeconomic effects do not differ very much. The capital stock is slightly reduced and net foreign debt increases. VAT is initially lower but then remains permanently higher. The welfare effects by cohorts have, however, changed rather much. By taking on debt, the state can postpone the welfare losses from current generations to future generations. As the state must pay interest on the debt, the losses in the future are larger. (One might well think that in an economy with good growth prospects but current poverty problems such a debt-taking policy is justified.)

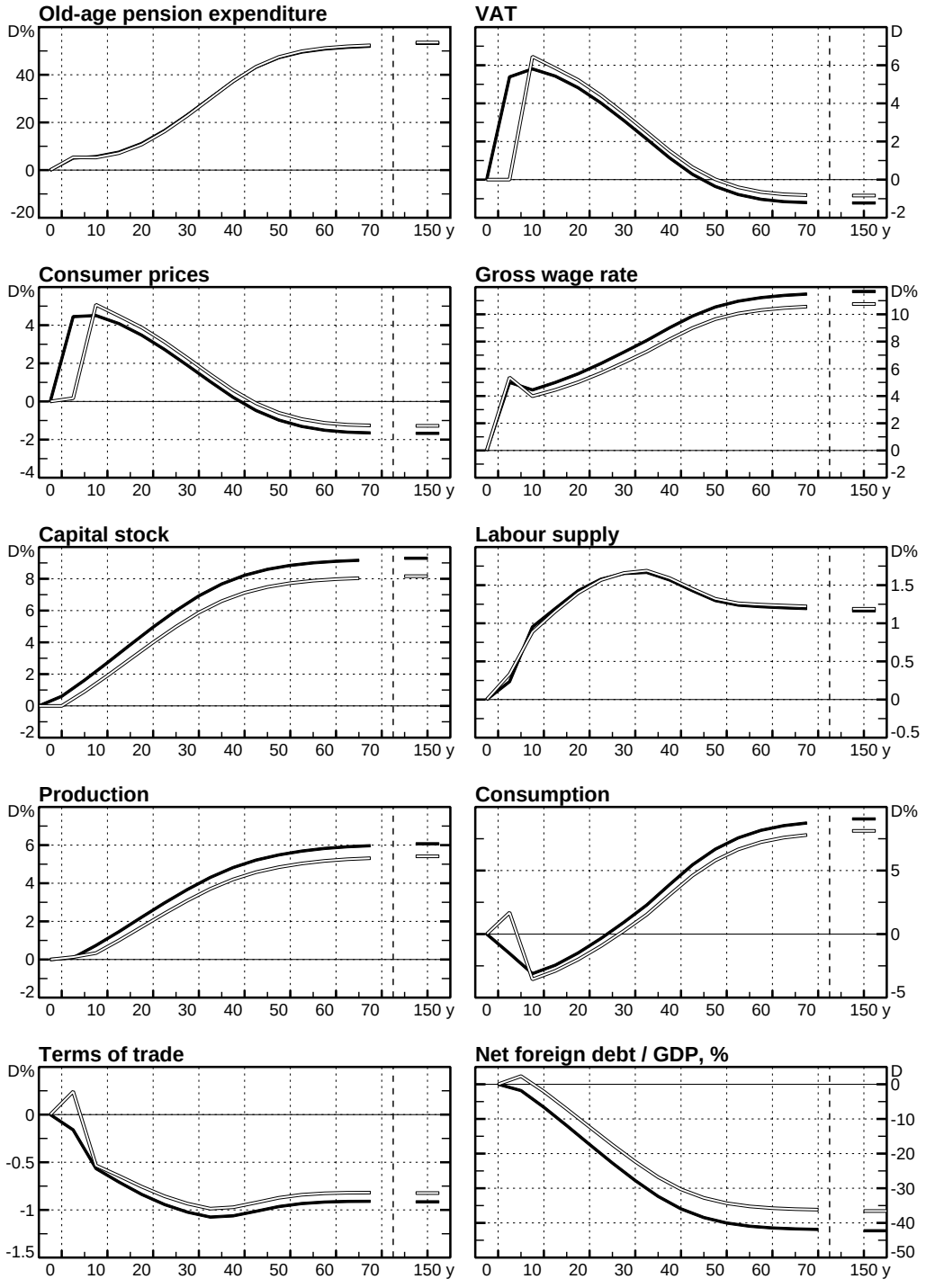
Figure 7.5. Changes in welfare by age from privatisation



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

The right-side pillars show the welfare effects when the public debt is used in the first period.

Figure 7.6. Privatisation with mandatory 2nd pillar, with and without 1st-period government borrowing



Deviation of simulation run from base run
D = absolute deviation
D% = per cent deviation

ETLA

Table 7.1. Macroeconomic effects of privatisation policies

	5 years	10 years	50 years	150 years
Privatisation with voluntary participation				
Old-age pension expenditure	5.6	4.8	-35.8	-40.7
Contribution rate to public system*	-9.0	-9.0	-9.0	-9.0
VAT rate*	5.0	5.0	-0.6	-1.3
Wages	6.3	6.3	7.4	8.1
Consumer prices	4.2	4.2	-0.9	-1.5
Capital stock	0.2	0.5	3.9	4.3
Labour supply	-0.3	-0.1	1.6	1.5
Consumption	-0.4	-0.5	3.1	4.4
Net foreign debt / GDP*	-0.8	-2.0	-14.2	-15.9
Privatisation with mandatory participation				
Public old-age pension expenditure	4.8	4.3	-33.9	-38.8
Total old-age pension expenditure	5.0	5.7	47.2	53.2
Contribution rate to public system*	-9.0	-9.0	-9.0	-9.0
Mandatory private contribution*	5.0	10.0	10.0	10.0
VAT rate*	5.4	5.8	-0.4	-1.2
Wages	5.0	4.4	10.5	11.7
Consumer prices	4.4	4.5	-1.0	-1.7
Capital stock	0.6	1.6	8.6	9.3
Labour supply	0.2	1.0	1.3	1.2
Consumption	-1.5	-3.1	6.7	9.1
Net foreign debt / GDP*	-1.8	-6.6	-40.0	-42.3
Mandatory pension funds / GDP*	8.5	26.1	113.3	116.1
Privatisation with mandatory participation and initial debt financing				
Public old-age pension expenditure	5.2	3.8	-34.4	-39.3
Total old-age pension expenditure	5.4	5.3	47.5	53.5
Contribution rate to public system*	-9.0	-9.0	-9.0	-9.0
Mandatory private contribution*	5.0	10.0	10.0	10.0
VAT rate*	0.0	6.5	0.0	-0.8
Wages	5.4	4.0	9.6	10.8
Consumer prices	0.2	5.1	-0.6	-1.3
Capital stock	0.0	0.9	7.5	8.2
Labour supply	0.3	0.9	1.3	1.2
Consumption	1.7	-3.6	5.8	8.1
Public debt / GDP*	11.4	11.4	11.4	11.4
Net foreign debt / GDP*	2.3	-2.1	-34.3	-36.6
Mandatory pension funds / GDP*	8.5	26.2	113.9	116.7

Per cent deviation (*=percentage point deviation) of simulation run from base run.

8. ANALYSING THE POLICY COMBINATION PROPOSED BY THE PHARE STUDY GROUP

8.1 Background

The Phare Study Group summary report proposes a package of pension policy measures, aimed at the three problem groups that were identified in the project.

The first group consists of fiscal problems of the current pension system. These are partly due to large obligations accepted from the Soviet era, partly connected with the tumultuous transition process, especially the fall in GDP in the early 1990's and the accompanied labour market developments. An increasing number of disability pensions is one result, and the problems have been the background for a wide-spread evasion of social contributions and income taxes. Fiscal problems will prevail: ageing increases pension expenditures in the coming decades, and current fertility rates, both their low level and continuous downward trend, are alarming.

The second problem group is the poverty of retired people. This results both from the low level of pensions and, to an increasing degree, the declining coverage of the current system. Projections based on the current share of workers who pay contributions show that only 54 % of the old-age population would be covered by the pension system in 2025. The current pension system seems to be failing to achieve its main objective.

The third group of problems is related to incentive issues, concerning both working and saving incentives. As a PAYG system with unfavourable future demographics, the rate of return from current contributions can be expected to be low. The fiscal difficulties due to demographics point towards future political risks and makes the credibility of the system suspect. The current system entails no funding, so as far as it is deemed credible it discourages saving compared with funded alternatives.

The retirement age is currently being increased gradually to 62.5 years for men and 60 years for women. This reduces the fiscal strain in the current system. According to the OLG model calculations in Section 4 of this report, the effect is equivalent to 3 percentage points of the wage bill that is the base for contributions.

8.2 The proposed policy package

The Study Group pays special attention to the poverty problems. The problem resulting from the low level of pensions could be remedied by increasing the benefits. That would yield a fiscal deficit. The fiscal problem could be alleviated in time by indexing the benefits partially to wages and partially to consumer prices. In an economy with good growth prospects, which we expect Lithuania to be, wages will grow faster than prices. Thus the relative role of indexed benefits will decline after the initial increase.

The simplest cure for the coverage decline would be to make the basic pension universal. Working history would not be required for eligibility, citizenship and age would suffice. This coverage expansion would also create a deficit in the finance of

old-age pensions. This requires a permanent financing solution, as there is no point in trying to reduce the coverage again.

The research group thought the poverty problems so pressing that it searched for a way to finance both the increase in benefit levels and the universality. The changes should be such that the system will also be efficient in the long run. The group formulated a proposal that consists of six points.

1. Increase the basic pension level by 40 %, change its indexation, and make it universal.
2. Increase the retirement age to 65 for both men and women.
3. Lower the contribution rate to the public pension system by 11.75 percentage points and finance that by increasing the value-added tax rate.
4. Terminate the accumulation of new rights for the earnings-related part of the public old-age pension. Honour the rights that have already accumulated.
5. Start gradually a private, funded, mandatory earnings-related pension system.
6. Create good possibilities for voluntary pension savings.

The first item is exactly the policy analysed in section 5 of this report. The basic pension's coverage is increased, the level is increased, and it is indexed to both consumer prices and wages with equal weights until its relative size, compared to average wages, has returned to the current level. In the simulations, that takes twenty years. After that the basic pension is again indexed fully to wages.

If the increase in retirement age is continued, to 65 years for both men and women according to a schedule that has been proposed already earlier, in section 4 we show further reductions in the cost burden of the order of 3 – 3.5 percentage points in the contribution rate.

The switch from contributions based on wages to value-added taxes in the finance of pensions, justified e.g. by the tax-evasion phenomena, has been analysed in section 6. The size of the switch is slightly larger here, 11.75 percentage points in total. Together with items 4, 5 and 6 the financial switch forms a privatisation policy, which was analysed in the previous section. The introduction of the private mandatory system is, however, done more gradually here. During the first 5-year period the contribution rate is 2 per cent. Then it is increased by 2 percentage points in every five years, until it reaches 10 percentage points where it then stays. It is paid by the employee, whose one-percent contribution to the public system is abolished as part of the total 11.75 percentage point reduction.

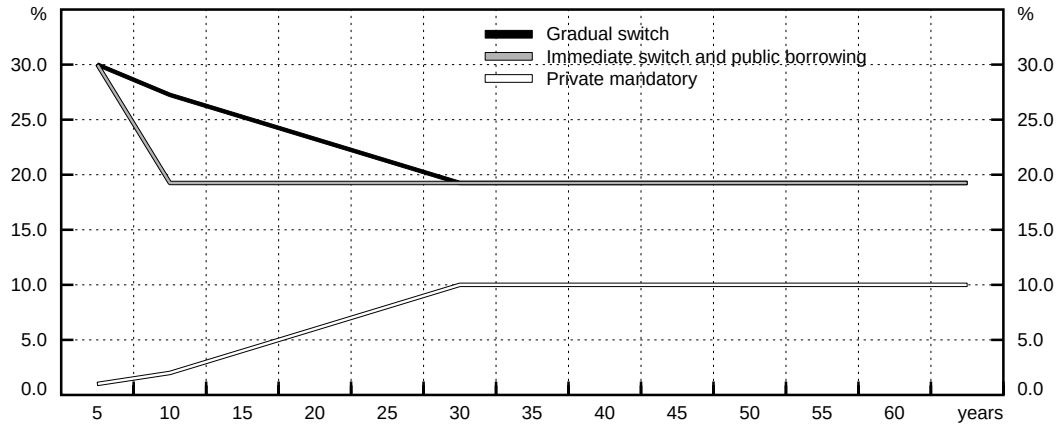
Besides being a combination of measures considered earlier with some differences mentioned in the previous paragraph, the following policy simulations differ in that their reference scenario is different. We now compare the economic outcome and the welfare of different generations to a baseline where the retirement age is increasing gradually to 60 years for women and 62 years and six months for men. This baseline in fact is exactly one of the simulation outcomes presented in Section 3 of this report.

We shall simulate three implementations of the proposed policy package. In the first, **the immediate switch alternative**, the contribution rate to the public system is reduced immediately to its new permanent level, and the whole financial burden is cov-

ered by increasing the value-added tax rate. In the second, **public borrowing** is used for 10 years while the VAT rate is kept at 25 per cent. After that the VAT rate is adjusted so that it covers the changes in public expenditures, including the interest payments of the additional debt that was taken. The third is the **gradual switch alternative**. The employer's contribution rate to the public system is reduced by 2.75 percentage points in the first five-year period, and then reduced by two percentage points every five years, until it reaches 19.25 %. The employees' one-percent contribution is again abolished immediately.

The contribution rates thus follow the patterns depicted in the next chart. The upper two curves represent the employer's contribution rate. It is either reduced directly to its new low level, or reduced gradually at the same speed as the employee's contribution rate, shown by the lowest curve, is increased.

Figure 8.1. Contribution rates in alternative transitions



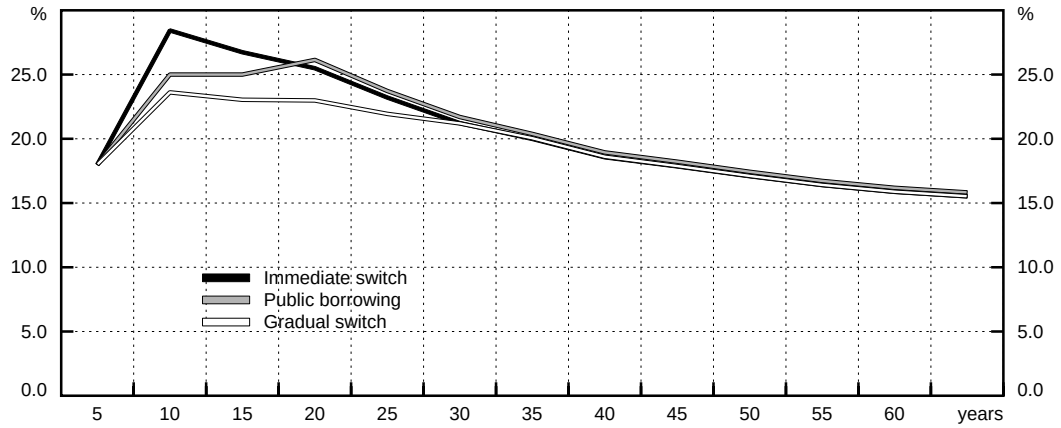
The macroeconomic consequences of the proposed policy package in each alternative are shown on the adjacent page.

8.3 Transition costs

There are costs associated with the transition to the proposed system. Old obligations must be paid while at the same time paying into the funds for future obligations.

First, notice that total contributions do not increase, if we add up the contributions to the social insurance fund (which has no funds, actually) and to the private pension funds.

Figure 8.2. VAT rates in alternative transitions



The costs come from the increase in VAT and the increase in retirement age. As shown by the uppermost curve in the following chart, the VAT rate would increase to about 28 % in the initial stage and then decline gradually towards its current level and finally somewhat below it. Using public borrowing temporarily, the VAT rate could be kept at e.g. 25 % for ten years, and then it would slightly increase before gradually declining towards the current level and below. The amount of public debt would increase about 2.5 - 3 percentage points in relation to GDP, and stay at that level afterwards. The lowest curve shows the VAT rate in the gradual switch alternative. The VAT rate would rise to 23 % and then start to gradually decline towards the same long-run value as in the immediate switch alternative.

8.4 The welfare effects

Who will actually bear these costs? The following three charts show the welfare effects by cohorts according to the OLG model.

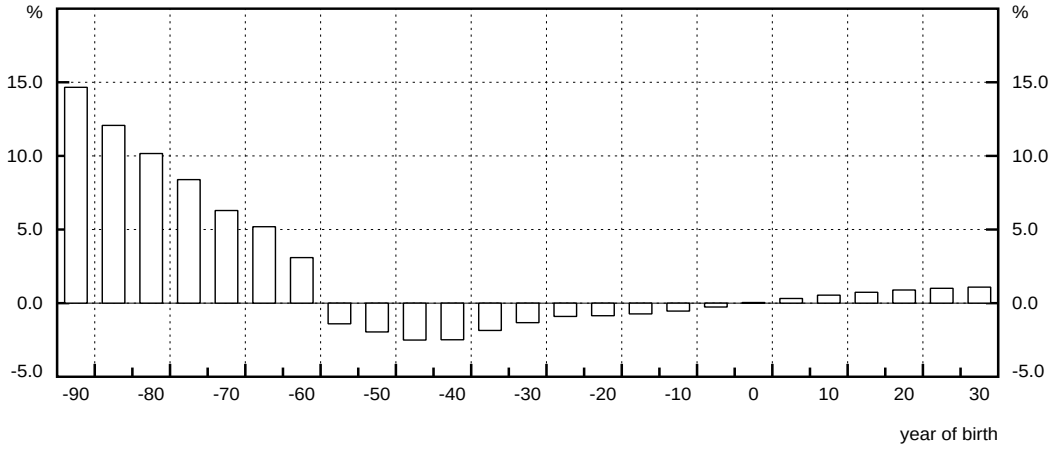
The welfare costs will be borne by current and future workers. Estimates from the OLG model give small welfare losses, below 3 % for those in the age groups 30 - 50 at the time of the execution of the program, when compared to the situation where the first part of the retirement age increase would be carried out but nothing else is done.

In all alternatives those already retired gain substantially. That is mostly due to the increase in the basic pension. The gains for them are largest in the public borrowing alternative, as can be expected; they gain from the lower VAT but are not around to pay for the higher debt's interest costs.

Most current workers will suffer a little from the policy package, only those above 55 gain. The gradual switch transition hurts the working-age people most. Not only is the reduction in contributions gradual, so is the resulting increase in wages. The biggest

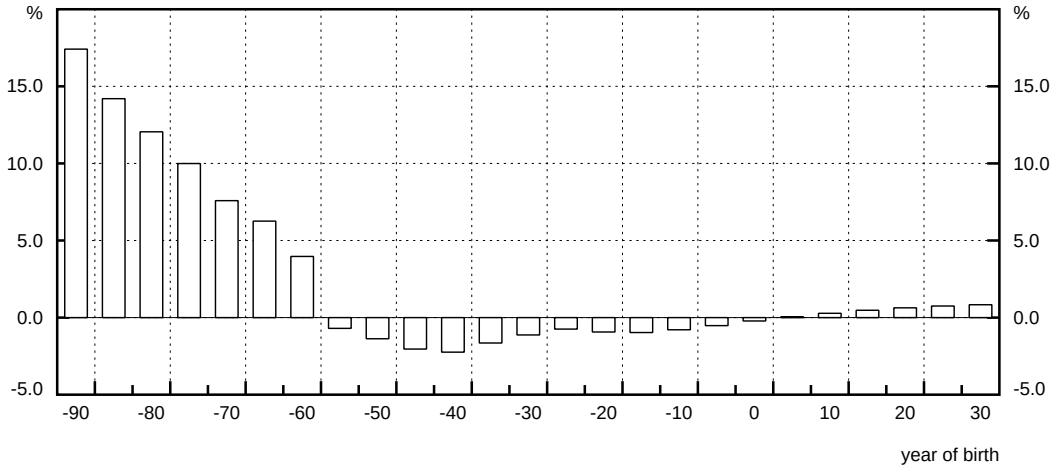
losses, about 3 % of the remaining lifetime's consumption, are felt in the age groups 35 – 39 and 40 - 45. An immediate switch would allow wages to rise faster. The public borrowing alternative is also best for current workers. Correspondingly, it is worst from the future generations' point of view, as they have inherited a higher public debt.

Figure 8.3. Changes in welfare by age in the immediate switch alternative



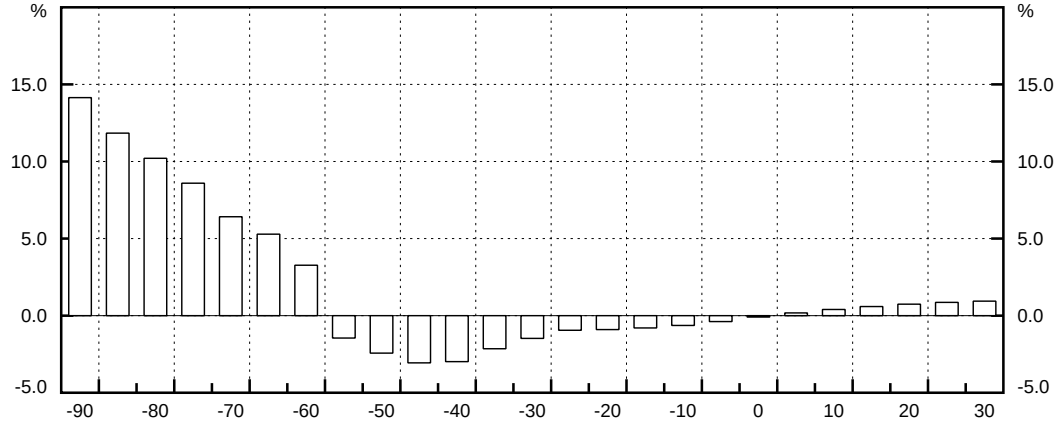
Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

Figure 8.4. Changes in welfare by age in the public borrowing alternative



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

Figure 8.4. Changes in welfare by age in the gradual switch alternative



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss).

The effects described above are for the average households. Some comments can be made concerning the welfare effects for tax evaders. They suffer from the increase in VAT and do not probably gain from the wage increase resulting from the decline in the contribution rate. They do gain, however, from the increase in retirement age which puts a downward pressure on consumer prices, but this effect is minimal. If the tax evaders do not participate in the mandatory private system either, they don't directly benefit from the rates of return on accumulated assets, but may gain indirectly due to the favourable macroeconomic effects of the private funded system. If they are liquidity constrained, the mandatory contributions which they evade won't accentuate the constraint. A bigger welfare effect, however, comes from the basic pension. If it is made universal, also current tax and contribution evaders get it when they are old. That may increase their welfare substantively. A civilised society cannot, however, tolerate poverty, and old poor people will be supported by some means in any case. As discussed in section 4.7.1 of the Study Group report, the basic pension replaces some other from of assistance for them, and also cuts administrative expenses. Tax evasion is of course a problem which the society should address irrespective of the pension system.

The comforting result concerning the transition to an effective funded system and at the same time alleviating considerably the problem of old-age poverty is that even the maximum losses to current taxpayers seem to be tolerable, of the order of 2 – 3 % of the consumption stream during the remaining lifetime. Sensitivity analysis in the next section shows that these estimates are not very sensitive to variations in key parameter values.

Table 8.1. Macroeconomic effects of the Study Group's proposal

	5 years	10 years	20 years	50 years	150 years
Immediate switch alternative					
Public old-age pension expenditure	40.8	31.8	11.1	-44.6	-49.2
Total old-age pension expenditure	40.9	32.0	15.7	27.0	69.5
Contribution rate to public system*	-9.9	-8.8	-7.1	-7.5	-7.7
Mandatory private contribution*	2.0	4.0	8.0	10.0	10.0
VAT rate*	10.4	8.7	5.2	-1.6	-2.9
Wages	7.0	5.9	4.6	11.1	15.4
Consumer prices	8.8	7.2	3.8	-2.5	-3.5
Capital stock	0.4	1.2	3.6	12.4	15.2
Labour supply	-0.3	0.3	1.6	2.3	1.8
Consumption	-0.5	-1.4	-2.6	5.2	13.7
Net foreign debt / GDP*	-1.2	-3.8	-13.9	-57.3	-67.8
Mandatory pension funds / GDP*	3.5	11.1	37.8	134.1	148.8
Public borrowing alternative					
Public old-age pension expenditure	41.2	32.3	11.4	-45.0	-49.6
Total old-age pension expenditure	41.2	32.5	16.0	27.4	70.5
Contribution rate to public system*	-9.9	-8.8	-7.1	-7.5	-7.7
Mandatory private contribution*	2.0	4.0	8.0	10.0	10.0
VAT rate*	7.0	7.0	5.7	-1.3	-2.6
Wages	7.3	5.7	4.0	10.3	14.5
Consumer prices	6.1	5.9	4.3	-2.2	-3.2
Capital stock	0.0	0.5	2.7	11.3	14.1
Labour supply	-0.3	0.2	1.5	2.3	1.8
Consumption	1.6	-0.5	-3.1	4.4	12.9
Public debt / GDP*	7.1	11.4	11.3	11.3	11.3
Net foreign debt / GDP*	1.5	0.7	-8.9	-51.8	-62.3
Mandatory pension funds / GDP*	3.5	11.1	37.9	134.9	149.9
Gradual switch alternative					
Public old-age pension expenditure	33.8	26.6	8.8	-44.6	-49.2
Total old-age pension expenditure	33.9	26.9	13.2	26.1	69.5
Contribution rate to public system*	-1.9	-2.8	-5.1	-7.5	-7.7
Mandatory private contribution*	2.0	4.0	8.0	10.0	10.0
VAT rate*	5.6	5.0	3.9	-1.6	-2.9
Wages	1.9	1.8	2.9	11.0	15.4
Consumer prices	4.8	4.2	2.8	-2.5	-3.5
Capital stock	0.2	0.9	3.2	12.4	15.2
Labour supply	-0.7	0.0	1.6	2.3	1.8
Consumption	-0.5	-1.7	-3.1	5.1	13.7
Net foreign debt / GDP*	-0.4	-2.3	-11.9	-57.0	-67.8
Mandatory pension funds / GDP*	3.4	10.6	36.8	133.6	148.8

Per cent deviation (*=percentage point deviation) of simulation run from base run.

9. SENSITIVITY ANALYSIS

9.1 Introduction

Estimates of the parameter values usually vary quite a lot in all countries where empirical evaluations have been carried out. The effects of this incomplete knowledge on the results are usually studied with sensitivity analysis. The need for this type of analysis is even more pronounced in the case of Lithuania, where no country-specific estimates of the key parameters are available.

Firstly, we look at the effects on pensions, both their level and purchasing power. Secondly, we look at the finance of the pensions. Thirdly, we look at general macroeconomic effects. Fourthly, we look at the effects on generational welfare. The first three issues we do with steady state sensitivity analysis, and the fourth with dynamic simulations.

9.2 Steady state sensitivity analysis

The long-run effects of pension policies can be found using a steady state version of the Lithuanian OLG-model. Analogously, the sensitiveness of these effects to specific parameter values can be studied simply by repeating the policy analysis with different parameter values. Although the important dynamic issues, such as intergenerational welfare, are completely missing, this method is usually computationally simple and provides some information about the possible sensitivity of the policy effects with respect to the key parameter assumptions.

The initial steady states are not calibrated to any degree of accuracy to the Lithuanian economy. Still some features remain automatically. The tax and contribution rates are kept at the same level as in the basic calibration of the dynamic model. Transfers from the social insurance fund to the households are kept constant in relation to the old-age pension expenditure. The government balances the social insurance fund's budget. The government's own budget is balanced by its transfers to the households.

Switching from contributions to VAT:

The employers' contribution rate was reduced by 9 percentage points. The decline in the state social insurance fund's income was compensated by directing a part of value-added tax receipts to the fund. Thus the VAT rate was endogenous. Pensions were determined by the rules of the system, so the increase in wages was reflected in the benefit levels. Other transfers from the social insurance fund to the households, and all transfers from the state to the households, were kept nominally fixed.

The results show that the VAT rate variation is not very sensitive to different parameter values. The increase varies between 4.3 and 6.5 percentage points. These values are observed for two values of the elasticity of substitution between capital and labour in the production function. For all other parameterisations, the range is about 1.2 percentage points.

Pension expenditure increases vary between 6.8 and 9.4 percentage points. The export demand elasticity is here the most important parameter. Real pension expenditure, calculated as the pension expenditure deflated by consumer prices, increases in all cases, the percentages varying between 1.1 and 2.8 points. The increase in total consumption varies between 0.8 and 2.3 percentage points.

Wages and consumer prices increase in all cases, with real wages increasing between 1.2 and 3.0 percentage points.

The table also consists of the policy effects when there are no liquidity constraints on households, i.e. they can freely borrow against future income. These are interesting more from the modelbuilding point of view than the parameter uncertainty viewpoint. Without the liquidity constraint the policy effects would be rather similar. Net foreign assets would have declined somewhat more than in the other cases.

Increasing the retirement age:

The retirement age was raised to 65 years for both men and women. The employers' contribution rate was endogenously reduced, reflecting the declining pension expenditure. The increase in wages was reflected in the pension benefit levels. Other transfers from the social insurance fund to the households were kept at 83 per cent of the old-age pension expenditure, so their amount declined. This choice, dictated by the formulation of the steady-state model, is different from the dynamic analysis presented in section 3. The resulting decline in the contribution rate is bigger here. The issue here, however, is not the size of the decline but its variation. Transfers from the state to the households balanced the state's budget, as the VAT rate was kept constant.

The sensitivity of the effect of the retirement age increase on the contribution rate is very small, the range is less 0.5 percentage points in width, except when the intratemporal elasticity of substitution and the liquidity constraint are concerned. With low substitution, the decline in the contribution rate is smaller, and without the liquidity constraint the decline is bigger.

Pension expenditure declines between 20 and 30 per cent. Again, the intratemporal elasticity of substitution between leisure and consumption and the liquidity constraint are important. With respect to other parameter combinations, the decline varies between –23.6 and –26.3 per cent. Changes in real pension expenditure are similar. Total consumption increases vary between 1.6 and 3.8 percentage points. Labour supply increases in all cases, again the limit effects come from the intratemporal parameter variation. Real wage increases are between 5.5 and 7.8 percentage points, except that without the liquidity constraint the increase is 9.6 percentage points.

Replacing part of the public pensions with mandatory private pensions:

The earnings-related part of the public pensions is removed. A mandatory private funded system is established with a contribution rate of 10 per cent. The total pension contribution rate – employers' and employees' to the public system plus employees' to the private mandatory system – is 31 per cent. The VAT rate is fixed, and transfers to households balance both the state's budget and the social insurance fund's budget.

The private pension fund's budget is balanced by the pension benefits, which are formed from the mandatory contributions and the interest incomes accrued.

The fall in public pension expenditure varies between 32 and 40 percentage points. The overall pension expenditure, on the other hand, increases between 35 and 82 percentage points. This increase seems sensitive to a number of things, especially capital – labour substitution, export demand elasticity, inter- and intratemporal elasticity of substitution, and productivity growth – interest rate combinations. This pension growth is mostly real, consumer prices rise modestly in all cases. Total consumption increases between 5.4 and 12.7 percentage points.

The amount of private pension funds seems substantial. With low capital – labour substitution the funds remain below one year's GDP, but with all other parameter values the funds are between 112 and 142 per cent of annual GDP. The increase in net foreign assets is much smaller, as households in the model reduce other savings when they increase pension saving. In the absence of liquidity constraints, net foreign assets would increase only about 10 % in relation to annual GDP.

9.3 Dynamic sensitivity analysis of the welfare effects

The sensitivity of long-run effects to different parameters does not tell much concerning the transition costs when the policy proposal is put to force. To study that, dynamic analysis is needed. Starting from the initial steady states, the policy package analysed in section 8 was put to force, and the dynamic solution paths were calculated. The results are summarised in the following graph.

From all the dynamic simulations, except for the absence of liquidity constraints, the graph expresses maximum and minimum welfare effects for each age group. All other effects are inside the area between the two solid lines. The parameter values yielding the maximum or minimum are identified with the capitals and explained below the graph. The welfare effects when there are no liquidity constraints are denoted with the dotted line.

There is considerable variation in the welfare measure for the current pensioners. The range is largest, about 9 percentage points, in the oldest age group, where the gains are also biggest. The maximum effect is obtained with a low export demand elasticity and the minimum for with a high intertemporal elasticity of substitution. The variation does not change the result that all pensioners benefit substantially from the reform. For current workers, who are the main payers of the reform, the welfare losses vary in a rather narrow range. That is also the case for the future generations. Qualitatively, the welfare results are not at all sensitive to the parameterisation of the model.

The analysis shows that liquidity constraints are rather important to the amount of welfare gains and losses of pension privatisation. Especially the gains of the future generations would be bigger without liquidity constraints. One future area of research would be the effects of privatisation in an environment where liquidity constraints currently exist but can be expected to vanish in the future. The timing of privatisation vis-à-vis the disappearance of the constraint would probably turn out to be crucial for the intergenerational effects.

Table 9.1. Sensitivity analysis of long-run pension policy effects

a) Switching from contributions to VAT

Case			Z	τ^l	τ^c	p^C	w	C	L	K	F	$\mathbf{p}^{\mathbf{d}}$	A^f
Basic case			7.8	-9.0	5.5	5.7	7.8	1.6	0.0	0.0	0.0	1.4	-3.2
Labour-capital elasticity (β)	A	0.6	7.5	-9.0	4.3	4.7	7.4	1.8	0.1	-0.1	-0.1	1.4	-4.4
	B	0.9	7.8	-9.0	6.5	6.6	7.9	1.0	-0.1	0.1	0.0	1.5	-2.2
Intertemporal elasticity (γ)	C	0.4	7.6	-9.0	5.4	5.6	7.6	1.4	0.0	-0.1	-0.1	1.4	-4.2
	D	0.75	8.3	-9.0	5.7	6.0	8.3	1.8	-0.1	0.5	0.3	1.5	-0.4
Intratemporal elasticity (ρ)	E	0.5	7.9	-9.0	5.2	5.5	8.0	1.7	-0.1	0.2	0.1	1.4	-2.6
	F	0.9	7.7	-9.0	5.7	5.9	7.6	1.4	0.0	-0.1	0.0	1.4	-3.9
Export demand elasticity (σ^E)	G	-10	6.8	-9.0	5.7	5.3	6.8	1.1	0.0	0.0	0.0	0.6	-1.2
	H	-2	9.4	-9.0	5.3	6.4	9.4	2.3	-0.1	0.3	0.1	2.7	-5.0
Sensitivity of capital movements (ϖ)	I	1	7.6	-9.0	5.4	5.7	7.6	1.4	0.0	-0.2	-0.1	1.5	-1.7
	J	9	8.0	-9.0	5.5	5.7	8.0	1.7	0.0	0.3	0.2	1.4	-4.6
Growth rate (g) and interest rate (r^d) combinations g, r	K	2, 3	8.2	-9.0	6.2	6.3	8.3	1.6	-0.1	0.4	0.2	1.5	-1.1
	L	3, 6	8.0	-9.0	5.2	5.5	8.1	2.0	-0.1	0.2	0.1	1.5	-1.7
	M	4, 5	7.8	-9.0	5.8	6.0	7.8	1.3	0.0	0.0	0.0	1.4	-3.5
	N	4, 7	7.8	-9.0	5.1	5.3	7.8	1.8	0.0	0.0	0.0	1.4	-3.0
No liquidity constraints			7.0	-9.0	5.4	5.5	6.9	0.8	0.1	-0.7	-0.4	1.3	-7.6

b) Increasing the retirement age to 65

Case			Z	τ^l	τ^c	p^C	w	C	L	K	F	$\mathbf{p}^{\mathbf{d}}$	A^f
Basic case			-24.5	-10.0	0.0	0.7	7.7	3.1	2.4	2.2	2.3	1.0	-3.9
Labour-capital elasticity (β)	A	0.6	-24.7	-10.2	0.0	0.7	6.8	2.2	2.4	1.4	1.6	1.0	-6.5
	B	0.9	-24.5	-9.9	0.0	0.7	8.1	3.4	2.5	2.9	2.7	1.0	0.3
Intertemporal elasticity (γ)	C	0.4	-23.6	-10.1	0.0	0.7	7.9	3.1	2.4	2.2	2.3	1.0	-3.6
	D	0.75	-26.2	-9.9	0.0	0.7	8.0	3.5	2.5	2.7	2.6	1.0	-1.6
Intratemporal elasticity (ρ)	E	0.5	-20.1	-7.1	0.0	0.7	6.3	1.7	0.6	1.0	0.9	1.0	-0.7
	F	0.9	-29.2	-9.8	0.0	0.5	6.7	3.7	3.6	2.8	3.1	0.7	-5.6
Export demand elasticity (σ^E)	G	-10	-24.6	-10.0	0.0	0.3	6.9	2.6	2.4	2.0	2.2	0.4	-2.8
	H	-2	-24.2	-10.0	0.0	1.3	9.1	3.8	2.4	2.5	2.5	1.8	-4.3
Sensitivity of capital movements (ϖ)	I	1	-24.7	-10.0	0.0	0.7	7.5	2.9	2.4	1.8	2.0	1.1	-2.1
	J	9	-24.3	-10.0	0.0	0.7	8.0	3.3	2.4	2.5	2.5	0.9	-5.6
Growth rate (g) and interest rate (r^d) combinations g, r	K	2, 3	-25.3	-9.9	0.0	0.7	8.4	3.7	2.5	3.1	2.8	1.0	0.0
	L	3, 6	-25.4	-10.0	0.0	0.7	8.2	3.8	2.4	2.7	2.6	1.0	-1.1
	M	4, 5	-24.1	-10.0	0.0	0.7	7.8	3.1	2.4	2.3	2.3	1.0	-3.5
	N	4, 7	-24.8	-10.1	0.0	0.7	7.7	3.1	2.4	2.1	2.2	1.0	-4.1
No liquidity constraints			-19.6	-12.8	0.0	1.0	10.6	3.8	2.5	2.4	2.4	1.5	-3.5

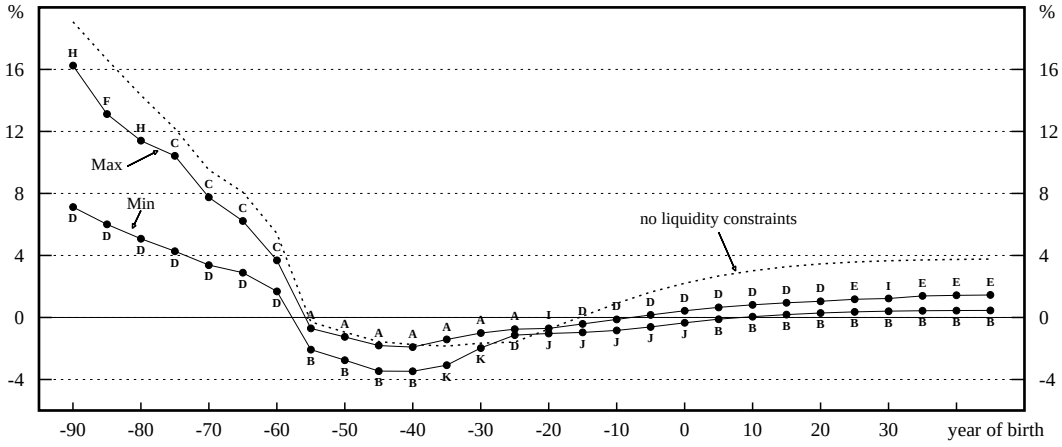
c) Replacing part of the public pensions with mandatory private funded pensions

Case			*Z*	τ^l	τ^c	p^C	*w*	*C*	*L*	*K*	*F*	$\mathbf{p^d}$	A^f	**H**
Basic case			58.2	-9.0	0.0	1.0	14.4	9.9	0.8	8.7	5.5	1.5	35.8	117.1
Labour-capital elasticity (β)	A	0.6	65.3	-9.0	0.0	1.0	14.1	10.2	0.8	6.3	4.9	1.4	18.1	86.1
	B	0.9	35.7	-9.0	0.0	0.6	11.6	6.7	1.1	12.3	5.6	0.8	58.0	141.8
Intertemporal elasticity (γ)	C	0.4	64.1	-9.0	0.0	1.2	16.5	12.6	0.8	10.7	6.8	1.7	45.2	117.5
	D	0.75	43.6	-9.0	0.0	0.8	12.2	6.9	1.1	7.3	4.8	1.1	28.0	114.2
Intratemporal elasticity (ρ)	E	0.5	78.4	-9.0	0.0	1.4	15.6	9.9	-0.3	8.1	4.8	2.0	37.3	116.2
	F	0.9	43.4	-9.0	0.0	0.7	13.3	9.8	1.7	9.3	6.2	1.0	34.5	118.0
Export demand elasticity (σ^E)	G	-10	44.2	-9.0	0.0	0.3	12.7	8.3	1.0	8.5	5.5	0.4	35.4	109.8
	H	-2	82.8	-9.0	0.0	3.0	18.7	12.8	0.4	9.2	5.7	4.4	35.9	128.5
Sensitivity of capital movements (ϖ)	I	1	56.7	-9.0	0.0	0.7	17.2	11.7	0.8	12.5	7.8	1.0	18.1	115.1
	J	9	60.0	-9.0	0.0	1.5	11.9	8.3	0.7	5.1	3.4	2.1	52.6	119.2
Growth rate (g) and interest rate (r^d) combinations g, r	K	2, 3	43.8	-9.0	0.0	1.0	14.2	8.3	1.0	9.5	5.7	1.4	35.4	124.2
	L	3, 6	72.3	-9.0	0.0	1.1	14.3	10.1	0.7	8.5	5.3	1.6	35.9	130.4
	M	4, 5	46.5	-9.0	0.0	1.0	14.5	9.3	0.9	9.1	5.8	1.5	35.9	112.3
	N	4, 7	72.6	-9.0	0.0	1.1	14.4	10.6	0.6	8.4	5.4	1.6	36.1	122.9
No liquidity constraints			59.2	-9.0	0.0	0.9	9.4	5.4	0.7	3.4	2.3	1.3	10.8	111.1

The figures express the percentage difference between the new steady state and the initial steady state. For the VAT rate, contribution rate and the net foreign assets-GDP ratio the figures express percentage points differences.

Z= total old-age pension expenditure
τ^c = value-added tax rate
w = wage rate
L = labour supply
F = private production
A^f = net foreign assets / GDP
τ^l = pension contribution rate
p^C = consumer prices
C = private consumption
K = capital stock
p^d = terms of trade (price of domestic good)
H = private pension funds / GDP

Figure 9.1. Welfare effects of the proposed policy package: Maximum and minimum effects and effects without liquidity constraints, by age



Welfare effects are measured by compensated variation, expressed as a percentage of discounted consumption expenditure during remaining lifetime (negative sign implies a welfare loss). See table 9.1. for the cases the capital letters refer to.

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