WORK IN PROGRESS- comments welcomed!

HOW VIABLE IS THE SYSTEM OF UNEMPLOYMENT INSURANCE SAVINGS ACCOUNTS: SIMULATION RESULTS FOR ESTONIA

Milan Vodopivec
(The World Bank)
and
Tomaz Rejec
(GEA College of Entrepreneurship, Portoroz)

July 2001

Abstract

This paper investigates the feasibility and redistributive consequences of an institutional innovation: the replacement of the traditional unemployment insurance (UI) system by unemployment insurance savings accounts (UISA) – the scheme where each worker is required to save a fraction of earnings in his or her account, and draw unemployment compensation from it.

By internalizing the costs of unemployment benefits, the system is expected to avoid the moral hazard inherent in traditional unemployment insurance schemes. Two important questions about its applicability, however, have to be addressed:

1. How viable is the UISA system? Unemployment insurance savings accounts eliminate pooling across individuals. If a significant proportion of workers cannot generate sufficient savings to draw upon during their unemployment spells, such a system may be non-viable.
2. What redistributive effects can be expected by the replacement of the UI system with the UISA system? For the U.S., research shows that such redistributive effects are likely to be small – what can be expected for other countries?

Using a simulation methodology similar to the pioneering study of Feldstein and Altman (1998), the paper addresses the above questions in the context of Estonia, the country for which there exist exceptionally rich dataset. The 1995 Estonian Labor Force Survey offers a panel microdata covering 6 consecutive years, and in the paper we expand this period to obtain lifetime working histories for a representative sample of individuals.

Preliminary simulation results indicate that in Estonia, relatively modest unemployment benefits could well be supported by the UISA system. Assuming a 3 percent contribution rate and a 60 percent replacement rate, 9-17 percent of workers end their active life with negative cumulative balance on their UISA account, and 30-45 percent of them experience negative balance on their UISA account at least once during their working life.

1. Introduction

With unemployment becoming a serious problem in many parts of the world, income support systems for the unemployed have gained the interest of policymakers. While the traditional unemployment insurance program provides protection against the hardship of job loss, there is growing persuasion and new evidence that, in the words of Meyer (1995), "unemployment insurance is not a completely benign transfer; it affects claimant's behavior" (p. 127). Indeed, evidence shows that unemployment insurance – even under the best program design and strict monitoring – creates adverse incentives which reduce job-search efforts and increase overall unemployment. Similarly, severance pay offers income protection for dismissed workers, but reduces the job creation capacity and the employment rate of the economy, and adversely affects marginal workers (Mortensen, 1994, Blanchard 1998). [1]

Spurred by adverse incentives created by traditional income support systems, new approaches to improve these systems have been embarked upon. The system of unemployment insurance savings accounts (UISAs) is the most radical and perhaps also the most promising one. Under the UISA system, each worker is required to save a fraction of earnings in his or her account, and draw unemployment compensation from it. By internalizing the costs of unemployment benefits, the UISA system radically changes workers' incentives and thus avoids the moral hazard inherent in traditional unemployment insurance schemes – and, under some proposals, provides the same protection to the unemployed as the traditional UI system does. Too little, however, is known about the working of the UISA system to know for which groups of workers, and under what conditions, this favorable evaluation of the system actually holds true.

[1] For an extensive evaluation of the efficiency effects of unemployment insurance as well as other income support programs, see Vodopivec (2001).

This paper is an attempt to provide insights into the working of the UISA system by simulating its introduction in one of transition economies – Estonia. In particular, it addresses the following two issues:

- How viable is the UISA system? Unemployment insurance savings accounts eliminate pooling across individuals. If a significant proportion of workers cannot generate sufficient savings to draw upon during their unemployment spells, such a system may be non-viable.
- What redistributive effects are produced by the replacement of the UI system with the UISA system? According to Feldstein and Altman (1998), such redistributive effects for the U.S. are likely to be small – what can be expected for developing countries?

Preliminary simulation results suggest that in Estonia, relatively modest unemployment benefits could well be supported by the UISA system. Assuming a 3 percent contribution rate and a 60 percent replacement rate, 9-17 percent of workers end their active life with negative cumulative balance on their UISA account, and 30-45 percent of them experience negative balance on their UISA account at least once during their working life.

The paper is organized as follows. To familiarize the reader with this rather new and not so well-known system, section 2 presents the UISA system: it describes its functioning, points out the potential feasibility problem that UISA may suffer from, and discusses the redistributive effects which would be brought about by the substitution of the traditional unemployment insurance system by the UISA system. Section 3 describes the methodology and data sources, and section 4 presents the simulation results. In section 5, we summarize the results and derive policy implications.

2. Unemployment Insurance Savings Accounts: What Do We Know About Them?

Partly in response to the shortcomings of the traditional unemployment insurance, the idea of unemployment insurance savings accounts (UISA) has gained popularity in recent years. The main rationale and key advantage of the UISA system as an alternative to the traditional unemployment insurance system is its potential of substantially improving the incentives of employed workers and job-seekers while simultaneously providing the same protection as traditional insurance schemes.

Unemployment insurance savings accounts, however, is still very much a novel idea. Much less empirical evidence exists about this system than about other systems of income support, and there has been no rigorous analysis of existing UISA programs. It is thus premature to give a reliable evaluation of this system as an alternative to traditional unemployment support schemes. Nonetheless, this idea has attracted a lot of attention in Latin America, where variants of this system have recently been introduced by Argentina, Chile, Colombia, Ecuador, Peru, and Uruguay. In Brazil, such a variant has been in place for several decades. Below we describe the proposed system of the unemployment insurance savings accounts and review the theoretical and empirical literature on the effects of such system.

Description. The system functions as follows. Employers deposit for each worker some specified fraction of his or her earnings into a special individual savings account on a regular basis (see table 1). In some countries (Chile), workers are also required to make regular contributions into their accounts. Upon separation and regardless of the reason for separation, workers can make withdrawals from their savings accounts as they deem fit. However, in Brazil, workers can only access their accounts in the case of involuntary separation. Furthermore, employers are required to make an additional payment of 40 percent of the account balance (plus interest) to the individual as penalty. In Panama and Venezuela, the

penalty is set as a multiple of previous wages, and offered regardless of the reason for separation. In all countries, at retirement, positive account balances are added to old-age pensions. Some programs allow workers to access their savings accounts for reasons other than unemployment, such health and education.

According to some proposals (see, for example, Cortazar, 1996, and Feldstein and Altman, 1998), unemployed workers would be able draw benefits monthly as under the traditional unemployment insurance, and the government would lend money to accounts where the balance falls below zero. A close variant of this arrangement has recently been introduced in Chile. In the Chilean system, employers and workers make contributions into individual savings accounts. At the same time, workers and the government make contributions into a separate fund called the "Solidarity Fund." After separation, if the unemployed worker's account balance falls below a stipulated minimum, the difference is made up via transfers from the Solidarity Fund (Heckman and Pages, 2000).

To improve both the welfare and efficiency effects, the unemployment insurance savings accounts could be combined to provide protection against other risks as well.[2] Such recent proposals include the "Integrated Unemployment Insurance System" (Yun, 2001). Under this system, unemployment insurance is provided via integrating unemployment insurance with the pension system. Benefits are financed via a combination of withdrawals from an individual savings account – on which a worker accumulates his/her contributions for unemployment as well as for old-age pensions – and, under certain circumstances, also from a public unemployment insurance (which operates on a pay-as-you-go basis). Such a program thus combines inter-temporal pooling of risk of an individual with wide-base pooling under the traditional unemployment insurance system, and therefore offers a combination of self-

[2] Such is the current dual social/private arrangement in Uruguay, where the individual savings account covers not only unemployment benefits, but also old-age pension, disability, death, sickness and maternity benefits, as well as family allowances (Lipsett, 1999).

insurance through savings and public insurance. In addition, it combines several risks under one program, thus pooling the self-insurance component and reducing the amount of savings necessary for providing the same insurance under separate programs (indeed, there are also proposals to include other social insurance systems, such as disability and health-care, under the same roof, which – under certain conditions – is again welfare improving – see Orszag et al, 1999).

As Orszag and Snower (1997) point out, such a system could either be fully funded or PAYG. The main rationale for a PAYG approach, according to the authors, is the reluctance of most OECD countries to quickly embark on the transition to a funded system. In developing countries, another argument in favor of a PAYG approach are insufficiently developed financial markets. However, by opening a host of familiar problems plaguing PAYG pension systems (among others, re-introduction of intra- as well as inter-generational transfers, lack of transferability, susceptibility to political risk, avoidance of raising the national savings), this option needs to be carefully examined.

Incentives under unemployment insurance saving accounts. According to theoretical modeling, the main rationale and key advantage of the UISA system as an alternative to the traditional unemployment insurance system is its potential of improving the incentives of employed workers and job seekers while conceivably providing the same protection as traditional unemployment insurance. As shown by several theoretical papers, unemployment insurance savings accounts would radically change workers' incentives (Orszag and Snower, 1997; Orszag et al, 1999). By internalizing the costs of unemployment benefits, the UISA system avoids the moral hazard inherent in traditional unemployment insurance. The system is thus credited with a potential to substantially decrease overall unemployment and, by lowering payroll taxes, increase wages. In particular, Orszag and Snower (1997) show that unemployment insurance savings accounts reduce unemployment by both increasing on-the-job

effort of employed workers as well as job-search effort of unemployed workers. Orszag et al (1999) also recommend a comprehensive vs. a piecemeal approach when introducing savings accounts. They warn that a potential complementarity problem exists if the savings account is not set up for multiple uses: under the traditional unemployment system, workers who have built up substantial resources in their pension accounts have the incentive to withdraw from the labor force and claim unemployment benefits until they retire. Setting up an integrated savings account reduces such incentives.

There are also other advantages of the "Integrated Unemployment Insurance System." By combining several risks under one program, the system is expected to offer not only superior provision of insurance and thus consumption smoothing, but also to significantly reduce disincentives as compared to the traditional unemployment insurance system. In addition, the government could subsidize low wage workers, which would improve the distributive properties of the system. Moreover, because of the direct link between contributions and benefits, the system has the potential to attract informal sector workers. While details of the system still need to be determined, theoretical modeling suggests that the more risk averse is the individual and the lower is the job-search elasticity (that is, the less sensitive is the reemployment probability to job search), the higher is the level of optimal borrowing from the public part of the system (Yun, 2001).

Empirical evidence. Unemployment insurance savings accounts are still largely an "uncharted territory." Much less empirical evidence exists about this system than about other systems of income support, and – apart from Kugler's (2000) evaluation of the Colombian program – there has been no rigorous analysis of existing UISA programs. In her pioneering study, Kugler (2000) examines the effects of a 1990 conversion of the severance pay program into an unemployment insurance savings accounts program in Colombia. She finds that the lion's share of the costs of the transfer that firms make to individual workers' accounts (75-87

percent) show up as a reduction of wages; that implies that the likely effects of the new program on the reduction of labor demand and employment are small. She also finds that, in accordance with the theoretical predictions, the conversion increased both firing and hiring by firms, in comparison with the previous system of severance pay. Her work, however, does not shed light on the interesting question of the effects of UISAs on the reemployment probability, that is, whether or not the system improves job search incentives.

There has been no other rigorous empirical work about the effects of real world UISA-like systems. Some researchers, however, have reported that the Brazilian FGTS system, while avoiding the problem of disincentives in job search found under unemployment insurance, creates incentive and other problems of its own (Gill et al, 2000). First, the system creates perverse incentives on the part of the worker to precipitate a firing so as to be able to access the funds in the savings account. It is estimated that the system increases the labor turnover rates by 30 percent. Second, it also creates additional litigation costs incurred in deciding whether or not the cause for dismissal is "just." More research as well as piloting is needed to learn whether problems of the Brazilian program can be avoided.

The above discussion on the incentives under the UISA system is not complete, however. The elimination of the problem of adverse incentives applies only for individuals who save enough to maintain positive balances and who expect that they will end their working life with a positive balance. In contrast, workers who expect to end their working life with negative balances face the same incentives as under the traditional unemployment system. This consideration – which obviously has important consequences for the overall feasibility of the UISA system – is considered next.

Feasibility of unemployment insurance savings accounts. Unemployment insurance savings accounts eliminate pooling of resources across individuals and, instead, rely on incomparably more restrictive intertemporal pooling of resources of one individual only. This

raises an important feasibility question: if a significant proportion of workers cannot save enough – via modest contributions from their earnings -- during their productive life to draw upon their accumulated savings during their unemployment spells, then such a system is nonviable. In other words, if unemployment is concentrated among a group of workers, these workers may not be able to finance their unemployment benefits by their own savings. In contrast, there may be a large group of workers who would never use their savings account for unemployment purpose. Under such circumstances, the UISA system would be irrelevant as an alternative to the traditional UI system.

To investigate the feasibility of the system, Feldstein and Altman (1998) simulated the working of the UISA system for the U.S. In their simulations, the protection provided by unemployment benefits is completely the same as under the current system, but it is financed from individual's unemployment insurance savings account, to which individuals are required to contribute 4 percent of their wages. Their simulations show that over a 25 year period, only a small proportion of workers (5-7 percent) end their working life with negative balances (these estimates are conservative in the sense that they do not account for any behavioral responses to changes in incentives), and that the cost to taxpayers is reduced by more than 60 percent. Feldstein and Altman thus conclude that the UISA system is a viable alternative to the standard unemployment insurance system. Of course, their conclusion is valid for the U.S. economy. Since in other countries the probabilities of entry into and exit from unemployment differ substantially from those of the U.S., the conclusion of the viability of the UISA system cannot be extrapolated to other countries, particularly not to developing ones.

Distributive issues and unemployment insurance savings accounts. The UISA system can in principle provide the same income protection as the traditional unemployment insurance system does (with less adverse incentives, as claimed above). Switching to the UISA system, however, does have distributional consequences, because the benefits are financed in a

different way. According to Feldstein and Altman (1998), however, the distributional effects for the U.S. are likely to be small – albeit they work in the "wrong" direction, that is, they tend to hurt the poor. They find that individuals in all quintiles except the bottom one slightly gain, and individuals in the bottom quintile slightly lose (distributive effects appear worse, because the simulation does not take account of behavioral responses to the changed incentives following the introduction of the UISA system). It is hard to predict what distributional effects the switch to UISA will have in the context of developing countries.

To summarize, the UISA system – and its variant Integrated Unemployment Insurance System – seem to be promising options, particularly for countries where initial conditions seem to be especially suitable (for example, for countries where the existence of severance pay programs may ease the transition to an UISA system). By internalizing the costs of unemployment benefits, the program avoids the moral hazard inherent in the traditional unemployment insurance program and thus improves reemployment incentives – which is, given the weak monitoring capacity, an important advantage particularly for developing and transition countries. In its integrated version with public insurance – thus avoiding its main weakness of the absence of risk-pooling among individuals – the program promises to yield both superior protection and improved incentives, and has also the potential to attract informal sector workers. There is a need, however, for further investigation – and piloting – of the program. Little is known about the working of the UISA system to know for which groups of workers, and under what conditions, the above favorable evaluation of the system actually holds true (and important design parameters of the system regarding contribution rates and rules for withdrawal, for example, also need to be examined). And as explained above, the current paper – by examining the consequences of the absence of cross-pooling for the viability and the distributive properties of the system – seeks to help bridging this gap.

3. Methodology and Data

A simulation methodology similar to the one of Feldstein and Altman (1998) is used, adapted according to data availability. The simulation thus consists of applying UISA rules to labor force participants over their entire working life. This allows to determine the histories of contributions to and withdrawals from their UISA of workers, from which one can derive characteristics of the UISA system which are suggestive of the viability and desirability of the system. In particular, the following characteristics (broken down by gender, age, and education) are focused upon: the fraction of workers which end their active lives with negative cumulative balances on their UISAs; the fraction of workers who ever have had negative balances; and the share of public financing needed to finance unemployment benefits. We performed an extensive test of robustness of the derived estimates with the respect of different parameter values of the UISA system.

It has to be emphasized that in our calculations, we ignore behavioral consequences which the new system is likely to bring, the omission which likely underestimates the viability of the UISA system (we plan to provide some back-of-the-envelope calculations in later versions of the paper).

Below we present the simulation algorithm and discuss the most important data issues arising in the simulation.

The simulation algorithm. For each person between 15-63 years of age we apply the following procedure. We assume that each worker's UISA is empty at the time of entering the labor force. Thereafter, each worker contributes to his/her account during employment spells, and draws unemployment benefits during unemployment spells. Each month, the worker puts a fraction of his wage to his account, as set by the *contribution rate*. The contributions are waived when the balance on the account is above a predetermined *maximum amount*. Monthly withdrawals from the account are made when the worker is unemployed, and the level of the

benefit is determined by the *replacement rate* (a given percentage of the person's previous wage), or as a flat rate (there has indeed been a flat benefit in Estonia). Eligibility is restricted according to prior *minimum employment requirement*. In addition, we have built into the UISA system an initial *grace period* (in the duration of several years), during which the individual's benefit is not financed by withdrawals from the worker's UISA, but instead by the government. Moreover and most importantly, if the account is "in the red" (that is, its balance is negative), the benefit is nonetheless paid to the worker (obviously, it is financed by the government or other sources) – and the negative balance of his account is further increased. All UISA accounts also accrue (negative or positive) monthly interest payments, depending on their balances.

Data sources. The study's main data source is the Estonian 1995 Labor Force Survey (retrospectively covering the period of 1989-95). The universe for the sampling was the 1989 census of the Estonian population. The sample size was just below one percent of the adult population (12,246 individuals), with 9,608 (77 percent) interviewed. Most of the nonresponse was attributable to failure to locate an address for the individual, and to emigration of Non-Estonians following Estonian secession from the former Soviet Union. Respondents were asked about their labor market status as of January 1989 and all subsequent changes of the status. For each spell of employment, they also reported industry of employment, type of employment, and a number of employer attributes. The survey also elicited information on human capital attributes including education, work experience and job tenure, and demographic information on age, ethnicity and gender.

Beside standard questions about the current labor market activity, the survey also asked retrospective questions on wages and employment from the period before transition up to 1995, and the subsequent surveys covered the gaps between the two consecutive surveys. This required recollection of labor activities up to six years before the time of interview, which

makes the collected data suspect to recall bias. To minimize this bias, enumerators were carefully trained to cross check answers for employment and unemployment spells to insure consistency. Moreover, research indicates that individuals recall traumatic events more readily, and changes in labor market status are likely to have been particularly memorable in an economy transiting from a system with many years of constant steady employment. Indeed, data validation checks show that the recall bias has been very limited. For example, the data on economic activity from the 1989 census corresponded quite well with the survey responses from the 1995 survey, and the majority of the discrepancies are attributable to changes in labor force definitions.[3] Similarly, the estimates of the number of registered unemployed obtained from the surveys quite closely match the data from the registers of Employment Offices (for example, for the second quarter of 1997 the survey estimate is 36,400 and the Employment Office number 35,700 – see Statistical Office of Estonia, 1998).

The major challenge for the purpose of this paper has been to obtain a complete work and unemployment history for a representative sample of Estonian labor force, based on a panel data that spans only over 6 years. To obtain such histories, we produced a population of synthetic labor force participants ("persons") by connecting the segments of working histories of workers with similar characteristics ("parents") for whom the survey data exist. We describe this procedure in detail in appendix 1. Additional problems are created also by the fact that the period for which data are available (1989-95) is not a stationary one. To constrain the unemployment growth that simple extrapolations would produce, we are therefore made assumptions about a long-term, equilibrium unemployment rate in Estonia. In particular, we have adapted the procedure of producing the population of synthetic labor force participants so as to obtain a lower aggregate unemployment rate (based on the work histories of the "parents"

[3] In 5.4 percent of the cases, the recall data indicated labor force participation when the census indicated inactivity. The opposite disagreement occurred in 3.2 percent of the cases. The former cases were concentrated

that span over the 1991-94 period; in continuation we refer to these work histories as pertaining to a low-unemployment scenario) and a higher aggregate unemployment rate (based on the work histories of the "parents" that span only over the 1993-94 period; we refer these work histories as pertaining to a high-unemployment scenario).

4. Simulation Results

In this section we describe the preliminary results of the simulation of the UISA system in Estonia. In general, the results show that the UISA system is a viable alternative to the traditional unemployment insurance system.[4] The results were obtained by using the above simulation algorithm on the sample of complete work histories for the population of synthetic "persons," usually for both the low- and high-unemployment scenarios. We report the results obtained under the baseline values for the parameters of the UISA system, and also the sensitivity results produced by changing these baseline values. Because the results are sensitive to the selection of "parents" used in the procedure to produce complete – synthetic – work histories, we repeated each type of simulation 30 times and generated average values for the quantities we want to evaluate, together with their standard errors.

(a) Baseline simulation. The following baseline values of the UISA simulation parameters are used:

- contribution rate: 3 percent of person's current wage,
- maximum amount: 3.6 average wages (that is, the amount that would cover a 6-month unemployment spell paying a flat benefit of 60 percent of the average wage),
- replacement rate: 60 percent of person's last wage,
- minimum prior employment requirement: 6 months,

---

among women in their twenties, and such mismatches are attributable to a change in labor force definition (see Noorkoiv et al, 1998, for details).

- start-up period: 36 months,
- interest rate: 5 percent.

Overall, the simulation results speak in favor of the UISA system. Under the baseline parameter values of the UISA system and under the low-unemployment scenario, only 9 percent of workers end their working life with negative cumulative balance (the comparable number under the high-unemployment scenario is 17 percent – see table 2). The number of workers with a negative account balance at least once during their working life is substantially larger, 31 percent and 45 percent for a low- and high-unemployment scenarios, respectively. This suggests that the ability to draw benefits even when the UISA balance may be negative is an important feature of the system, allowing to smoothen consumption patterns for a large number of workers who subsequently "repay" such payments. Not surprisingly, the higher the education of workers, the lesser is the likelihood that they end their working careers with negative balances, and that these balances are ever negative. Perhaps more surprisingly, the likelihood of men to experience negative balances is substantially larger than the likelihood of women.

On average, the total average value of unemployment benefits received by a person during his working life is 2.8 average monthly wages, under the low-unemployment scenario, and 4.4 average monthly wages, under the high-unemployment scenario (table 3). About two thirds of the benefits are financed by workers from their UISAs (somewhat more under the low-unemployment scenario), and the rest by the government (in the latter case, workers are drawing benefits despite the negative balance on their UISA accounts). The negative balances in terms of the percentage of the value of benefits exceed the percentage of workers who end their working life with negative balances, which means that individuals who end their working life

[4] We must stress that at this point, we have investigated only the viability question, and that we plan to carry out the analysis of redistribution brought about by switch from the traditional unemployment insurance to UISA later.

with negative balances receive a disproportionately large share of unemployment benefits. The results on gender and education in table 3 are similar to those reported in table 2.

Additional insights are obtained by examining the accumulation of negative balances by age of workers (figure 1). The percent of workers with negative balances steeply rises with age, and in the 25 to 30 year bracket it nearly reaches its final value, that is, the percent of workers who end their working career with negative balances. Interestingly, at lower ages, the outcomes are very similar for both genders, and only after the age of 35 the outcomes for gender start to deviate – there is an increase of the percent of men with negative balances and a slight reduction of the percent of women.[5] The age distribution of the percentage of workers with negative balances also strongly differs across education levels, with workers with only basic education raising their share till the age of 50, and workers with university degree reducing it after the age of 30. The distribution of the percentage of unemployment compensations financed by individuals from their UISAs by age corroborates the above findings (figure 2).

(b) Sensitivity analysis. Here we report the results on how deviations from the baseline values of the UISA parameters affect the measures of the viability of the UISA system. For each parameter, we present two plots. One represents the fraction of workers with negative balances on their UISA account at the end of their working life (solid lines), and the fraction with negative balances at least once during their working life (dashed lines). In the other plot, we show the value of benefits financed by individuals (solid lines) and government (dashed lines), in multiples of average monthly wages. Results are shown for both low- and high-unemployment scenarios. The results are as follows:

[5] This result may be produced by specific circumstances of early transition which favored women: relative demand shifting toward predominantly women industries, low-wage women having strong incentives to withdraw from the labor force, and women – being more educated than man – benefiting from rising returns to education (see Orazem and Vodopivec, 2000).

Contribution rate. The UISA system is very sensitive to changes in contribution rates (figure 3). As expected, larger contribution rates lower the fraction of negative balances and increase the share of self-financing. The relationship is non-linear (the marginal effects of increasing the contribution rate are decreasing), particularly in a high-unemployment scenario.

Replacement rate. Larger replacement rates increase the fraction of negative balances and increase both the amount of self-financing and government financing, with the share of the latter being much higher under high replacement rates (figure 4). The effects of the increase of the replacement rates on the fraction of negative account balances and amounts contributed are much more linear than in the case of contribution rates. Similar observations apply to the changes in the level of the benefit under the flat-fee regime (that is, each individual receiving the same amount of the benefit) – see figure 5.

Minimum employment duration requirement. As expected, large values of this parameter reduce the fractions of workers with negative UISA balances – but the high intensity of the effect is surprising (figure 6). For example, under the high-unemployment scenario, raising the minimum employment duration requirement from four to eight months reduces the fraction of workers who end their working careers with negative UISA balances from 30 percent to less than 10 percent, and the absolute amount contributed by the government is also dramatically reduced. Obviously, making the eligibility more stringent eliminates many of "bad" risks, that is, individuals with long expected duration of unemployment, from receiving the benefits.

Contribution waiver amount. The UISA system is also highly sensitive to the limit on the maximum balance of UISAs necessary to waive contributions to the account(figure 7). If this limit is set low, the fraction of negative account balances and the amount of government contributions increases dramatically. But there seems to be a ceiling – at approximately five

average wages – above which increasing the limit does not affect the performance of the UISA system (the saturation effect).

Interest rate. There is an interesting asymmetry in the effects of interest rates: a higher interest rate increases the number of workers with final negative balances but reduces the number of workers who ever "sink in the red" (figure 8)! Increasing the return on investments thus *does not* improve the chances of workers to end their working life with the positive balance – but it does increase the amount of benefits self-financed and reduces the value of government's contribution.

The length of the grace period. The possibility that the government alone finances benefits which occur during unemployment spells at the start of the working career importantly improve the system's performance (figure 9). Beyond the two year length of the grace period there is a reduction of the fraction of workers with negative account balances, as well as of the value of government contributions (the latter particularly applies to the high-unemployment scenario).

5. Concluding Remarks

By simulating the working of the unemployment insurance savings account (UISA) system, the paper examined how viable this system is as an alternative to traditional unemployment insurance in Estonia. Assuming a 3 percent contribution rate and a 60 percent replacement rate, our calculations show that only 9 to17 percent of workers end their active life with negative cumulative balance on their UISA account (somewhat more than Felstein and Altman (1998) find for the U.S), and that 30 to 45 percent of them experience negative balance on their UISA account at least once during their working life (the lower numbers refer to the low-unemployment, and the higher to the high-unemployment scenario). These simulation results thus suggest that in Estonia, a large majority of workers would be well-protected against the risk

of unemployment by the UISA system, and that the system has therefore passed this test of viability. It has to be emphasized that the above simulations do not account for any behavioral changes and that by doing so, they underestimate the viability of the system – after all, improved reemployment incentives are the main rationale for introducing the UISA system.[6] (Redistributive effects of the introduction of the UISA system in Estonia will be examined in subsequent versions of the paper.)

The above results suggest that by allowing workers to draw benefits even when the balance on their account falls below zero – with the government lending money to such accounts – the consumption smoothing properties of the UISA system are significantly improved. The above results also suggest that the UISA system is quite sensitive to changes in its parameter values. For example, setting a low contribution rate may significantly increase the fraction of workers who end their working careers with negative balances on their UISAs accounts and reduce their share of self-financing. Similarly, choosing an adequate minimum employment duration requirement is also important, as the system is highly sensitive to its changes and already a small increase could significantly improve the performance of the system.

To conclude, let us also mention some "design and implementation" considerations about the suitability of the UISA system for middle- and upper-middle-income developing countries and transition countries:

- Weak monitoring capacity of these countries accentuates the moral hazard problem inherent in the traditional unemployment insurance program and encourages other misuses of the system. Hence the self-policing nature of the UISA system represents a bigger advantage.

[6] But note that some workers may stay unemployed so as to be able to draw benefits from their UISA accounts rather than exit to inactivity, and thus there are also some factors which would contribute to higher unemployment under the UISA system. This effect, however, is expected to be a minor one.

- Under the traditional unemployment insurance system, employers in developing and transition countries sometimes fail to pay program contributions. By introducing personal accounts, workers themselves monitor such payments. In addition, the same feature makes the UISA system less susceptible to the political risk.
- The administrative complexities of introducing UISAs do not stand out as prohibitive; for example, old-age insurance systems introduced in many Latin American countries require similar information systems.

References

Blanchard, O. (1998). Employment Protection and Unemployment, MIT, 16 p. Unpublished paper available at: http://web.mit.edu/blanchar/www/

Cortazar, R. (1996). "Sharing Risk in Volatile Labour Markets." In R. Housmann, and H. Reisen, eds., *Securing Stability and Growth in Latin America, Policy Issues and Prospects for Shock-Prone Economics.* Paris: OECD.

Feldstein, Martin, and Daniel Altman (1998). Unemployment Insurance Savings Accounts. NBER Working Paper No. 6860.

Gill, I.S., E. Haindl, C. E. Montenegro, and C. N. Sapelli (2000), Chile: Has Employment Become more Precarious?", in I.S. Gill and C.E. Montenegro, eds., "Readdressing Latin America's "Forgotten Reform:" Quantifying Policy Changes in Argentina, Brazil, and Chile," World Bank.

Heckman, J. J., and C. Pages (2000). "The Cost of Job Security Regulation: Evidence from Latin American Labor Markets." NBER Working Paper No. 7773.

Kugler, A. (2000). "Severance Payments Savings Accounts: Evidence from Colombia." Universitat Pompeu Fabra, processed (prepared for the World Bank).

Lipsett, Brenda (1999). Supporting Workers in Transition: Income Support Programs for the Unemployed in Brazil and Argentina. Prepared for HDNSP, World Bank.

Meyer, Bruce D. (1995). "Lessons from the U.S. Unemployment Insurance Experiments," *Journal of Economic Literature*, Vol. 33, 91-131.

Mortensen, Dale T. (1994). Reducing Supply-side Disincentives to Job Creation. Paper presented at Federal Reserve Bank of Kansas City Symposium "Reducing Unemployment: Current Issues and Policy Options," Jackson Hole, Wyoming, August 25-27, 1994.

Orazem, P. and M. Vodopivec (2000). "Male-Female Differences in Labor Market Outcomes During the Early Transition to Market: The Cases of Estonia and Slovenia." *Journal of Population Economics*, Vol. 13, pp. 283-303.

Orszag, J. Michael, et al (1999). The Impact of Individual Accounts: Piecemeal vs. Comprehensive Approaches. Paper presented at the Annual Bank Conference on Development Economics, World Bank, April 29, 1999.

Orszag, J. Michael, and Dennis Snower (1997). From Unemployment Benefits to Unemployment Support Accounts. Available at: http://www.econ.bbk.uk/ukcosts/incentives.html.

Statistical Office of Estonia, 1998. *Methodological Report on 1997 Estonian Labour Force Survey*. Tallinn 1998.

Vodopivec, M. (2001). Income Support Systems for the Unemployed: Issues and Options, The World Bank, HDNSP, processed, 140 p.

Yun, J (2001). “On the Integration of Unemployment Insurance With Pension Through Individual Savings Account,” The World Bank, processed, 14 p.

Table 1: Stylized features of unemployment insurance savings accounts programs, Latin America

Coverage	Level of benefit	Eligibility Conditions	S
In Brazil (Fundo de Garantia de Tempo do Servicio – FGTS, established in 1967), Chile, Colombia, Ecuador, Columbia, Panama, Peru, Venezuela, all formal sector workers.	Amount accumulated in the individual savings account (deposits plus interest earned). In Brazil, if dismissed, employer must pay an additional 40 percent (plus interest) as penalty. In Panama and Venezuela, penalty set a multiple of previous wages.	Upon separation (regardless of the reason of separation). Exception: Brazil, only if worker is dismissed. Some programs allow access for other reasons as well (e.g., health and education expenditures).	Brazil, E contribut monthly contribut workers' In Urugu percent o pesos goe balance, goes to a contribut to the sys necessary social/ pr covers ol and mate and unem

Sources: Lipsett (1999), Heckman and Pages (2000), Mazza (2000).

Table 2: Workers with negative balance on their UISA (in percent)

	Negative balance at retirement		Ever negative balance during the working life	
	Low unemployment scenario	High unemployment scenario	Low unemployment scenario	High unemployment scenario
Total	9.4±1.3	17.6±2.0	30.7±2.0	45.1±2.6
Gender				
Males	11.5±2.1	22.3±3.9	37.2±3.3	54.2±4.1
Females	7.8±1.7	13.9±2.3	26.0±2.5	38.0±3.4
Education				
Basic	17.1±7.2	31.3±13.7	32.2±8.8	50.2±11.3
Middle	9.9±1.5	18.7±2.2	32.1±2.3	46.8±3.2
University	5.7±2.1	6.3±4.4	25.3±4.3	32.6±7.5

Table 3: Total average value of unemployment benefits received by a person during his working life, and the fraction of these benefits financed from UISAs

	Total average value of unemployment benefits		Fraction financed from UISAs	
	Low unemployment scenario	High unemployment scenario	Low unemployment scenario	High unemployment scenario
Total	2.8±0.1	4.4±0.2	70.4±2.2	66.1±2.6
Gender				
Males	3.3±0.3	5.3±0.3	67.1+3.0	61.6±3.2
Females	2.4±0.1	3.7±0.2	73.7±3.4	71.2±3.5
Education				
Basic	3.1±0.7	4.9±1.1	67.5±10.5	55.2±12.9
Middle	3.0±0.2	4.6±0.2	69.4±2.7	66.2±2.7
University	2.1±0.3	2.6±0.5	77.0±4.4	71.6±7.5

Figure 1: Fraction of persons with negative UIS account balance, by age, gender, and education (high unemployment scenario)

By gender **By education**

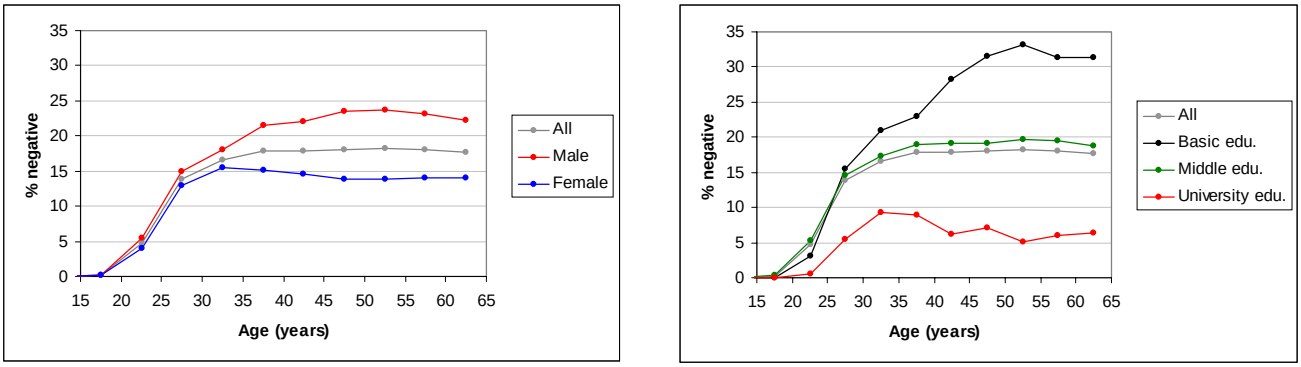


Figure 2: Percent of unemployment compensations financed by individuals from their UISAs, by age, gender, and education (high unemployment scenario)

By gender **By education**

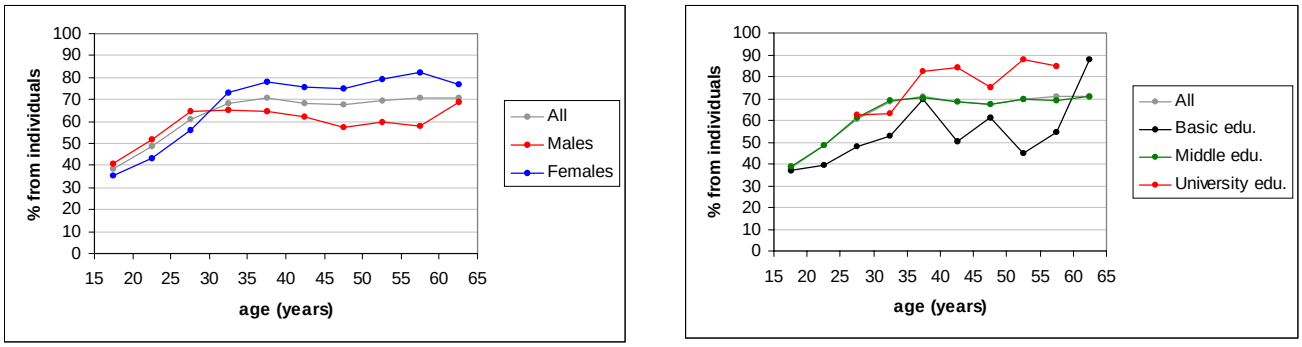


Figure 3: Contribution rate dependence of UISAs, low and high unemployment scenarios

Negative balance **Value of benefits financed by individuals and government** (in multiples of average monthly wages)

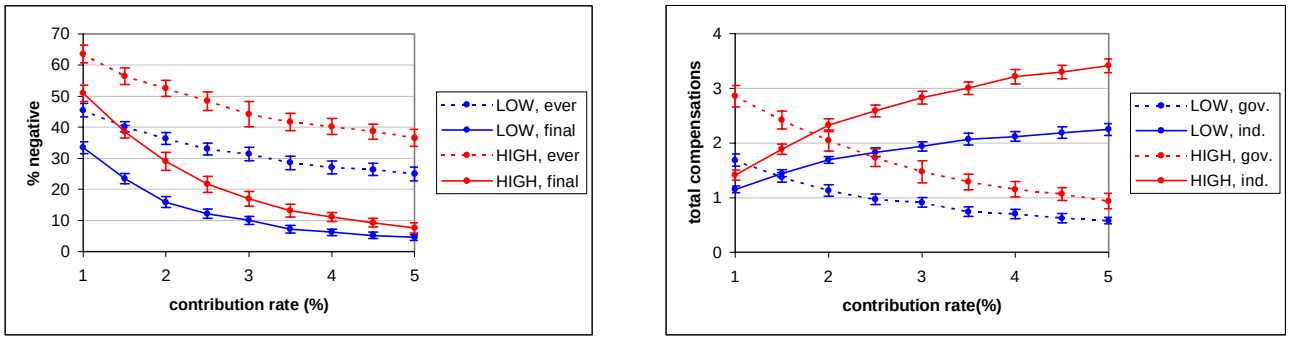
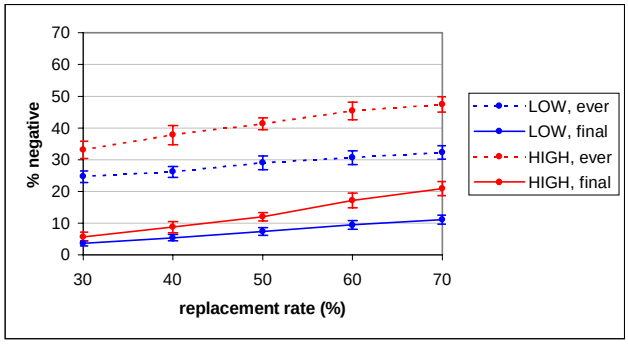


Figure 4: Replacement rate dependence of UISAs, low and high unemployment scenarios

Negative balance



Value of benefits financed by individuals and government (in multiples of average monthly wages)

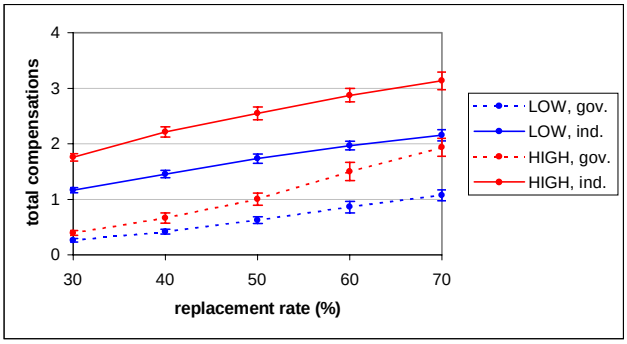
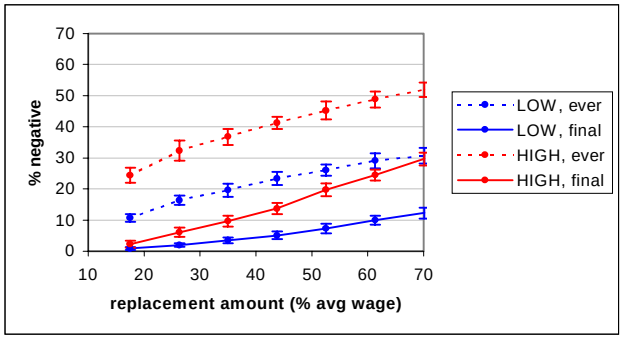


Figure 5: Performance of UISAs under flat-fee benefit, low and high unemployment scenarios

Negative balance



Value of benefits financed by individuals and government (in multiples of average monthly wages)

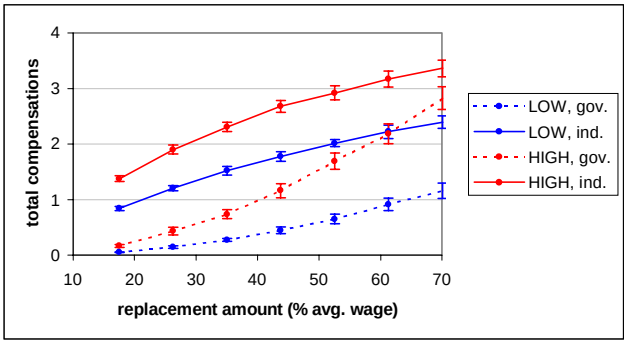
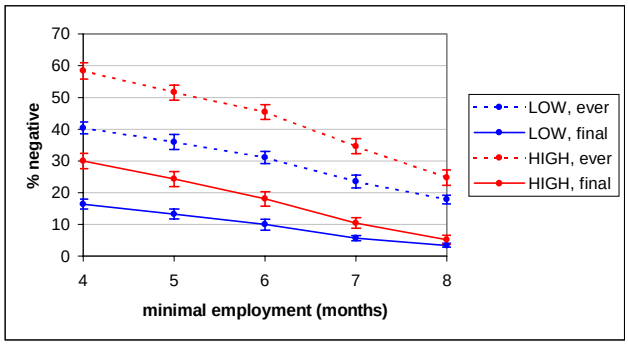


Figure 6: Minimum employment duration dependence of UISAs, low and high unemployment scenarios

Negative balance



Value of benefits financed by individuals and government (in multiples of average monthly wages)

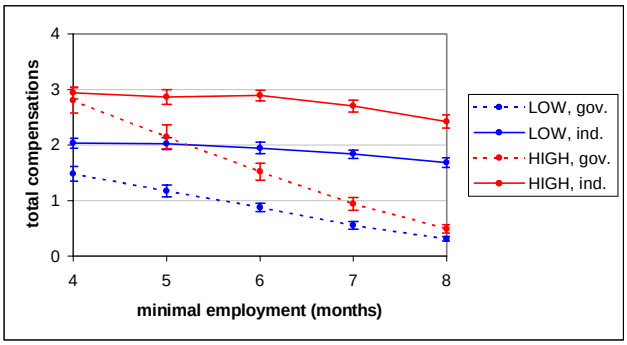
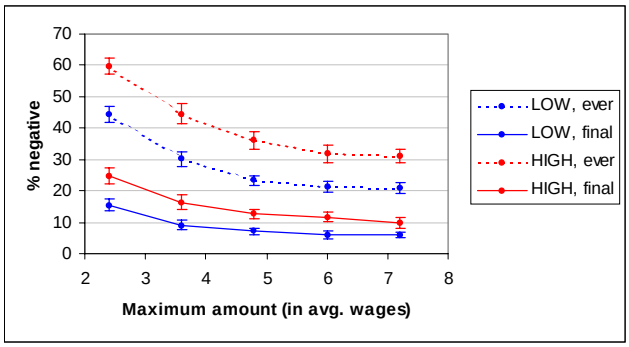


Figure 7: Dependence on the limit on the maximum balance of UISAs necessary to waive contributions to the account, low and high unemployment scenarios

Negative balance



Value of benefits financed by individuals and government (in multiples of average monthly wages)

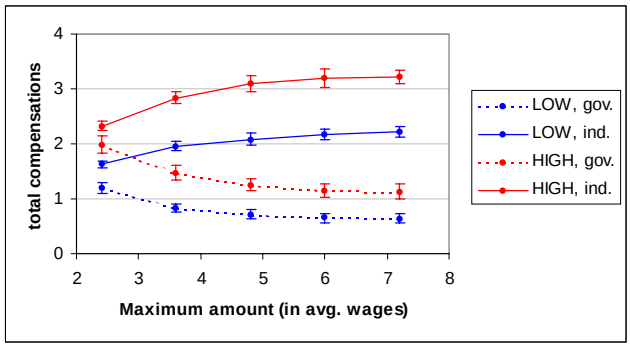
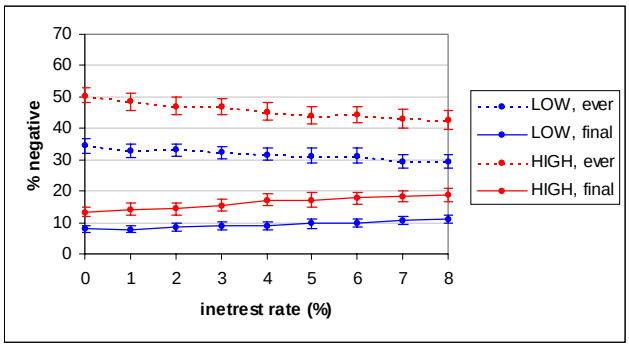


Figure 8: Interest rate dependence of UISAs, low and high unemployment scenarios

Negative balance



Value of benefits financed by individuals and government (in multiples of average monthly wages)

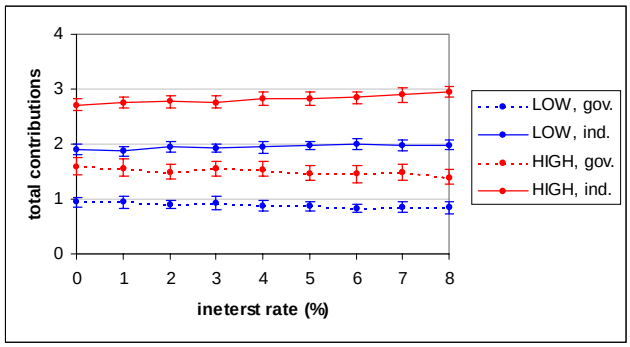
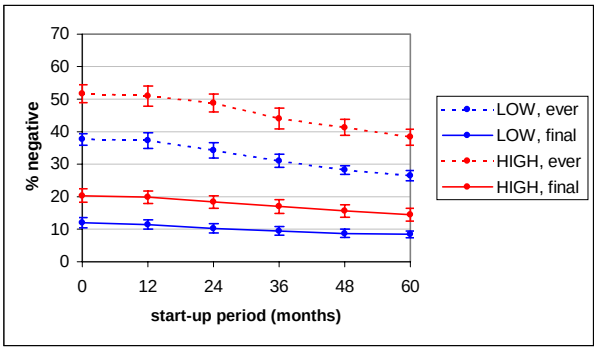
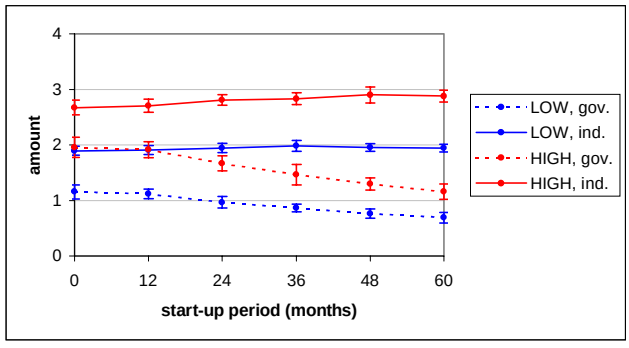


Figure 9: Dependence of UISAs on the length of the grace period, low and high unemployment scenarios*

Negative balance



Value of benefits financed by individuals and government (in multiples of average monthly wages)



* The value of benefits financed during the grace period is not counted as financing under the UISA system.

Appendix 1: Obtaining the complete work history for individuals from the 1995 ELFS

The data from Estonian Labor Force Survey 1995 contains detailed demographics and labor market information for a large number of individuals for the period 1989-94. To be able to simulate the working of the UISA system, however, we are interested in the whole period when a person participates in the labor force, i.e. from entering the labor force till the final withdrawal from it. This period is much longer than the period covered by the survey. We have overcome this problem by "gluing" the data of different individuals (called hereafter *parents*). The collection of data of a number of parents spanning over the whole labor force participation period gives us the information for one *person*. It is the population of such "synthetic" persons that is used in our simulations.

The gluing procedure is further complicated by the fact that the labor market in Estonia was not stable during the period of the survey. The unemployment rate rose significantly in 1991 and again in 1992, and stabilized during 1993-94. Therefore, we generated two different variants of simulations. For the first one, we use 1991-94 data (producing a lower average unemployment), and in the second only 1993-94 data (producing a higher average unemployment). These two different sets of results thus correspond to two alternative scenarios about the long term unemployment rate in Estonia: a low one (of about 5 percent) and a high one (of about 10 percent).

Processing of the data on " parents"

For each parent, during 1989-94 we distinguish three types of spells – employment, unemployment, and inactivity – with known starting and ending date. From that information we can also infer the date of entering and leaving the labor force.

From the survey, we know each parent's gender, age, education, and wage level. We distinguish basic, middle level and university level of education. Wages are obtained either directly from the survey (the data for wages exist for the first and the last month of the spell, as well as for the month of October for the years 1989, 1992, 1993, and 1994), or they are imputed based on the earnings regressions calculated from the 1992 wage data. Moreover, because wages grew strongly in the early 1990s, their wage levels are normalized so that the average wage is constant during the period of the survey. Because data on wages are not available for each month, they are interpolated for the missing months.
At this point, due to a deficiency of data, we had to drop from our simulation all parents whose only spell during 1989-94 was inactivity. As a consequence we obtain labor force participation rates which are too high (we plan to correct for this deficiency in the next versions of the paper).

Below we present some statistics about the "parent" population (figures A1-A4).

Figure A1: Distribution of parents by age, January 1991

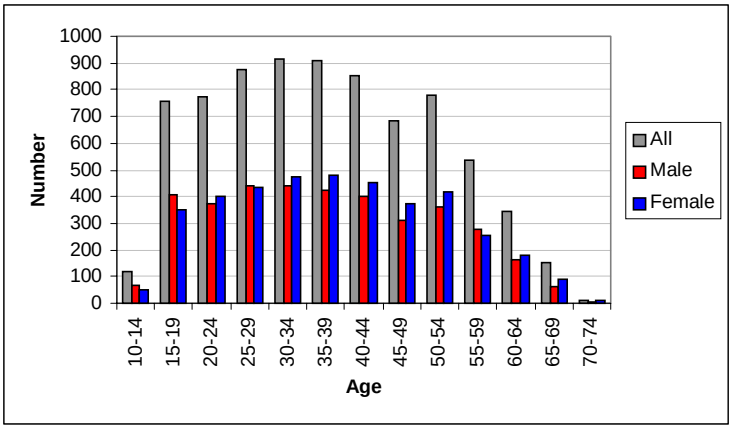
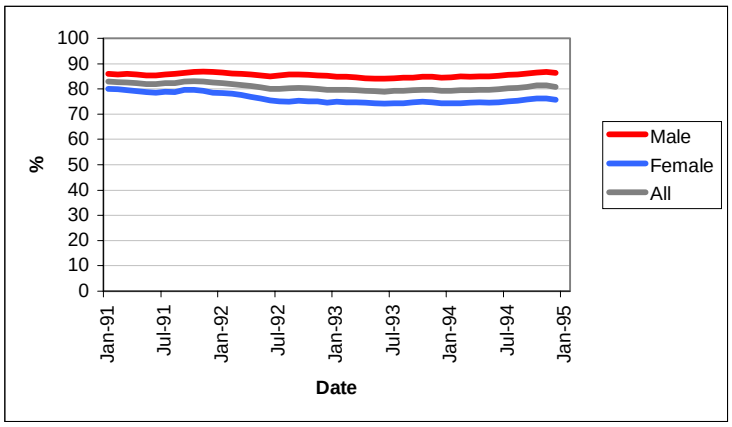


Figure A2: Labor force participation*



*Note that the rate is very high, due to the omission of the inactivity spells (see text).

Figure A3: Unemployment rate

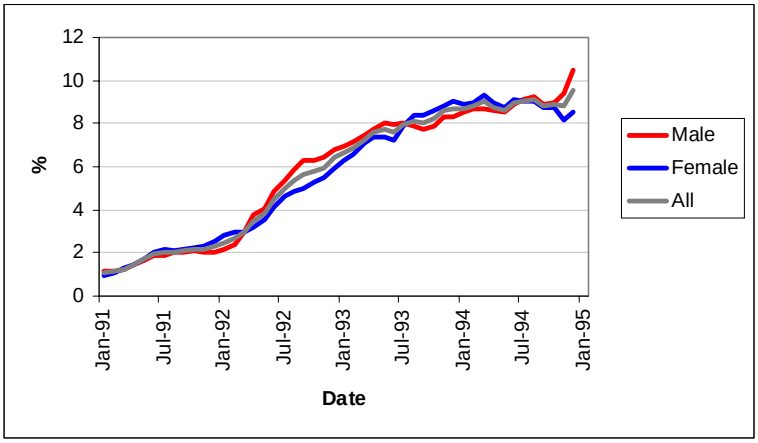
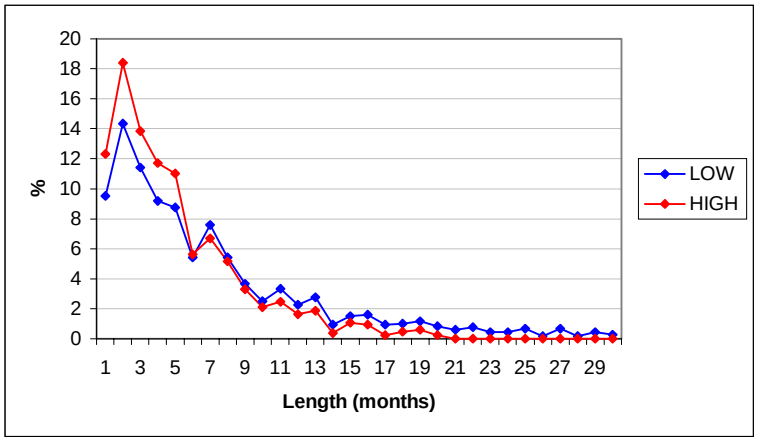


Figure A4: Distribution of unemployment spells, by length*



*Included are only the spells that lie entirely within the 1991-1994 (or 1993-1994) period.

Obtaining "persons" by gluing the "parents" (obtaining the complete work history)

Below we present the method of "gluing" parents into persons, and provide statistics of the "glued" population. We describe the method for the 1991-1994 data; a similar procedure is used for the 1993-1994 data.

As "seed persons," we used all "parents" who were between 25 and 28 years old in December 1994. All other parents are used to extend the age range of the "seed persons" over the whole labor force period. To find parents which are suitable candidates for a given person in a certain labor market state, the following criteria are used:

- Age (within two years of the actual age)
- Type of spell
- Gender
- Education

The danger has been that there is no "parent" available, that is, that we cannot find any suitable extension of working period by a work experience during the 1991-94 period for which we have true data. Therefore, we allow that each "parent" is used more than once in the gluing procedure. Of all candidate parents, only those with the lowest use count are considered, and one is randomly chosen and glued to the person. To prevent systematic errors in the "glued" population, we limited the use of each parent. We decided to limit the use to three times – the number which produced a desired long-term unemployment rate. Namely, if no candidate "parent" is found using the above procedure, we removed a "person" from the population. This procedure resulted in removing more unemployed then employed persons from the population, and we used this fact so as to arrive at the desired, prespecified long-term unemployment rate.

The above algorithm is repeated until one of the following criteria is met:

- The last "parent" glued to a person retires in the period of the survey.
- The retirement age is reached. The retirement age can be gender dependent, but we took 63 years form both male and female workers, which is planned to be the retirement age in Estonia in the future.
- The person dies. The survey only included people that were alive at the time the survey was carried out. Because of that, no information of deaths can be extracted directly from the survey

data. Instead, the deaths were determined using random number generator according to the 1999 death rates (Statistical office of Estonia, 2000).

Using the same algorithm, we glued also younger "parents" to persons, to get work histories for ages below 25 years. The stopping criteria in this case are:

- The entering labor force age (15 years) is reached.
- The last parent glued is entered the labor force during the period of the survey (this case includes persons entering the labor force after they have completed 15 years of age, for example, after finishing a high school or college).

The initial number of "seed persons" is 618. Only 350 of them survived the gluing algorithm. Those persons are our population which is subject to simulation. The largest number of persons that have to be discarded come from the cases where an unemployment spell has to be glued. The problem lies in the large increase of unemployment during the 1991-1994 period. Thus, not enough unemployed parents in 1991 are available to be glued to an unemployed parent in 1994. As a matter of fact, this phenomenon stabilizes the unemployment rate to the average value in the 1991-1994 period. If we were to artificially glue all the unemployed parents, we would have induced an exponential growth of unemployment. If we use only 1993-1994 data (in this period the unemployment rate was almost constant), the number of discarded persons is not that large. We present both options, which correspond to a "low-unemployment" (1991-94) and "high-unemployment" (1993-94) scenarios.

Below we present some statistics about the "persons" population (figures A5-A8).

Figure A5: Labor force participation rate

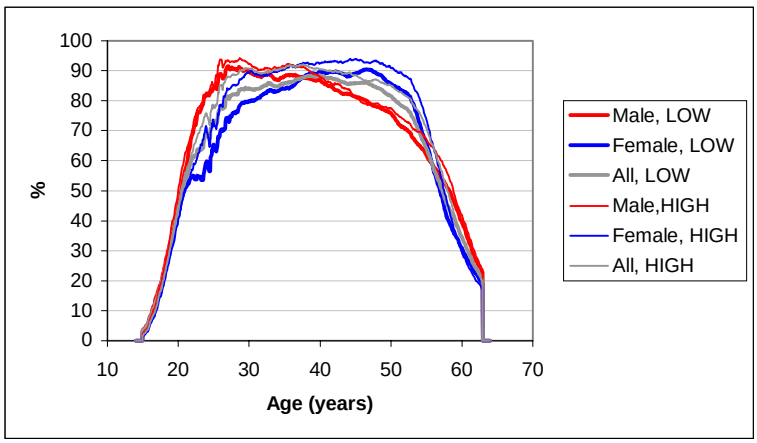


Figure A6: Unemployment rate

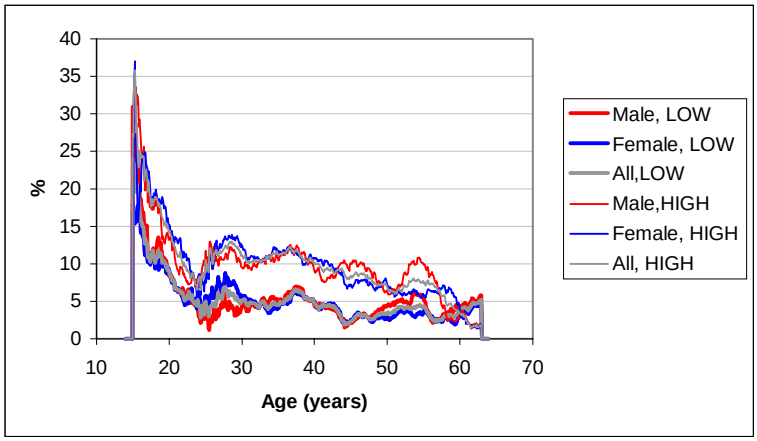


Figure A7: Distribution of persons according to the number of unemployment spells

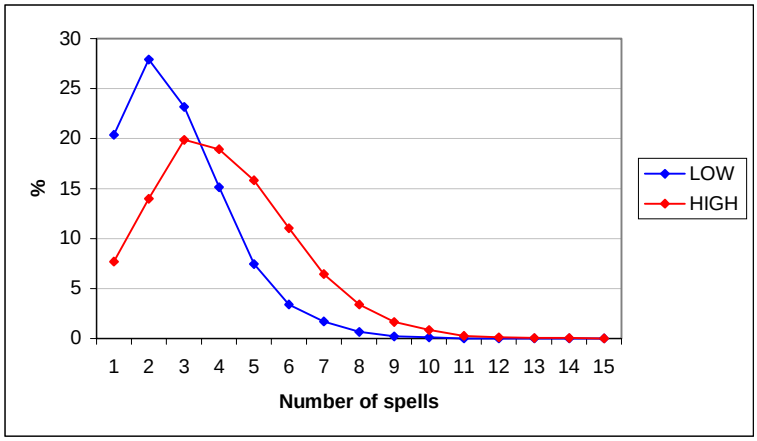


Figure A8: Length distribution of unemployment spells