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THE ECONOMIC EFFECTS OF POPULATION AGEING AND DEMOGRAPHIC UNCERTAINTY IN LITHUANIA: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Research Report
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1 INTRODUCTION

Population ageing and its consequences have been widely explored in most industrialised countries during the last 10 – 15 years. A general understanding of possible problems has emerged, and vivid discussion of necessary policies is continuing.

Transition economies have understandably focused on economic problems that are pressing in the short term. Yet, population ageing is taking place in these economies also. The research project described in this report, and summarised in this section, has concentrated on ageing in Lithuania.

The project combines economic analysis of population ageing with statistical analysis of demographic uncertainty. Stochastic population simulations, which quantify demographic uncertainty, are used as inputs in a dynamic general equilibrium model of the Lithuanian economy. To our knowledge this approach has not been used before. Thus much of what we present here is new in ageing research. We are able to quantify the consequences of demographic uncertainty on both the expected economic consequences of ageing and on the effects of various policy measures. On both, our results unequivocally show that demographic uncertainty must not be neglected: the magnitudes of uncertainty should make us humble when we make claims about the effects of population ageing and recommend policies to avoid bad and unsustainable outcomes. But this does not mean that inactivity in policies is recommended. Quite the contrary: uncertainty can be thought of as an extra reason for activity, as Auerbach and Hassett (2001) point out: with a risk-averse population the costs of future outcomes worse than expected outweigh the benefits of outcomes better than expected. Wise ageing policies should be prepared for a worse demographic future than the expected one. Our results indicate that recognising demographic uncertainty can also lead to designing new policy instruments and improving old ones, which may help policies to be even more proactive and precautionary than previously. Research in these issues certainly is in very early phases, and a lot more can be expected in the coming years.

What else is new in this project? The stochastic simulations of future Lithuanian population, described shortly below and in full in Chapter 2, are new and should by themselves be of great concern to Lithuanian decision-makers. Behind the simulations is also careful work concerning the reliability of current demographic statistics in Lithuania. Other contributions include estimates of age-related health expenditures (these are first such estimates concerning Lithuania) and descriptions and assessments of migration, family policies, pension system and pension policies and health-care system in Lithuania.

In this section we will look at ageing mostly from an economic viewpoint. We assess the economic characteristics in Lithuanian population ageing process and related important economic features, including the consequences of demographic uncertainty. We also present some methodological viewpoints, summarising our experiences in using stochastic population simulations as inputs in a dynamic general-equilibrium model.

In section 2 we describe demographics. In section 3 we describe our results concerning the way population ageing will affect the Lithuanian economy, in particular the public sector. In section 4 we discuss policy options, and summarise some policy analyses. Section 5 consists of our recommendations, which vary from economic policy suggestions to statistics collection and future research.

2 FUTURE MAY SURPRISE US, BUT LITHUANIAN DEMOGRAPHICS LOOK DARK

Population ageing in Lithuania is a demographic development expected to happen in the future. The expectation, like similar expectations in all European countries, is based on demographic forecasts. And forecasts are erroneous, also demographic forecasts. Forecast errors are unlikely to change the qualitative assessment that populations are indeed ageing throughout the industrialised world. But one of the key starting points of this study is that quantitatively the ageing phenomenon is very uncertain when we look beyond the next couple of decades. One of the major contributions of this project has been to quantify the uncertainty in the Lithuanian demographic future. The work is summarised here; it is presented in detail in Chapter 2 by J. Alho.

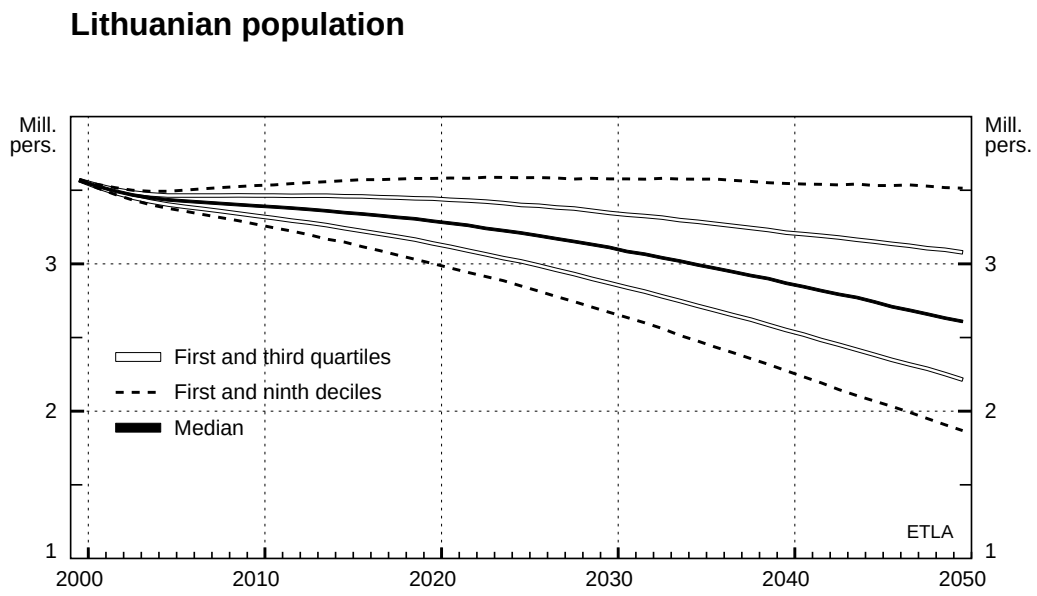
The basic assumptions behind the most likely scenario are as follows.

- fertility is assumed to stay at the prevailing level for the whole forecasting period. Total fertility rate is 1.35. This is in stark contrast to United Nations' and World Bank's fertility assumptions; both expect fertility rates to start increasing after 10 to 20 years and be close to 2 in 2050. Alho argues that evidence supporting their assumptions is weak, at best.
- mortality rates are based on observed decline between 1989 and 1999. The rates are smoothed to averages of the age-specific rates of change. The mortality rates for the oldest old are deemed unreliable, and instead the average of age-specific mortality rates in the four Nordic countries for females over age 90 and males over age 85 are used.
- migration is assumed to start from 17 000 net emigration per year and to decline gradually to zero by the year 2006. So 40 000 – 50 000 inhabitants may leave Lithuania in the near future. Alho presents arguments for both higher and lower choices. Migration is also discussed by Lazutka and Pocius (Chapter 3 in this report).

The uncertainty around the most likely point estimates are based on the following approaches. Fertility: Finnish time series from 1776 - 1996. Mortality: empirical estimates from Finland (which may be too low for Lithuania). Migration: judgment, as in some other studies. Nothing specifically Lithuanian is included – the information does not exist or is deemed unreliable.

The point forecast and the uncertainty are put into a model, which randomly produces 1500 different population paths for Lithuania. Their distribution shows which type of outcomes are more likely and which less. Figures 1 and 2 summarise the outcome.

Figure 1.

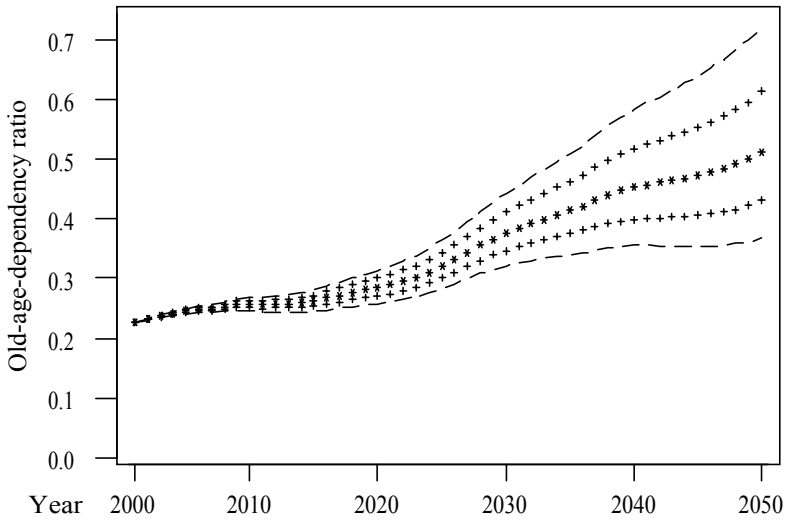


It is very likely that there will be fewer Lithuanians in the future than there are now. There is less than 10 % probability that the population in 2050 will be larger than in 2000. In the median outcome the population decreases by 0.5 million. And the probability that there are less than 2 million Lithuanians in 2050 is well over 10 %. One may well say that Lithuania has a population problem, without going deeper into the ageing issue.

Uncertainty with respect to the size of population is also large. It is as likely that the population in 2050 is between 2.2 and 3.1 million as that it is either smaller than 2.2 or larger than 3.1 million. If one wants an interval that has 80 % probability to include the actual outcome, the limits are 1.8 million and 3.5 million. Uncertainty is sizeable already in 2020: the width of the 80 % confidence interval – the difference between first and ninth deciles – is over half a million people.

Figure 2 describes the distribution of old-age dependency ratio (the ratio of population in ages 65+ over the population in ages 19-64) in 2000 – 2050. It is also calculated from 1500 simulations.

Figure 2: Predictive distribution of the Lithuanian old-age-dependency ratio: median (*), first and third quartiles (+), and first and ninth deciles (-).



Why is the high – low population scenario approach misleading?

Before moving to economic issues, we wish to motivate our choice of using stochastic population simulations. Economic assessments of ageing costs commonly rely on one basic demographic projection, supplemented by "high" and "low" demographic variants for sensitivity analysis. Lee and Edwards (2002, p. 11) offer four ways in which this scenario-based approach to assessing the uncertainty of forecasts of total population is seriously flawed. The first concerns assumptions about cross correlations between fertility and mortality, which by the nature of the method are usually either +1.0 or –1.0. The second is that fertility and/or mortality will always follow the highest plausible path or the lowest; long-run fluctuations like the baby boom are ruled out. Thirdly, the method provides inconsistent indications of uncertainty to differing outcome variables such as population size, life expectancy and old age dependency ratios. Fourthly, the method is intrinsically unable to assign probabilities to its high-low ranges.

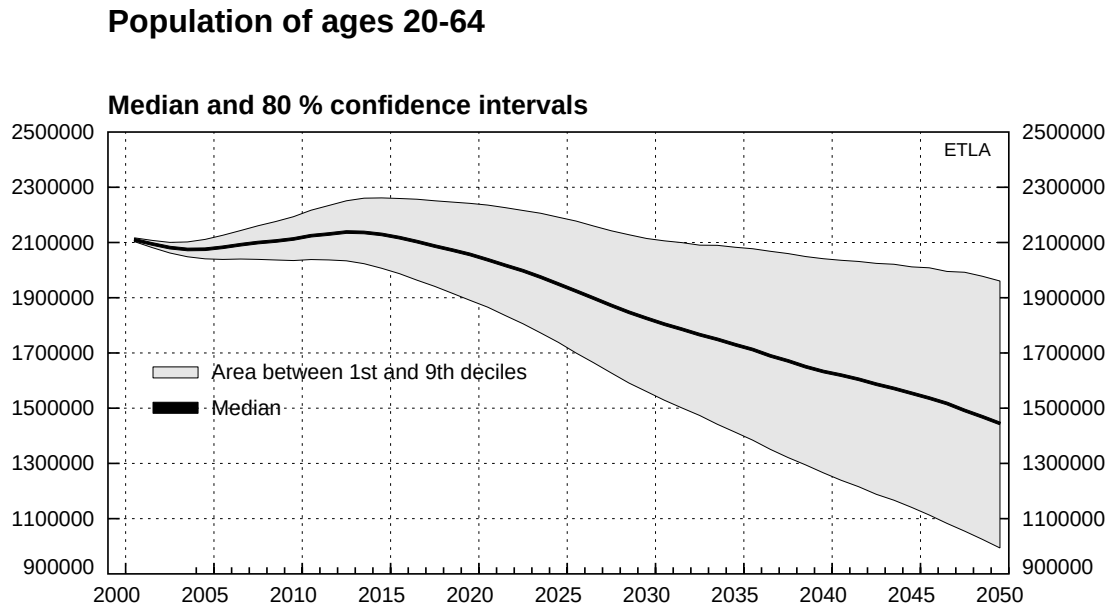
3 ECONOMIC EFFECTS OF POPULATION AGEING IN LITHUANIA

3.1 Introduction

The strongest link between the demographic trends and the economy of Lithuania considers labour supply. Figure 3 shows both the median path and the uncertainty involved in the amount of working-aged population. It shows that the population ageing starts to have notable effects on labour markets in 2020's, i.e. somewhat later than in OECD countries, but the decline is pronounced. The median falls from 2.1 million in 2015 to less than 1.5 mil-

lion in 35 years. Furthermore, there is about 10 percent probability that the number falls below 1 million.

Figure 3.



Population ageing affects the economy both directly by changing market conditions in various markets, but also indirectly by changing the demand for income transfers and services provided by public sector. Since this higher demand needs to be financed, also tax rates change. Furthermore, the final incidence of the tax burden depends on the tax structure used and the reactions of the agents in the markets.

The only method available that can handle all these elements in a unified framework is a numerical overlapping generations model. Our LOG model (short of Lithuanian Overlapping-Generations model) is an improved and more detailed version of the overlapping generations model used in the earlier study (see Jensen and Lassila 2002). The central elements of the model are utility maximizing households, profit maximizing firms, foreign agents, labour, capital and goods markets, and a public sector, which provides services and income transfers and collects various taxes. The model is calibrated to the Lithuanian economy. We simulate the effects of population ageing by using the sample paths of the stochastic population forecast as inputs in the model.

1.3.2 Macroeconomic outcomes of population ageing

The most likely population scenario, referred to as the baseline scenario, predicts that the fertility rate remains to be low, expected lifetime is longer in the future and net migration declines gradually to zero. This means that the age ratio rises permanently to a higher level.

A simulation using the baseline population as input in the LOG model shows that the low fertility rate reduces labour supply and generates an adjustment process in production and

in labour markets. Firms substitute capital for labour, but the growth rate of capital stock slows down. The lack of labour compels firms to expand abroad. Wage rate rises due to excess demand for labour. The net effect on disposable incomes and consumption of households is, however, negative due to higher pension contribution rates and taxes.

The demographic trend also affects aggregate saving. The higher the ratio of pensioners to young people, the lower is the savings ratio of the economy. On the other hand, the needed investments are much smaller in a shrinking economy. The balance in capital markets may be reached either by international capital flows or by shifts in the domestic interest rate or both. We used in the simulations a model version in which the interest rate is fixed.

Another relevant question is whether ageing also affects the export demand and terms of trade. Since export demand was assumed to be price-elastic and independent of the population ageing in export markets, the reduced supply of export goods improves the terms of trade in the long term

From the point of view of public sector finances, population ageing is problematic both due to higher pension expenditure and increased demand for old age services but also due to the smaller total wages, which is the main tax base.

We now turn to the two biggest issues determining the costs of population ageing, namely pensions and health care.

1.3.3 Pensions

In principle, Lithuania has a pension system that appears both transparent and well-thought of. In practice there are severe problems related to contribution evasion and deficient coverage, old-age poverty, weak incentives, and fiscal sustainability.

There are two types of pensions in Lithuania: social insurance pensions based on contributions and financed from the separate social insurance fund and state pensions payable from the state budget. Both operate on a pay-as-you-go basis.

Social insurance pensions are paid from the separate state social insurance fund and are based on the amount of contributions paid and the length of the coverage. They constitute more than 90 % of Lithuanian pensions**.** In 2000 social insurance pension outlays amounted to 34,2 per cent of the state budget. State pensions accounted for 2,24 per cent and social pensions for 1,2 per cent of the state budget.

The state social insurance fund is governed by a tripartite council representing employers' organisations, labour unions, and the government. The fund is financed by a 31% employer contribution on the wage bill plus a 3% employee contribution on their individual wages (the rates were 30 % and 1 % before year 2000). Social security contributions are used to finance pensions (old-age, disability and survivorship), short-term benefits (sickness and maternity), as well as unemployment and health insurance partially. The pension system is described in more detail in Chapter 4 by A. Morkuniene and commented by R. Lazutka.

A previous Phare study (Lassila et al., 2001) identified three groups of problems in the Lithuanian pension environment. The first consists of fiscal problems of the current pension system. These are partly connected with the tumultuous transition process, especially the fall in GDP in

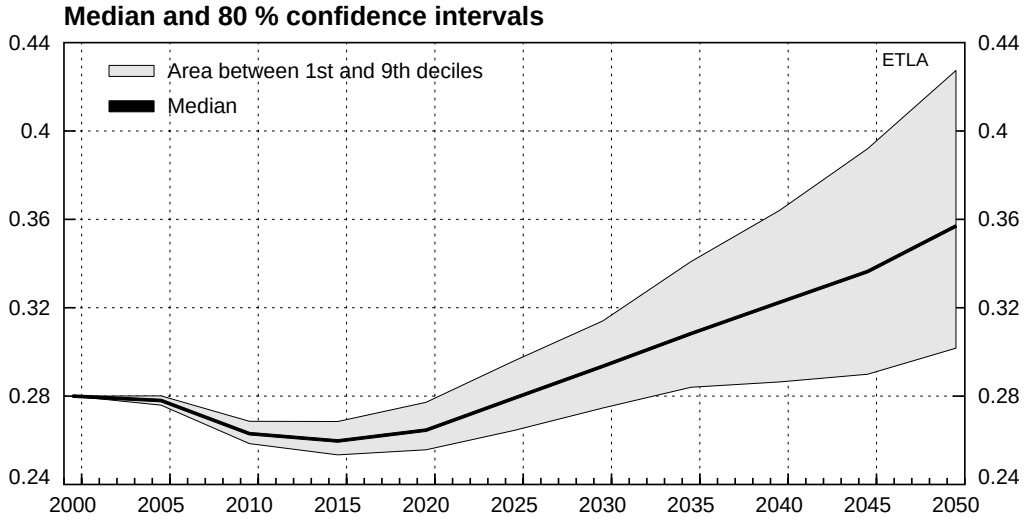
the early 1990's and the accompanied labour market developments. An increasing number of disability pensions is one result, and the problems have been the background for wide-spread evasion of social contributions and income taxes. Fiscal problems will prevail: ageing will raise pension expenditures 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, declining coverage of the current system. Projections based on the current share of people contributing to the system 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. This is probably one factor behind contribution evasion. High redistribution within the system weakens the work incentives of middle- and high-income earners. The fiscal difficulties due to demographics point towards future political risks and make 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.

Figure 4.

Social security contribution rate and demographic uncertainty



These problems still persist. Chapter 4 shows that the fiscal imbalances are not likely to be in the very near future, the coverage problem has if anything become slightly worse.

Figure 4 shows the distribution of social security contributions from 100 population runs with the LOG model. The starting value of the contributions is set to 28, which includes both pension contributions and health contribution parts. Coverage is assumed to remain at the current low level.

After the initial decline, the current contribution level is again reached in 20 – 30 years. In 2050 the rate is almost certainly above the starting level of 28 %. The median estimate is 36 %, and there is 10 % probability that the level exceeds 43 %.

3.4 Health care

Main features and problems

The model of health care system was inherited from the Soviet Union era, which implies that also the current problems are largely similar to those in the other transition countries. There have been substantial reforms which have modified the administration and finance, but the provision of public services mostly follows earlier principles. From the point of view of cost efficiency this implies that the number of personnel and beds in hospitals is high, but the quality of provided care does not correspond to the size of total costs.

The financing reform established a mandatory health insurance system. The share of the finance coming from private sector insurance contributions is, however, less than a fifth. This is partly due to the fact that the state pays the contributions on behalf of more than half of the population. Another cause for the low amount of private contributions is the reduced incentive to participate due to the extensive care provided also to those who are not insured. A rough calculation shows that the contributions received by the State Sickness Fund are about 1.2 percent of total wages even though the employers' statutory contribution rate is 3 percent.

For the insured people, almost all the health care services are free. On the other hand, there is a problem of receiving enough finance for wages, pharmaceuticals and medical equipment. Together with the inadequate quality of basic services this has lead to co-payments, part of which are unofficial. The under-the-table payments to medical personnel may generate non-optimal allocation of resources and corresponding efficiency losses if the incentives are not correct. It is also likely that this practice is against the objective of equity, since the need for health care services is likely to be negatively correlated with the ability to pay.

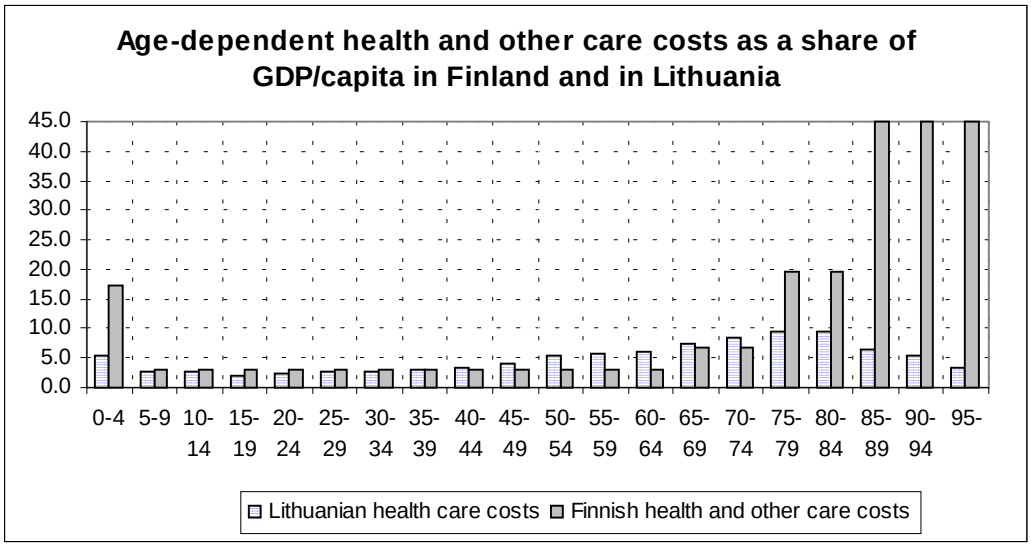
Many of the future challenges are based on the initial transition problems. The system needs more money to be able to supply adequate services even for the current demand. The higher future demand reflects both the big change in the demographic structure and the likely shift in the age-related costs to the standards of the Western societies. The long-term growth of the incomes helps to finance these costs, but whether the provision of health care takes place in the public or private sector is unclear. In any case, it seems that the older and larger generations have not enough means to pay for their old age health costs, and intergenerational transfers are needed. The solidarity of the future generations is thereby challenged by markedly higher taxes. Furthermore, since the other ageing costs increase at the same time and since sensitivity to react to tax rate hikes by increasing tax avoidance can be large, there is a substantial risk to end up in a vicious circle of higher tax rates and lower actual tax bases.

Evaluating the effects of demographic uncertainty on the future health care costs

The age-specific health cost data gathered by Morkūnienė and Murauskiene for the first time (see Chapter 5 in this report) helps us to compare the current situation to the one in

the Western countries. It seems that the ratio of age-specific costs to GDP are markedly lower in Lithuania in the very old ages. This might partly be due to the difficulty of separating health costs from costs of long-term care (see OECD 2000 for similar problems in developed countries). We take as a point of comparison the age-specific health and old age cost data from Finland (it is based on the norms used for the state support to municipalities). Dividing the data by GDP/capita allows us to put the costs in the same figure. Figure 5 shows that the largest cost pressures are in the health and old age care of the oldest people. The experiences from Western countries show that the costs are highest during the few last years of life.

Figure 5.



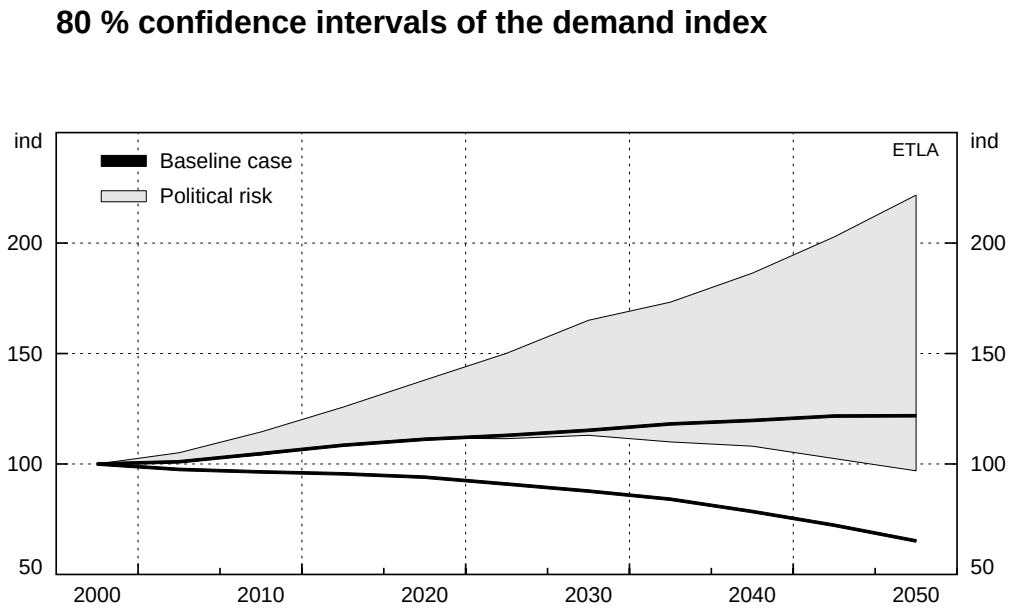
We have evaluated the future demand of services by simply combining a population forecast and an age-cost profile. The outcome is an index, which shows the amount of needed care. Aggregate labor costs can be calculated using this quantity index and labor unit cost data from corresponding OLG model simulations.

Political uncertainty and public health care costs

We have also produced an example of the effects of political uncertainty. In figure 6, 100 sample paths from the Lithuanian stochastic population forecast have been used to generate the distribution of the demand index in the baseline case and in a case which might is called as "realisation of political risks". The latter assumes that the age-dependent costs divided by GDP/capita are increased in a political process to a level, which corresponds current norms in Finland. The increase is carried out in 30 years.

The results show clearly that connecting demographic uncertainty to the current low health care costs is not likely to lead to unsustainable future paths of expenditures. On the other hand, if the demand and public provision of the services rises to the levels typical to Western standards, even the median shows an increase of more than 50 percent. Such a development would mean that both the needed tax hikes and the crowding out effect of the public sector labour demand would put pressures on the private economies. Furthermore, demographic uncertainty plays now a much bigger role. The probability of very high values for the index is quite large.

Figure 6.



The calculations above gave an idea of the demographic and political uncertainty concerning the quantity demanded. Two further questions remain open. First is the trend in prices, which is linked to the quality of services demanded. Another is the future trend in the productivity when the services are provided.

We have discussed here the two large expenditure items, pensions and health care, which are strongly linked to ageing of population. Third important issue, family policy, is discussed by Lazutka (Chapter 6 in this report). Another large age-linked item is educational expenses. We do not consider the sensitivity of those expenditures to ageing. One could claim that the low fertility lead to lower educational costs, which alleviates the public finance problems of ageing. This is not, however, very likely. In our case the assumed high productivity growth necessitates more resources in the educational sector in all demographic scenarios.

4 WHAT AGEING POLICIES SHOULD LITHUANIA PURSUE?

4.1 General remarks

To summarise, Lithuania has a postponed Western-type ageing problem, due mostly to low fertility and coming in later, and a severe public administration reliability problem. To solve the former, the latter must be solved first. After that, the latter will still turn out as a difficult task.

Besides our own analyses, we look for wise policies from existing research and experience. There are two obvious sources: ageing policies in industrial countries, and administration and tax evasion research concerning developing and transition economies. The first source

is summarised in Bovenberg and van der Linden (1997). Some, perhaps most, of the policies mentioned in there are clearly very important for Lithuania. We mention just a few:

- Enhance the efficiency of social-security administration
- Shift tax burden more to those outside the labour force
- Enhance efficiency in financial sectors

Tax evasion is a common problem for all transition economies. It is partly linked to the negative ideological image of the public sector, but also to the undeveloped tax administration and legislation. One popular way of fighting against evasion is to introduce insurance elements in the provision of public services and income transfers. For the latter, the approach of individual funded or nominal social accounts, especially applied to pension systems, has gained much interest and also success. In the service sector, health insurance has become common, however, as explained above, not always without problems.

Another possible method is to look for administratively more efficient tax systems. This means typically more simple tax rules, equal rates and larger bases. Also the tax structure may be aimed to reduce evasion. VAT is not easy to avoid, since before the final purchase, the sales of the intermediate good are registered from the announcements of both seller and buyer.

Third complementary way out of this dilemma, highly relevant for ageing economies, is to strongly limit the increase in expenditures and taxes. Tax smoothing e.g., by prefunding would also distribute the burden in time.

In this study, Lithuania has been a test ground for introducing demographic uncertainty into ageing analysis. We have shown that uncertainty is large. Thus the asymmetry mentioned by Auerbach and Hassett (2001) must be taken into account: with risk aversion, outcomes that are worse than expected should weigh more than outcomes better than expected. Policies should be precautionary. We must ask how unfavourable demographics could hit Lithuania. What are the really bad cases Lithuania should be prepared for? One is straightforward to identify: declining labour force, due to low fertility and/or high emigration. It would result in very bad age ratios, which, with PAYG pensions, would cause high contribution rates and also create pressures for tax increases to finance age-related public services and transfers. Another financial problem may come from unexpected decreases in mortality.

We have analysed one pension policy, which could be expected to be efficient for the fiscal consequences of declining labour force: moving from average-wage indexation to wage-bill indexation. Another policy measure, directed at surprising mortality decline and its effects, is longevity adjustment of pension benefits. As a more common policy measures, we have also studied increases in the retirement age and a switch from payroll-type financing to VAT.

4.2 Pension policies

Many of this project's researchers took part in an earlier research project, which came up with a suggestion of a thorough renewal of the pension system (see Lassila et al, 2001, and Jensen and Lassila 2002). The proposal included increases in the basic pension for a couple of decades, switching towards more VAT financing, and replacing the earnings-related part of the pension with a private mandatory fully funded scheme.

The key feature behind the recommendation above was the coverage problem. If one believes the current system is unsustainable, because increasing contributions are likely to make the contribution evasion more common, then the recommendation is indeed worth repeating here.

If, however, one thinks that the current system can be sustained, and the coverage increased so that all Lithuanians are adequately insured for old age, then one must search for policies that help the sustainability and efficiency of the system.

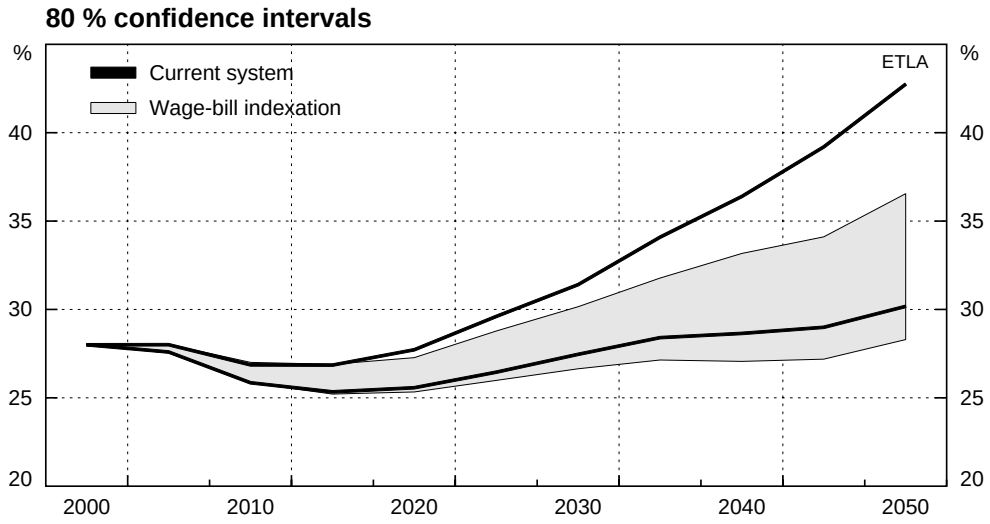
Without committing us to either of these views, we have analysed some policies that might help the current pension system. One relevant benchmark has been the Notional Defined Contribution (NDC) system, which is in use e.g. in Sweden and in Latvia. The major objectives in this system are firstly to improve efficiency by tighter link between contributions and benefits and secondly to keep contribution rate stable by using methods, which redistribute demographic risks between generations. These methods, wage-bill indexation and longevity adjustment, were used also in our simulations. Actually we do not know any other studies, which have analysed comprehensively the efficiency of these methods to limit the effects of demographic uncertainty. This is quite surprising taking into account the popularity of the approach in reform discussions and also in actual reforms.

Figure 7, in four parts, describe the effects of these policies on the distribution of the contribution rate. The analysis is explained in more detail in Chapter 7 by Lassila and Valkonen.

Figure 7.

a)

Social security contribution rate in Lithuania



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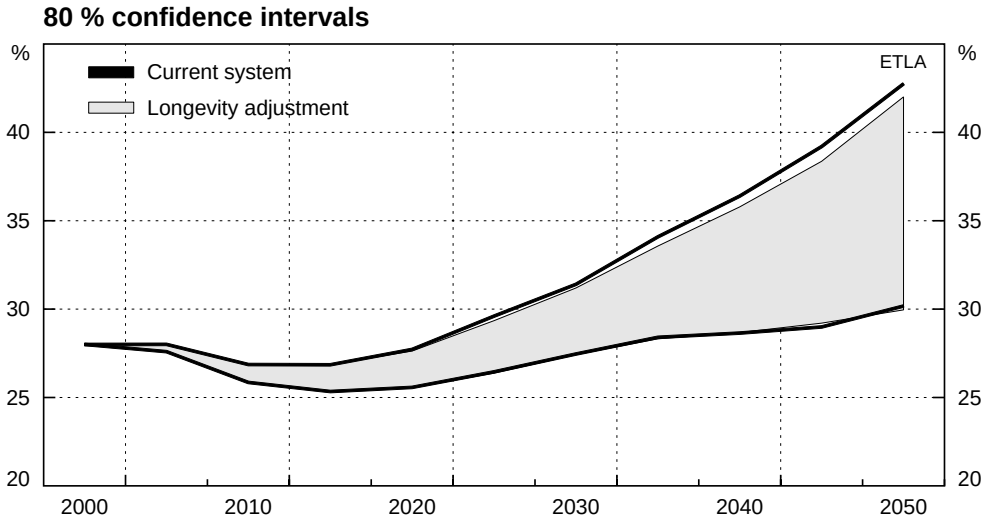
80 % confidence intervals
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Current system
Longevity adjustment
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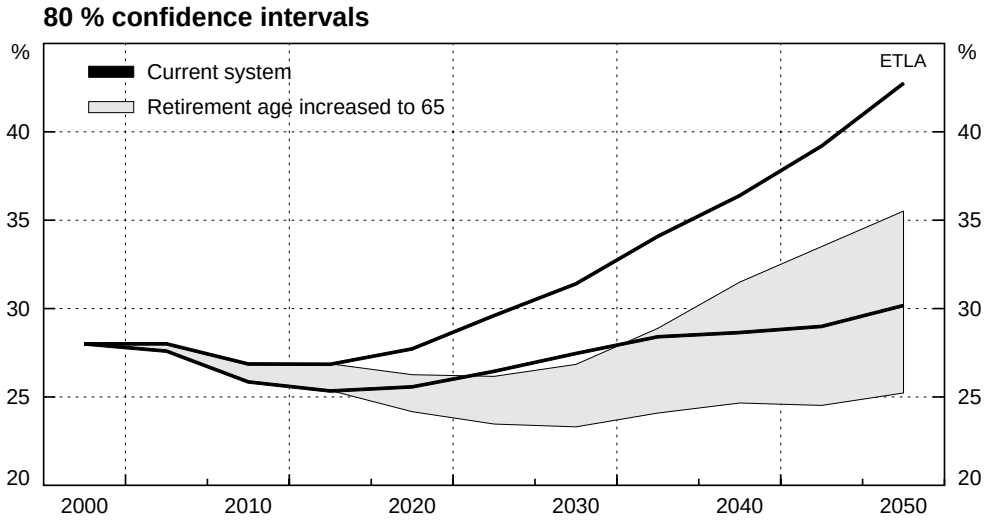
80 % confidence intervals
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Current system
Retirement age increased to 65
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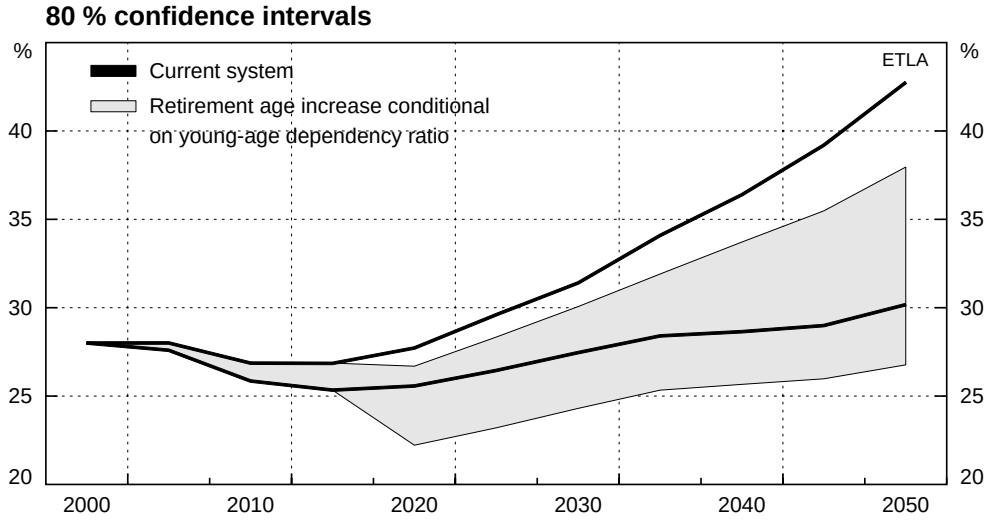
d)



Wage-bill indexation:

We have studied pension indexing, namely switching from average wage indexation to total wage-bill indexation. Currently the earnings-related part of pension benefits is indexed to average wages. In our alternative, the indexation is to total wage bill, which includes also the number of workers. The results show that wage-bill indexation effectively decreases the sensitivity of pension contributions to demographic uncertainty (see figure 7 a), at the cost of transferring demographic risks to pensioners but without endangering the basic subsistence function of the pensions. There is an ex ante trade-off between contribution variability and replacement rate variability, the former declining and the latter increasing with the degree of wage-bill indexing. One way of limiting the possible negative effects of the reformed index rule to the replacement rate is to announce to the worker early enough the likely pension level and give a possibility to accrue more pension by retiring later.

Flexible retirement age is a prerequisite also to the efficient use of the pension policy analysed next, namely longevity adjustment.

Longevity adjustment:

A new way of dealing with increased life expectancy is to link pension benefits to average longevity. It is applied in Sweden and in Latvia. The higher the expected number of pension years, the smaller is the pension. Since life expectancy is likely to increase quite slowly and steadily in industrial countries, individuals already know early during their working age the probable amount of the reduction in pensions. Therefore they can adjust in advance by shifting labour supply and private saving correspondingly.

The Swedish application of longevity adjustment to pension benefits is based on observed mortality[1]. Each year, the latest available statistics on age-specific mortality is used to calculate the expected remaining lifetime of those reaching the official retirement age. Each period's longevity is compared to the base period's longevity; the coefficient is the inverse of this comparison. Longevity adjustment to each cohort's pensions is done only once, when the cohort starts to receive old-age pensions.

When the observed[2] numbers are used in the longevity adjustment, the LOG model gives the following simulation results for contributions (see figure 7b). The effects are small. One reason for this is that the adjustment concerns only the earnings-related part of the pension, not the basic part. Another is that the measure affects one new retiring cohort per period, so it comes into force very gradually.

This analysis has been somewhat crude, since we do not deem the current mortality information very reliable. That is why the period 2005 – 2009 was used as the base period, and first changes in pensions took place for those retiring in 2010 – 2014. Another weakness is that some migration is also counted as changes in mortality, as explained in section 7, but this effect is probably rather small. Despite these reservations the results seem to show that from a fiscal point of view longevity adjustment is not as important as wage-bill indexation. Still it might be a good measure and should be taken under serious consideration in the future, but only after the mortality statistics have become more reliable.

Increasing the retirement age:

Increasing the retirement age is analysed in two different variations. Firstly, we increased the retirement age gradually to 65 years, so that the cohort born 1960 is the first cohort with 65 as the official age for old-age pensions. Increasing retirement age is in practise a way to cut pensions, and it decreases the contribution rate roughly proportionally to the base contribution rate in all demographic alternatives considered. An intuitive reason for proportional effects is that the bad cases are those where there are many pensioners relative to workers, and in those cases the increase in retirement age also has larger effects.

In the second alternative we tied the timing and magnitude of retirement age increase to future demographic development in Lithuania. We demonstrate by this that retirement age increase can also be used to affect directly the uncertainty, originating in uncertain future demographics, in pensions and contributions. While this conclusion is hardly surprising, to our knowledge no-one has shown this before.

The baseline distribution of the social security contributions show decreasing contributions for about 15 years, and then it takes from 5 to 15 more years before the current contribution level is again reached. This gives time enough to tie retirement age increase to future demographics in a manner that could draw people's attention to the problem of declining population. The higher fertility is, the less retirement age needs be increased.

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1 An alternative would be to use forecast mortality specific to the cohort reaching retirement age. With increasing life expectancy, the forecast-based estimate of the length of the remaining lifetime exceeds that based on the latest observed mortality. One might then think that a longevity adjustment based on forecasts would yield bigger cuts in monthly pensions than an adjustment based on observed mortality. Lassila and Valkonen (2002) claim that this is not likely. The reason is that in many countries the increase in longevity has already taken place in the base period's forecasts, but not in the observations.

2 "Observed" means here that as the scenario actualises period by period, the coefficient is calculated from the previous period's age-specific mortalities.

The Lithuanian policy-makers could use the information in this report, specifically the young-age dependency ratio (Alho, this report, Appendix IV). The young-age dependency ratio is the ratio of population in ages 0 – 18 to those in ages 19 – 64. Looking ahead to year 2020, this ratio is uncertain: although the working-age population in 2020 can be predicted with some confidence, the young have not yet been born.

Assume a rule is announced now: the retirement age depends on the young-age dependency ratio in 2020 and onwards. Specifically, if the ratio in 2020 is below the first quartile value in Alho's predictive distribution, the retirement age is increased to 65 years. If the ratio is lower than the median of the predictive distribution but higher than the first quartile, the retirement age is increased 63.75 years. If the value is above the median but below the third quartile, the retirement age is increased to 62.5 years. Finally, if the ratio is above the third quartile value of the predictive distribution, the retirement age remains at 61.25 years.

The increases in retirement age are irreversible. So, if further in the future the young-age dependency ratio increases, the retirement age does not decline. But if the dependency ratio decreases further the retirement age increases if the limit values described above are exceeded.

Figure 7d shows that the contribution rates again decline, in some cases more than with the fixed-increase-to-65 schedule, in some cases less. In 2050 the decreases are smaller with this conditional increase than with the unconditional increase, as can be expected. Variation in contributions is larger with the dependency-based increase in retirement age policy; this example turned out to be slightly variance-increasing, not decreasing as Lassila and Valkonen thought it to be. Thus they demonstrated, unintentionally, that conditional policies should be designed carefully and studied much more extensively than has been possible in this project.

Switching from contributions to VAT in pension financing:

There are several reasons to consider also shifts in the tax structure as a method of alleviating the burden of high ageing costs. The higher pension contribution rates of the future wage earners are generated by ageing of the population. Since there are no corresponding improvements in the replacement ratio, this increase is almost a pure tax (the only actuarial justification is the longer lifetime). The looming negative labour market incentive effects have generated a discussion whether it would be wise to finance at least part of the costs by taxing consumption. Even though VAT is also a part of a tax wedge between labour costs of a employer and net wages, the tax base is larger (current financial wealth and income transfers are also included) and the distortion thereby is smaller. Hence, the measure would support growth and enhance welfare.

Another often used justification for the measure, linked to the ageing problem, is that the baby-boom generations have not financed a fair share of their pensions. The intergenerational shift of resources implied could be mitigated by taxing their incomes or expenditures more heavily.

One of the main problems of the pension systems in transition countries is the low participation rate even in the mandatory schemes. Comprehensive collection of pension contributions, as well as other labour income taxes, seems to be difficult. A shift to VAT funding could help, not only because of easier control, but also due to the participation incentive

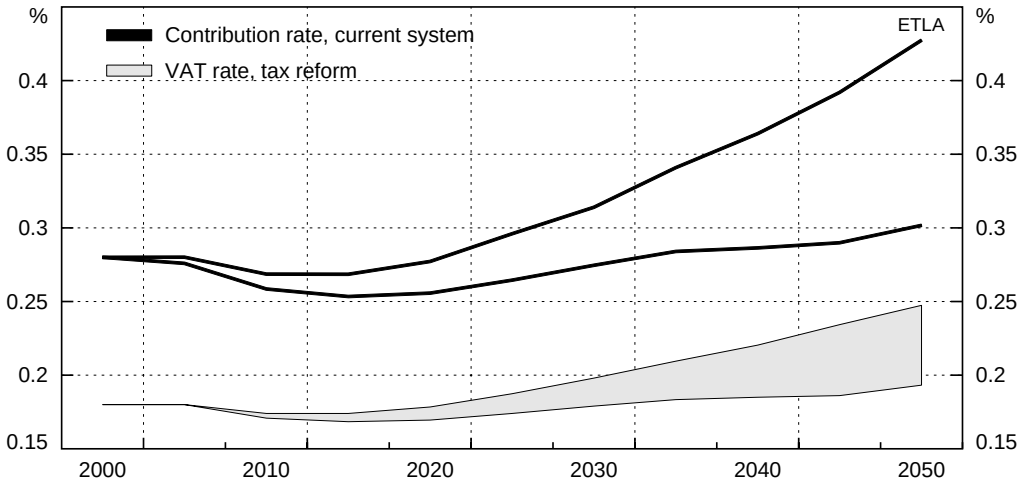
created. Those who avoid contributions would be still participating the financing of the pension system, but without accruing pension rights.

Tax reform simulations with the numerical OLG model reveal that some positive incentive gains can be detected. Also the intergenerational tax smoothing seems to limit the intergenerational reallocation of resources. Corresponding to the figures above, which describe the future distribution of social security contribution rate in the baseline case and after the reform, we focus here on the VAT rate after the reform (see figure 8). It seems that broadening the tax base both mitigates the increase in the median and gives markedly narrower limits to the 80 percent confidence interval. As this can be reached with very small welfare losses to some generations and bigger gains for all the others, the reform seems to be advisable.

Figure 8.

Social security contribution rate and value added tax rate in Lithuania

Median and 80 % intervals



Summarising pension policies:

The following two tables summarise the effects of pension policies to contribution rates. It is important to notice that including uncertainty into analysis leads to new conceptual issues, in addition to multiplication of numerical results. The tables highlight this. The first table presents the distribution of outcomes, and the second table the distribution of policy effects. The figures in the tables answer two different questions; it holds both that the median of contribution rates in 2030 declines by 0.98 percentage points when moving to full wage-bill indexation, and that at the same time the median effect of this measure is a decline of 0.84 percentage points.

Table 1 Distribution of social security contributions
Median rate and 50 % and 80 % confidence limits, %

Policy measure	2000	2030			2050		
		Median	50 %	80 %	Median	50 %	80 %
Current system	28	29.41	28.49 30.40	27.46 31.39	35.70	33.31 38.05	30.19 42.69
Wage-bill indexation	28	28.43	27.64 29.42	26.64 30.15	32.10	30.39 34.25	28.29 36.55
Longevity adjustment	28	29.16	28.34 30.19	27.42 31.20	34.84	32.90 37.17	29.96 42.01
Retirement age increase	28	25.05	24.20 25.78	23.31 26.84	29.83	28.06 31.77	25.24 35.51
Conditional increase in retirement age	28	27.22	25.71 29.09	24.30 30.06	31.57	29.40 34.05	26.77 37.96

Table 2 Distribution of policy effects on social security contributions
Median effect and 50 % and 80 % confidence limits, %-points

Policy measure	2030			2050		
	Median	50 %	80 %	Median	50 %	80 %
Wage-bill indexation	-0.84	-0.38 -1.62	0.22 -2.35	-3.00	-1.74 -5.38	-1.17 -7.46
Longevity adjustment	-0.18	-0.12 -0.29	-0.04 -0.39	-0.47	-0.13 -0.82	0.25 -1.19
Retirement age increase	-4.38	-4.18 -4.64	-4.07 -4.98	-5.64	-5.22 -6.48	-4.96 -7.23
Conditional increase in retirement age	-1.77	0.0 -3.95	0.0 -4.77	-5.12	-1.88 -6.36	0.0 -7.14

The tables show that pension policy measures have effects with the right sign: contributions would decline. Of the four measures considered the longevity adjustment has smallest effects. Although data problems affect this outcome, it confirms the view that the Lithuanian ageing problem is much more due to low fertility than to increasing longevity.

For VAT the figure 8 suffice. In the base case the VAT rate is exogenous, set to 18 % in all demographic alternatives. When it is made endogenous, the distribution of outcomes equals the distribution of policy effects plus a constant. Put in another way, the effects on VAT are not correlated to the starting level of VAT, whereas the effects on contributions, in cases presented in the above tables, are correlated to original contribution levels.

A word of warning here: we have only dealt with demographic uncertainty. The policy measures considered certainly are sensitive also to economic uncertainty. Before indexing pension benefits to total wage bill ,e. g., one should analyse how the wage bill behaves over the business cycle and what consequences that might have on pensions and contributions.

We have not analysed prefunding for future pension benefits. A version of it, a fully funded private system, was analysed (without demographic uncertainty) in the previous study (see e.g. Jensen and Lassila, 2002). A fully-funded system defined-contribution system would by definition even out completely the variation in contribution rates, if only

demographic uncertainty is considered. Prefunding should in the future be analysed especially from the point of view of demographic and economic uncertainty. To quote Lee and Tuljapurkar (2001, p. 53): ”One of the most basic questions is the following: In the face of uncertainty of the future finances of the Social Security system, should we accumulate a large reserve fund to buffer the system against likely future adversity, or should we tailor our policy to future realities as they unfold?” Why we have not done that analysis is because it is more than a parametric change: the institutional structure is not there.

5 DEMOGRAPHIC UNCERTAINTY, ECONOMIC POLICIES AND INTERGENERATIONAL REDISTRIBUTION

Intergenerational redistribution measures summarise the effects of various policies on the welfare of different cohorts. The measures take into account the changes during the whole lifespans of cohorts. As the effects seem to be rather uncertain even in a single period and accounting only for demographic uncertainty, as this study demonstrates, one could think that life-long effects of policies are so uncertain that practically nothing can be said. This is not generally true, however. Lassila and Valkonen (2002, Chapter 7 of this report) interpret the results of this study so that policy measures can be divided into two groups with respect to the uncertainty in their intergenerational redistribution consequences, keeping in mind that the uncertainty here reflects only the underlying demographic uncertainty. The first group consists here measures like switching from contributions to VAT and increasing the retirement age according to an unconditional plan. The second group of policies include longevity adjustment of pension benefits, switching to wage-bill indexation in pensions and conditioning the retirement age to dependency ratios.

In the first group, the relative positions of different cohorts vis-à-vis each other remain roughly the same, the uncertainty concerns mainly the size, and sometimes also the sign, of the welfare effects. In the second group the magnitudes are also uncertain, but in addition to that the relative positions of different generations are very uncertain in some cases. For instance current pensioners may lose and future generations gain from switching to wage-bill indexation in pension benefits, but it is quite possible that current pensioners will gain and future generations lose, or at least gain less than current pensioners; the patterns depend on future demographics.

An intuitive reason for the differences in the uncertainty of welfare consequences is apparent, as Lassila and Valkonen note, when one considers what distinguishes the policies in the two groups. The policies in the second group are explicitly tied to future demographics, whereas those in the first group are not.

As figure 9 shows, the welfare effects from wage-bill indexation (measured in this study by cohort-wise compensated variations) are uncertain. A funny feature is that for some generations the effects are cancelling each other out, so the total effect is rather certain!

Figure 9.

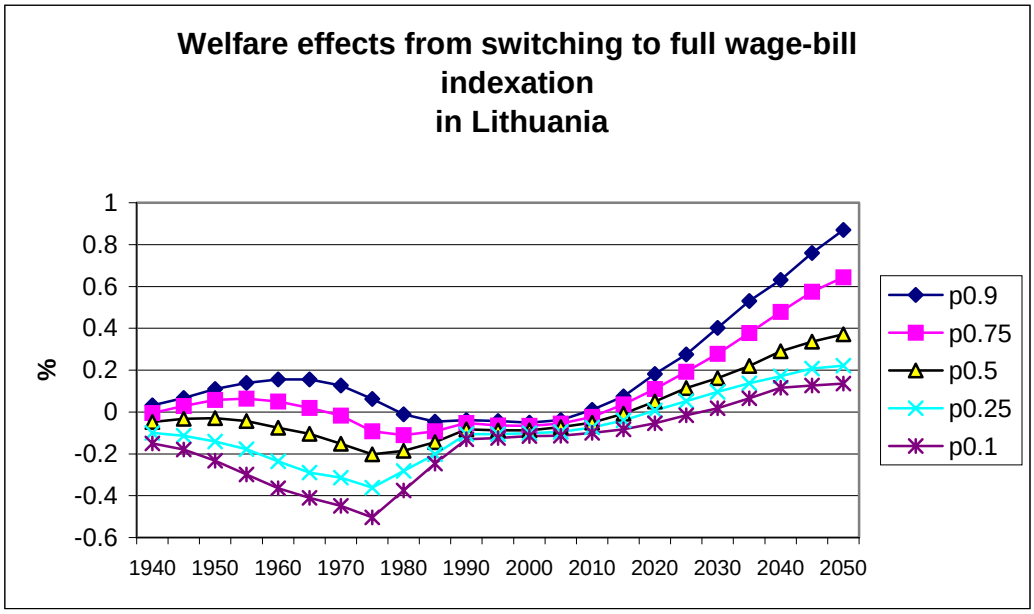
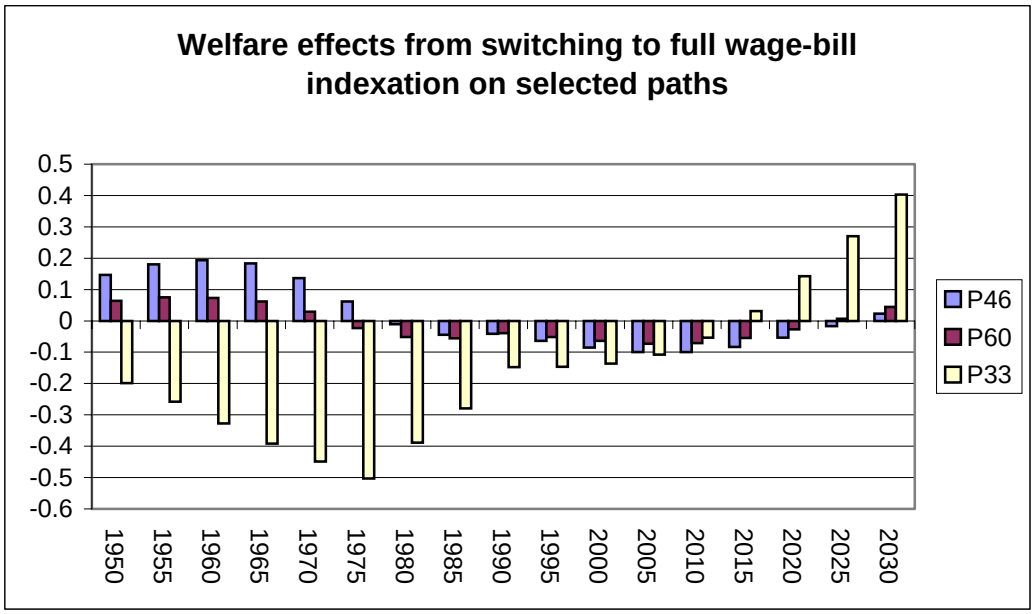


Figure 10 includes welfare effects of wage bill indexation in selected population paths. They are illuminative. Current workers and pensioners gain from wage-bill indexation when the number of workers initially increases. Future cohorts gain less in that case or even lose. But if current cohorts lose, it is because the labour force declines, and in that case future cohorts are better off with wage-bill indexation than with current system.

Figure 10.



6 CONCLUDING REMARKS

6.1 Recommendations

Based on research done in this project, we wish to make the following recommendations.

Statistical recommendations:
* The accuracy of censuses should be studied using survey-based dual systems estimation. Such methods are a standard practice in the United States and the United Kingdom, for example.
* A systematic approach to collecting both in and out-migration data should be established. Information on out-migration can probably only be collected via surveys, such as the regular household survey.
* The accuracy of the mortality statistics in the oldest ages should be investigated. Current official statistics contain features that are unusual in international comparison. For a better understanding of the problems caused by aging it is necessary to determine the reliability of the statistics.
* A system of keeping track of health care expenditures by age should be set up. In particular, the reliability of the cost estimates and the causes of the low level of expenditure in the oldest ages should be investigated. The current estimates are unusual in international comparison.

Immigration policy recommendation:
Although net emigration from Lithuania is the generally expected development in the near future, preparatory policies for immigration should not be neglected. The demographic outcomes explored in this report certainly leave room for a significant number of immigrants. Lithuanians should agree on principles and policies on how to integrate immigrant workers and their families into society. Institutions should be prepared and rules ready when Lithuanian firms want to hire foreigners or when potential immigrant workers are at the boarder.

Pension policy recommendations:
If the current pension system is decided to be upheld, the measures analysed in this study should be taken under closer consideration. They could help in sustaining the system fiscally. But more research is certainly needed. Wage-bill indexation, partially or in full, is effective but should be looked at also from a business cycle point of view, as noted above. Longevity adjustment cannot be applied without better mortality statistics. Increasing the retirement age further is generally a wise target, but there are many alternative ways to implement it. Increasing VAT-based funding of social insurance fund's expenditure has many good sides, but also complicated effects, if one remembers the uncertainties.

6.2 Notes for future research

Introducing demographic uncertainty into ageing analysis raises three groups of questions. The first group concerns expenditure issues. The basic question is, given the estimates of demographic uncertainty, how uncertain are the ageing cost projections? The second group relates to policy issues. How should the recognition of demographic uncertainty and its consequences for expenditure projections affect the policy targets that are set? How does it affect the use of policy instruments? Could new instruments be designed to deal with these

uncertainty features? The third group of questions involves methodological issues. How can economic methods used in ageing research, such as overlapping-generations models, deal with demographic uncertainty? How should stochastic population simulations be developed to better serve economic analysis?

We have given first answers to the first two questions above, in the case of Lithuania. They are tentative, as first answers often are. They are also encouraging; progress in research and useful applications can be expected.

Some remarks on the use of models may be given. We have used 1500 population paths in some calculations such as health care demand indicators. These were done outside the economic model. In the model we have used 100 randomly chosen population paths. This has required many changes to model software, and development of new ways to present the results. We are in the early phases in this respect.

Numerical OLG models produce a vast array of output with every single run. Here one analysis comprises of 100 base runs, 100 simulation runs, and calculation of differences between the two sets. The number of analyses done has not been limited by lack of ideas or alternatives, but simply by lack of time. The conclusion from this is that very efficient data-handling procedures and algorithms are essential for this type of analysis. The model's economic features also need extensive development, especially in including uncertainty into the model agents' decision-making in a consistent manner.

We hope to address these and related issues in our future research.

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