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## A Finnish Application

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# Unemployment accounts - a Finnish application

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**Abstract**

We consider a reform that would replace the current Finnish unemployment insurance (UI) scheme with individual unemployment accounts. The reform would provide additional pensions for individuals who end up with a positive account balance at retirement age without restricting unemployment benefits relative to the current system. At the same time, the reform is likely to improve labour supply incentives, at least for some individuals. The question is whether such a reform would be self-financing. The fiscal effects of the reform depend crucially on the distribution of lifetime unemployment and the extent to which the reform would increase labour supply. We use a micro panel comprising a representative sample of 1/3 of the Finnish population and covering the period 1988-2010 to estimate the distribution of lifetime unemployment and to simulate how the unemployment accounts would evolve. We assume that the reform improves labour supply incentives only via the extensive margin and find that it is likely to be self-financing if the labour supply elasticity at the extensive margin is about 0.16 or higher. We also experiment with integrating UI with the pension system.

**Keywords:** unemployment insurance, unemployment accounts, lifetime unemployment

**JEL codes:** H53, H55, J65

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# 1 Introduction

This paper considers the implications of replacing the current Finnish unemployment insurance (UI) scheme with an unemployment account system. The aim of such a reform would be to mitigate the moral hazard problems associated with UI. Since traditional UI schemes lack a direct link between taxes paid and benefits received, they weaken the incentives of the unemployed to search for a job or accept one. As a result, they tend to increase unemployment.

In unemployment account systems, individuals pay part of their labour income to individual accounts. When unemployed, they draw their unemployment benefits from these accounts. At retirement, positive balances are converted into additional pensions while negative balances are forgiven (see e.g. Feldstein and Altman (1998), Bovenberg et al. (2012) and, for a literature review, Valentini (2008)). Unemployment benefits may be kept the same as in the current system. Hence, unemployment accounts help individuals to smooth consumption during unemployment periods just like the current UI system. The fact that negative balances are forgiven implies that unemployment accounts also provide interpersonal redistribution. That is, those who are often unemployed still receive a net transfer from other taxpayers.

Since withdrawing unemployment benefits reduces savings in these accounts, at least individuals who expect to have a positive balance at retirement should have better incentives to search or accept a job, than when covered by a conventional UI scheme. This is because for individuals who end up with a positive balance, withdrawing unemployment benefits imply a smaller additional pension. Such a direct link between benefits and future pension improves their labour supply incentives relative to a conventional UI scheme.

However, replacing the current UI scheme with an unemployment account system also creates new transfers, namely the additional pensions that are related to positive balances at retirement. In the absence of behavioural effects, these transfers create a fiscal burden, relative to the current system. That is, financing these transfers may require increasing taxation or cutting government spending. The key question is whether the positive behavioural effects are large enough so that they suffice to finance the positive balances without tax increases or benefit cuts. If that is the case, replacing the current UI system with UI accounts generates a Pareto improvement in the sense that everyone is entitled to the same benefits as in the current system, while at least some individuals receive additional pensions.

Whether unemployment accounts indeed provide a Pareto improvement, depends on the extent to which improved incentives can be expected to increase employment. The answer also crucially depends on the distribution of lifetime unemployment. This is because the distribution of lifetime unemployment determines, among others, the share of individuals that are likely to end up with positive account balances.

Our examination is largely based on Statistics Finland's Finnish Longitudinal Employer-Employee Data (FLEED-data). It is a random sample of 1/3 of the Finnish population aged 15-70 years in the years 1988-2010. We form synthetic lifecycles by combining information from different sample persons. For example, one synthetic lifecycle may borrow information from a sample person aged 17 in the year 1988 (hence 39 in the year 2010), from a sample person aged 39 in the year 1988 (hence 61 in the year 2010) and from a sample person aged 61 in the year 1988. This way we construct lifecycles from age 17 to 64. This is the age interval where people in Finland are generally entitled to unemployment benefits.[1]

These synthetic lifecycles allow us to examine the distribution of lifetime unemployment and simulate how unemployment accounts would evolve in the absence of behavioural effects. Following Bovenberg et al. (2012), we try to estimate how a reform that replaces the current UI scheme with unemployment accounts changes labour supply incentives as measured by the change in the average net financial gain from working relative to not working.[2] Together with the synthetic lifecycles, and an estimate for the relevant labour supply elasticity, this allows us to estimate the increase in aggregate labour supply induced by the reform.

We also consider integrating UI with the earnings-related pension system, as suggested by Stiglitz and Yun (2005). To this end, we also apply a structural lifecycle model featuring labour supply and retirement decisions and a detailed description of the Finnish pension benefit rule.

We proceed as follows. In the next section, we describe the data and the way we form the synthetic lifecycles. In section 3, we describe the distribution of lifetime unemployment. In sections 4 and 5 we describe in detail the unemployment account system and explain how we evaluate its fiscal effect. In section 6 we present the results regarding the unemployment account system. In section 7 we consider the case where the UI is integrated with the pension system. We conclude in section 8.

[1] There are some rare cases, like temporary layoffs, for over 64 year-old persons, when it is possible to receive unemployment benefits.

[2] We focus on unemployment insurance taking into account all unemployment benefits, while Bovenberg et al. (2012) considered "welfare accounts" that include also other tax funded transfers but only short-term unemployment benefits.

# 2 Constructing synthetic lifecycles

We begin the construction of lifecycles from a *seed cohort* aged 39 years at the end of the year 2010. For a person in this cohort (person A) another person is selected from the cohort aged 39 years at the end of the year 1988 (person B). Person B is selected so that he or she is as similar as possible to person A according to various socio-economic variables. Combining information of these two persons we get a synthetic lifecycle covering ages 17 to 61. The information on ages 17-39 comes from the person A and information on ages 40-61 comes from the person B. To get a full lifecycle covering ages 17 through 64, another person is selected from the cohort aged 61 years at the end of the year 1988 (person C). Again, person C is as similar as possible to person B according to our socio-economic variables. From person C we borrow information about ages 62 to 64. This way one lifecycle covering information on the age years 17-64 is constructed. In the same way, we create full synthetic lifecycles starting from each person in the cohort aged 39 years at the end of 2010.

We also construct lifecycles beginning from different seed cohorts in the same way. The seed cohorts are the cohorts aged from 39 to 60 at the end of the year 2010. The cohorts from which the synthetic lifecycles are combined are presented in the appendix of this paper. For example, the second row of the table shows that for a sample person in the seed cohort aged 40 years at the end of 2010 the corresponding cohorts are the cohort aged 18 at the end of 2010 and the cohorts aged 40 and 62 at the end of 1988. One lifecycle is constructed beginning from each person in each seed cohort. In the end, we get a data set of 539 574 (synthetic) lifecycles.

## 2.1 Matching procedure

Selecting the sample persons that are combined to form lifecycles is based on a *matching procedure*. For every seed cohort person (*seed person*), the matching procedure selects a sample person who is matched with that seed person to form a (part of a) lifecycle.[3] The matched sample persons should be as similar as possible (in terms of unemployment risk) to each other in order to form realistic lifecycles.

The matching procedure is performed in two stages. In the first stage we eliminate the *candidate sample persons* who do not satisfy the following four conditions:

1. same gender,

2. same annual labour income decile,[4]

[3]The same matching procedure is used also to select the cohort 4 person who is matched with a cohort 3 person, when it is necessary in order to form complete lifecycles for age years 17-64.

[4]Labour income deciles are computed separately for each year and for each age. For example, a 39

3. same educational level (3-level classification),
4. same labour market status (employed, unemployed or outside the labour market) at the end of the year when the matching is performed.

There are a few cases, where none of the candidate persons in the corresponding cohort meet these conditions. In these cases, we give up the fourth condition.

In the second stage of the matching procedure we measure the similarity of sample persons in terms of a *distance function*. The distance function uses the number of real unemployment months and the number of estimated unemployment months during the age year when the matching takes place. The estimated unemployment months are based on a linear regression model of 56 socio-economic variables estimating the number of unemployment months. The regression coefficients of this model are estimated using least squares method and the original FLEED-data including all observations from all panel years 1988-2010. The distance function between persons $A$ and $B$ is defined as

$$D(A, B) = 100 \cdot \mid du \mid + \mid du_e \mid, \quad (1)$$

where $\mid du \mid$ is the absolute value of the difference of the unemployment months between persons $A$ and $B$ during the age year the match is performed and $\mid du_e \mid$ is the absolute value of the difference of the estimated unemployment months between persons $A$ and $B$. For each seed person, we compute the distance to every candidate person who satisfies the above four conditions. The candidate person whose distance is the smallest is then matched with the seed person. If there are several candidate persons minimizing the distance, the matched person is selected randomly.

The factor 100 in the first term of the distance function is set to ensure that the matching procedure always selects a candidate person whose number of unemployment months is as close as possible to the seed person's number of unemployment months. The estimated unemployment months only affect the selection if there is more than one candidate person for whom the absolute value of the difference of unemployment months $\mid du \mid$ is minimized.

## 2.2 Testing the matching procedure

The quality of our matching procedure can be tested by artificially splitting observed real lifecycles into two sets of shorter lifecycles and then matching them with each other. This gives us a set of (relatively short) synthetic lifecycles that can be compared with the

years old person who belongs to the first income decile among individuals of age 39 in 2010 is matched with a person who belongs to the first income decile among individuals of the same age in 1988.

corresponding real lifecycles. We perform this kind of test making 23 year long lifecycles for the years 1988-2010 by matching persons in the year 1999. To these synthetic lifecycles, we borrow the unemployment months of the years 1988-1999 from the seed persons and the unemployment months of the years 2000-2010 from the persons who are matched with them. So, in this case, the matched persons are selected from the seed persons. However, we don't allow the seed persons to be matched with themselves. As a result we get synthetic lifecycles for the years 1988-2010. We can then compare the distribution of unemployment months from this synthetic lifecycle data with the seed persons' real distribution of unemployment months for the same years. In this case, the seed persons are the set of all persons in FLEED-data aged 28-53 in 1999.

A satisfactory matching procedure should lead to an unemployment distribution that is very similar to the real unemployment distribution of the seed persons. On the other hand, a weak matching procedure often fails to find a candidate person whose unemployment in the period 2000-2010 is close to the seed person's real unemployment in this period. It is expected that a weak matching procedure would lead to lifecycle data with less variation in unemployment months between lifecycles than in the seed person's real distribution of unemployment months. This is because persons with very low (high) number of unemployment months in the period 1988-1999 tend to have low (high) number of unemployment months also in the period 2000-2010. As a weak matching procedure more often matches seed persons with very low (high) unemployment in the period 1988-1999 with persons with medium or high (low) unemployment in the period 2000-2010, it should lead to a lifecycle data set with too little variation in unemployment months across lifecycles.

Figure 1 shows the distribution of unemployment months in period 1988-2010 computed from four different lifecycle data sets. The horizontal axis shows the percentiles of the distribution of the unemployment months over the lifecycles considered, and the vertical axis the number of corresponding unemployment months. For readability, we present only percentiles 30-99. The lower bound hides no relevant information, since in all cases the unemployment months are zero in the first 30 percentiles.

The solid curve presents the seed persons' real unemployment distribution. The other three curves represent distributions that are related to the synthetic lifecycles with different matching procedures. The dotted curve presents a case where the matching is performed with the rules described above (the four conditions and the distance function). The dashed curve presents a case where the same four conditions are used, but the distance function generates random distances. For the dashed-dotted curve the matched persons are selected randomly from the set of all persons with the same age as the seed person.

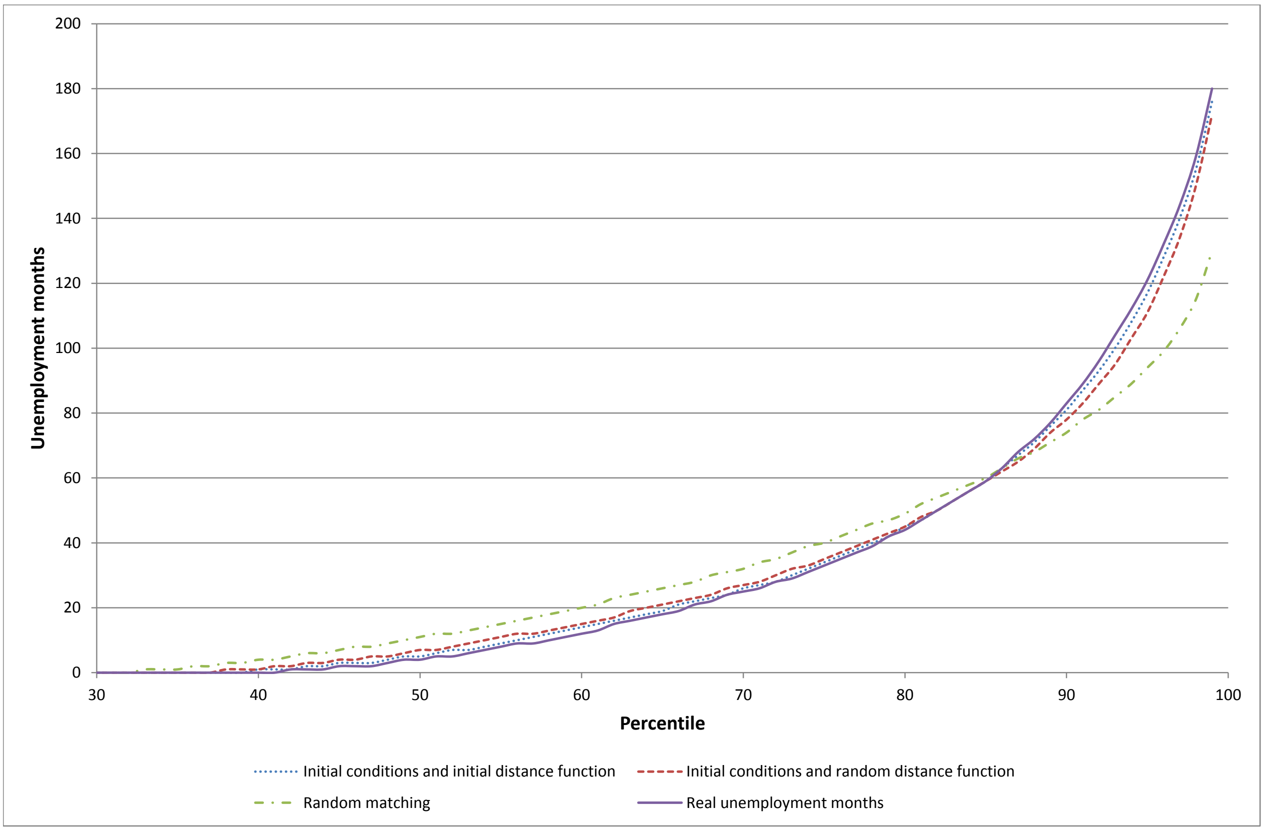


Figure 1: Distributions of unemployment months for period 1988-2010 computed from four different lifecycle data sets.

In the case where the matching is performed by the same rules as in our research data set (dotted curve), the unemployment distribution seems quite similar to the seed persons' real unemployment distribution (solid curve). This suggests that our matching procedure generates realistic unemployment distributions also when creating entire lifecycles. As we add more randomness to the matching procedure (the dashed curve), the variation in unemployment months decreases slightly. Furthermore, when matching is performed completely randomly for the dashed-dotted curve, the variation of unemployment decreases even more. These findings are in line with our expectations that a weak matching procedure leads to synthetic lifecycles with too little variation in lifetime unemployment months.

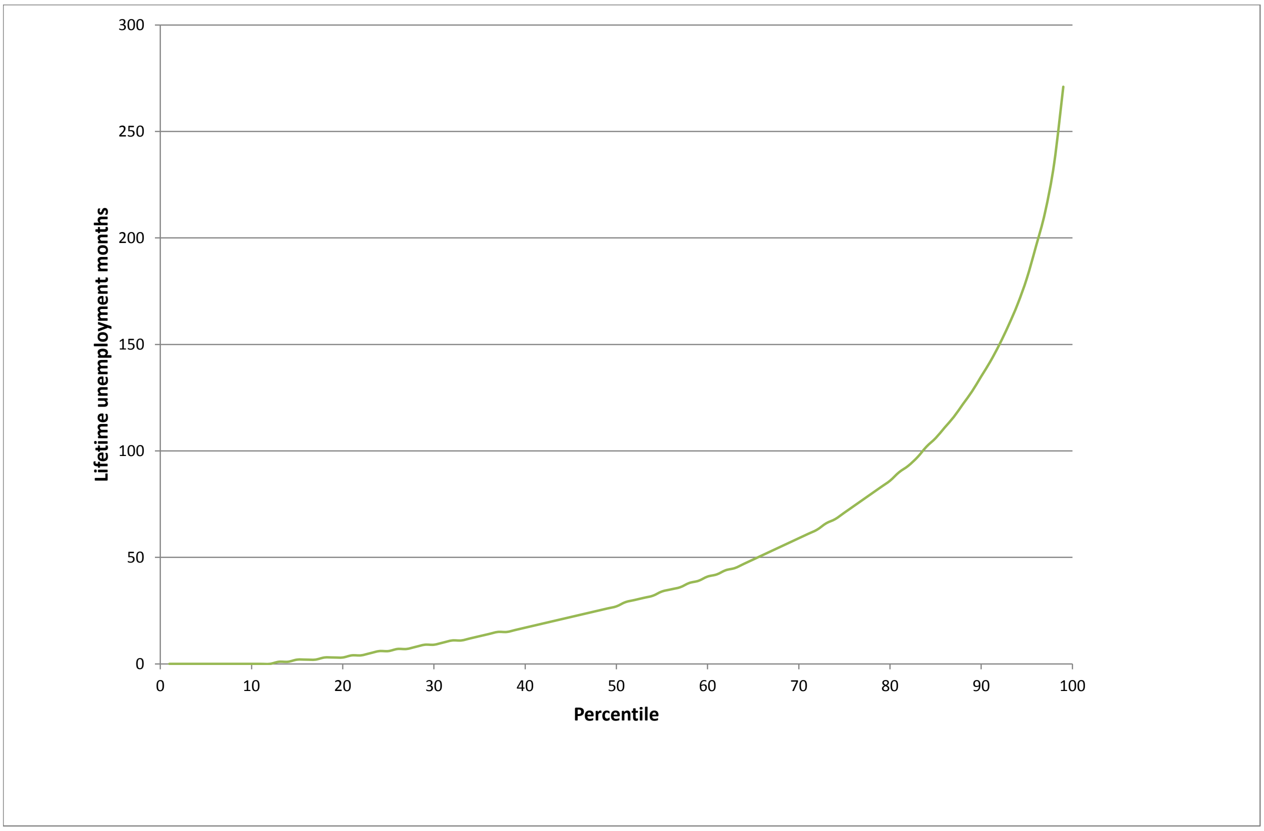


Figure 2: Lifetime unemployment distribution.

# 3 The distribution of lifecycle unemployment

In this section, we use the synthetic lifecycles to describe the distribution of lifetime unemployment in Finland. By lifetime unemployment, we mean the total number of unemployment months over the lifecycle. Figure 2 presents the distribution of lifetime unemployment for all individuals. For readibility, we again drop the maximum by displaying percentiles 1 to 99.

The first thing to notice is that the distribution is very uneven. About 12% of the individuals have zero unemployment months over their entire lifecycle. On the other hand, 10% of the individuals have at least about 140 unemployment months.

Table 1 compares lifetime unemployment in various subgroups. On average, men have more unemployment months than women. Mean unemployment is 54.1 months for men and 45.9 months for women. There is also slightly greater variation in lifetime unemployment among men than among women. The Gini coefficient for men is 60.3 months and 59.1 months for women. The 99 percentile corresponds to 291 unemployment months for men and 243 months for women.

Table 1: Lifetime unemployment in different groups.

| | Mean | Gini coefficient | Percentile points | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 10 | 25 | 50 | 75 | 90 | 99 |
| **Unemployment months** | | | | | | | | |
| All lifecycles | 50.1 | 59.9 | 0 | 6 | 27 | 71 | 135 | 271 |
| **By sex** | | | | | | | | |
| Men | 54.2 | 60.3 | 0 | 6 | 29 | 77 | 149 | 291 |
| Women | 45.9 | 59.1 | 0 | 6 | 26 | 66 | 121 | 243 |
| **By education level** | | | | | | | | |
| Primary education | 68.0 | 55.9 | 0 | 12 | 43 | 101 | 176 | 311 |
| Secondary education | 59.6 | 54.7 | 2 | 12 | 38 | 86 | 150 | 278 |
| Tertiary education | 29.9 | 64.7 | 0 | 2 | 13 | 40 | 82 | 199 |
| **By quintile of lifecycle labor income** | | | | | | | | |
| Quintile 1 | 98.6 | 48.7 | 2 | 24 | 79 | 155 | 226 | 335 |
| Quintile 2 | 67.8 | 46.9 | 4 | 21 | 54 | 101 | 152 | 243 |
| Quintile 3 | 40.6 | 52.8 | 1 | 9 | 28 | 60 | 98 | 178 |
| Quintile 4 | 28.1 | 57.4 | 0 | 4 | 17 | 41 | 72 | 141 |
| Quintile 5 | 15.3 | 65.2 | 0 | 1 | 7 | 22 | 42 | 97 |
| **By working sector*** | | | | | | | | |
| Private | 56.0 | 57.1 | 0 | 9 | 34 | 81 | 146 | 276 |
| Public | 37.6 | 64.9 | 0 | 3 | 17 | 49 | 104 | 258 |

** Working sector is the sector where individual is employed majority of his/her work history.*

There is a clear correlation between education and unemployment risk. For instance, persons with secondary education are on average unemployed about two times as much as persons with tertiary education. The mean unemployment months are 68.0, 59.6 and 29.9 months for individuals with primary, secondary, and tertiary education, respectively. On the other hand, based on the Gini-coefficient, lifetime unemployment seems to be more unevenly distributed among those with a tertiary education than among those with a primary or secondary education.

Not surprisingly, there is less unemployment among individuals with higher lifetime labour income. The average number of unemployment months falls from 98.6 months to just 15.3 months as we move from the first to the last quintile. In relative terms, the differences in median unemployment months are even larger.

Finally, the table compares lifetime unemployment of persons who work in the public sector for most of their working career with the lifetime unemployment distribution of the persons who mostly work in the private sector. The public sector workers suffer much less unemployment than private sector workers. However, the Gini-coefficient of lifetime unemployment inequality is higher for those working mostly in the public sector.

The average number of unemployment months by age is presented in Figure 3. Clearly, there are two peaks in the figure. The first peak is located at the early twenties. Pre-

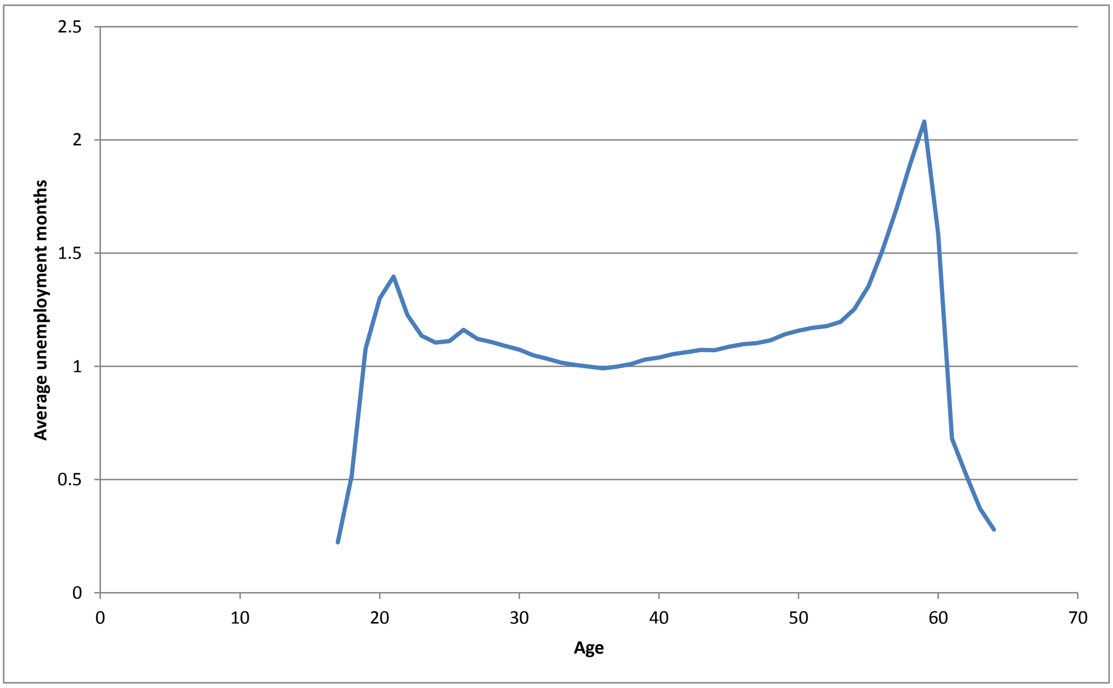


Figure 3: Unemployment months by age.

sumably, it reflects the difficulties faced by young persons in trying to find their first job. The second peak is located just below the age of 60. It is related to the fact that the current UI provides older workers with earnings related benefits for an extended period until retirement (which before the 2005 pension reform could take place at the age of 60). This arrangement, which is effectively an early retirement scheme, is sometimes referred to as the "unemployment pipeline". The age limit for the unemployment pipeline has been gradually increased during the last 15 years or so. Of course, our data partly reflects the situation when the age limit was lower than currently.

# 4 Unemployment account system

In this section, we define the baseline unemployment account system that we analyse and explain the mechanisms through which it affects public finances.

Our starting point is the current Finnish UI. The unemployment account system provides the same unemployment benefits than the current system. The Finnish UI system provides earnings-related benefits for up to 500 workdays after the unemployment period begins.[5] After that a flat rate benefit (so called labour market subsidy) is paid.[6] The earnings-related benefits provide a replacement rate of about 50% for an average wage worker. The replacement rates are higher (lower) for workers with lower (higher) wages. The flat rate benefit is about 700 euros per month.

The unemployment accounts system we consider is characterized by the following rules:

1. Each period, mandatory payments are credited to individual unemployment accounts. These payments are proportional to labour income.

2. The tax rate on labour income is lowered so that the sum of the new labour income tax and the mandatory payment to unemployment account equals the labour income tax and UI payments before the reform.

3. In case of unemployment, individuals receive the same unemployment benefits as before the reform. However, the benefits are now debited to their unemployment accounts.

4. An interest is credited to the positive account balance and debited to negative account balances. The interest rate should be the risk-free market interest rate.

5. When account holders reach the age of 65, positive account balances are converted into an additional pension and negative account balances are set to zero. Beginning from the age of 65 there will be no payments to the accounts. The additional pensions are taxed by the same rate as ordinary pension benefits.

In short, relative to the current UI system, everyone is paying the same taxes and payments relative to their labour income and is entitled to the same unemployment benefits. In addition, pensions are either as high as in the current system or, in the case of individuals that end up with a positive balance, strictly higher. This implies that if a reform that replaces the current UI system with unemployment accounts is self-financing (doesn't create a fiscal deficit relative to the status quo), it creates a Pareto improvement.

However, whether the reform is fiscally feasible, is a priori not clear. In fact, if the reform does not increase employment, it is certain to have a negative impact on public finances. This is because everyone then pays the same taxes while persons who end up with a positive account balance receive a new transfer and these transfers must be financed somehow. We refer to the fiscal effect stemming from the positive balances as *static fiscal*

[5] To be eligible to the earnings-related benefit, the individual must have paid voluntary insurance payments to an unemployment fund. However, this insurance is highly subsidized in the sense that the earnings related benefits are mostly financed by taxes.

[6] The flat rate benefit is fully funded by taxes and mandatory social security payments.

*effect*, since it arises even if the reform induces no changes in behaviour. However, when estimating the static effect, we need to take into account that the government gets part of the additional pensions back as tax revenue.

On the other hand, as discussed in the Introduction, relative to the current UI system, unemployment accounts should increase employment by improving the incentives to search and accept a job. By increasing employment, the reform should also increase tax revenue. We refer to the fiscal effect stemming from increased employment as a *dynamic fiscal effect*.

The reason why labour supply incentives should improve is twofold. First, when a person who ends up with a positive account balance is unemployed, the unemployment benefit reduces his future pension benefit. Such a person effectively pays his unemployment benefit himself. Second, since the mandatory payments directly increase the future pension benefits of the persons who end up with positive account balances, the mandatory payments are not taxes to them. Hence, relative to the current system, the effective tax rate of these persons is lowered by the introduction of the unemployment account system. Both these incentive effects should increase labour supply at least via the extensive margin (whether to work or not). The magnitude depends on the participation elasticity which measures how much the probability of working increases when the net income of working increases. It is also possible that the unemployment account reform causes behavioural change via the intensive margin (hours of work). This would further improve the dynamic effect of the reform.

In the case of individuals who expect to end up with a negative balance, the unemployment account system does not improve incentives. This is because they do not face a link between unemployment benefit withdrawal or payments to the unemployment account and future pensions. Whether or not they choose to work one additional month has (generally) no influence on their additional pension, which is zero anyway (unless the extra month spent working suffices to make the final balance positive). On the other hand, their incentives do not deteriorate either.

Of course, because of uncertainty about future unemployment, many young workers are probably uncertain as to whether they will end up with a positive or negative balance by retirement. Presumably, relative to perfect foresight, this weakens the incentives for those who actually end up with a positive balance. On the other hand, this uncertainty should also mean that incentives improve even for some of those individuals who actually end up with a negative balance.

The key question is whether the positive dynamic fiscal effect suffices to compensate for the negative static fiscal effect. The static effect is small if the additional pensions are small. The dynamic effect in turn is large if many individuals end up with a positive account balance and those individuals are quite often unemployed under the current UI system so that there is potential for a large decrease in unemployment.

The total fiscal effect of the reform is especially likely to be positive in a world where lifetime unemployment and income are quite evenly distributed. The extreme example is the case of a population where everyone experience exactly the same number of unemployment days and the same labour income. In this case, we can choose the account payment rate so that it exactly covers the aggregate total sum of the unemployment benefits if there were no changes in labour supply behaviour. In the absence of changes in labour supply, everyone would then end up with an account balance of zero and the static effect would be zero. However, in such a situation, following the introduction of unemployment accounts, incentives would improve for all, so the reform is bound to improve public finances.[7]

However, as the results in the previous section illustrated, the actual lifetime unemployment distribution is quite uneven. Therefore, the fiscal effect of the reform is a priori not clear.

# 5 Evaluating the fiscal effects of the unemployment account system

In this section, we explain how we use the synthetic lifecycle data described above to evaluate the fiscal effects of a reform that replaces the current UI system with unemployment accounts.

The data includes information on annual labour income and unemployment benefits. In order to make wages and unemployment benefits from different years comparable, we adjust them to the 2010 level by using Statistic Finland's index of wage and salary earnings.[8] As a result, the synthetic lifecycles do not feature aggregate wage growth. We assume that the average wage growth rate equals the real interest rate and that that in turn equals individuals' discount rate. We can then simply sum up adjusted wages and benefits over the lifecycles to get their present values.

We first determine the payment rate to the unemployment accounts. As we explained

[7]For sure, given increased labour supply, everyone will then end up with a strictly positive account balance and receive additional pensions. It is clear, however, that the resulting tax revenue increase is much higher than the net value of additional pensions. This is because the payment rate ,which determines the present value of additional pensions relative to the additional labour income, is much lower than the average tax rate.

[8]Official Statistics of Finland (OSF): Index of wage and salary earnings [e-publication]. ISSN=1798-7814. 1st quarter 2014. Helsinki: Statistics Finland [referred: 8.8.2014]. Access method: http://www.stat.fi/til/ati/2014/01/ati_2014_01_2014-05-28_tie_001_en.html.

above, it is determined so that aggregate payments to the accounts equal the aggregate unemployment benefits paid. It turns out that a payment rate of 5.62% of labour income satisfies this condition.

Given the payment rate, the lifecycle data allow us to simulate how individual unemployment accounts would evolve (without changes in labour supply) and compute the static fiscal effect. When computing the static fiscal effect, we need to take into account that the government taxes away part of the additional pensions. For our calculation, we assume that the sum of the direct and indirect taxes on additional pension income is 50% of the gross additional pension income. Hence the static fiscal effect is half of the aggregate additional pensions.

In order to estimate the dynamic fiscal effect, which stems from an increase in the aggregate labour supply, we first estimate how much the reform improves labour supply incentives (i.e. decreases effective labour taxation). We then compute the increase in aggregate labor income using an estimate for the corresponding labour supply elasticity. Finally, we approximate that 50% of this growth is collected to the public budget by income and consumption taxes. This growth in tax revenue constitutes the dynamic fiscal surplus.

We make several simplifying assumptions here. Firstly, we focus on the extensive margin (whether to work or not) only. In reality, the reform should increase labour supply via the intensive margin (how many hours to work) as well. However, the intensive margin is likely to be less important.[9]

Second, we divide the population in two parts, namely those who even in the absence of behavioural changes would end up with a positive balance at the age of 65 and those who end up with a negative balance. We assume that incentives improve only for individuals who end up with a positive balance.

Third, instead of trying to estimate the change in the labour supply incentives separately for each individual, we try to come up (following Bovenberg et al. (2012)) with a reasonable estimate for the average improvement in the labour supply incentives induced by the reform. This boils down to making assumptions regarding average unemployment benefits, other out-of-work benefits, and tax rates.

Specifically, for all the individuals that end up with a positive account balance, we estimate the relative increase in working days resulting from the reform, denoted by $E$, using the following formula:

$$E = \beta \frac{Y_1 - Y_0}{Y_0}, \tag{2}$$

where $\beta$ is the labour supply elasticity at the extensive margin, or "participation elasticity", $Y_0$ is the net financial gain from working (compared to not working) in the status

[9] See for example Bargain et al. (2012)

quo and $Y_1$ is the net financial gain from working after the reform.

Next we discuss our estimates for the average net financial gain from working before and after the reform. Let us denote the average (e.g. monthly) gross wage income by $W$, the average after-tax transfer received when not employed (average out-of-work transfer) by $B$, and the income tax rates before and after the reform by $t_0$ and $t_1$, respectively. The initial tax rate, $t_0$, includes the current UI payments. As described above, the new income tax rate is chosen so that the sum of the new labour income tax and the mandatory payment to unemployment account equals the initial labour income tax. Hence, the mandatory payment to the unemployment account is $(t_0 - t_1)$ of gross wage income.

In the current system, the net income gain from working is $Y_0 = (1 - t_0)W - B$. This is simply the difference between net wage income and the average out-of-work benefit received when not working.

After the reform, an individual who ends up with a positive account balance at retirement and chooses to work in the current period (e.g. month), receives the account payment(for the current period) back (with interests added) as an additional pension. The present value of this additional pension is $(1 - t_p)(t_0 - t_1)W$, where $t_p$ denotes the tax rate on pensions. In this case, the present value of the average real after-tax income from working is $(1 - t_0)W + (1 - t_p)(t_0 - t_1)W$. On the other hand, individuals who end up with a positive account balance also face a direct link between their future pension and withdrawal of unemployment benefits. This reduces the after-tax income when not working, from $B$ to $(1 - \alpha)B$, where $\alpha$ denotes the share of after-tax unemployment benefits from all after-tax public transfers received in the periods of non-employment. The net financial gain from working in the account system is therefore

$$\begin{aligned} Y_1 &= (1 - t_0)W + (1 - t_p)(t_0 - t_1)W - (1 - \alpha)B \\ &= (1 - t_1)W - t_p(t_0 - t_1)W - (1 - \alpha)B. \end{aligned} \tag{3}$$

Hence the change in the net income gain from working induced by the reform is

$$\begin{aligned} Y_1 - Y_0 &= (1 - t_1)W - t_p(t_0 - t_1)W - (1 - \alpha)B - ((1 - t_0)W - B) \\ &= (1 - t_p)(t_0 - t_1)W + \alpha B. \end{aligned} \tag{4}$$

The formula for the relative growth in working days can now be expressed as

$$E = \beta \frac{Y_1 - Y_0}{Y_0} = \beta \frac{(1 - t_p)(t_0 - t_1)W + \alpha B}{(1 - t_0)W - B}. \tag{5}$$

In order to estimate the average out-of-work transfer $B$ (relative to the wage level), we first compute the sum of unemployment years, $y_u$, and the sum of years spent out of the labour market, $y_o$, for individuals who end up with a positive balance. Unfortunately our data only contains information ib whether a person is outside of the labour force at the end of each calendar year. Therefore, $y_u$ and $y_o$ are based on the labour market status at the end of each year. The proportion of unemployment years from all non-employment years is $\frac{y_u}{y_u+y_o} = 0.1195$ while the proportion of out-of-labour-market years is $\frac{y_o}{y_u+y_o} = 0.8805$.[10]

We compute the average benefit $B$ as the weighted average of the average unemployment benefit for persons with positive end balances, denoted by $u$, and the average benefit for other non-employed persons (persons who are out of the labour market) with positive end balances, denoted by $o$. That is,

$$B = \frac{uy_u + oy_o}{y_u + y_o}. \tag{6}$$

Then share of unemployment benefits of all out-of-work benefits is determined as

$$\alpha = \frac{uy_u}{uy_u + oy_o}. \tag{7}$$

Using equations 6 and 7 we can also rewrite equation 5 as

$$E = \beta\frac{Y_1 - Y_0}{Y_0} = \beta\frac{(1-t_p)(t_0-t_1)W + \frac{uy_u}{y_u+y_o}}{(1-t_0)W - B}. \tag{8}$$

We assume the following replacement rates: $u = 0.4W$ and $o = 0.3W$. These replacement rates are roughly based on the results in Salomäki and Viitamäki (1996).[11] Since persons that end up with a positive balance have above average earnings, it is the replacement rates for relatively high income earners that are relevant here. Using the above estimates for $y_u$, $y_o$, $u$ and $o$, we get $B = 0.312W$ and $\alpha = 0.153$.

We set the wage income tax rate before the reform at $t_0 = 0.35$ and the tax rate for pension income at $t_p = 0.25$.[12] Since the reform lowers the wage income tax rate by an amount that equals the mandatory account payment, the new wage income tax rate is set at $t_1 = t_0 - 0.0562 = 0.35 - 0.0562 = 0.2938$.

We can now compute the relative change in the net income from working compared to not working. The result is

[10] Recall that the lifecycles only contain ages 17-64, so most of the retirement years are not included in these figures.

[11] Note that W is the before-tax wage and the replacement rates in Salomäki and Viitamäki (1996) are the net replacement rates.

[12] These approximations are based on the income tax rate estimates of the Taxpayers Association of Finland, see http://www.veronmaksajat.fi/luvut/Laskelmat/Palkansaajan-tuloveroprosentin-kehitys/ and https://www.veronmaksajat.fi/luvut/Laskelmat/Elakkeensaajan-veroprosentit/ . Again, the estimates for relatively high income earners are relevant since we are considering persons who end up with positive account balances.

$$\frac{Y_1 - Y_0}{Y_0} = \frac{(1-0.25)0.0562W + 0.153 \cdot 0.312W}{(1-0.35)W - 0.312W} = 0.266. \qquad (9)$$

We are left with the elasticity $\beta$. There is a very large literature that focus on estimating different labour supply elasticities. The estimates vary a lot depending on the data and econometric methods used. This is also true for the estimates of the participation elasticity. However, most of the recent estimates that are based on microeconometric analysis seem to vary between 0.1 and 0.4. For instance, Jäntti et al. (2013) estimate participation elasticities for 13 European countries. Their country specific estimates for all working age individuals range from about 0 to 0.4, with the estimate for Finland being 0.36. When exploiting also cross-country variation in the data, their estimate ranges from 0.10 to 0.35, depending on the specification. In another recent study, Bargain et al. (2012) present elasticity estimates for Finland equal to 0.12, 0.10, 0.21 and 0.33 for married women, married men, single women and single men, respectively.

Rather than fixing the elasticity at some level in our computations, we compute the elasticity that would suffice to make the reform self-financing. However, for illustration, we use a baseline value of 0.1 for some of our calculations. In this case, the relative growth in working days induced by the reform for those who end up with a positive account balance is $E = 0.0266$, i.e. a little less than 3%.

Of course, for a given participation elasticity, different assumptions regarding unemployment benefits, other out-of-work benefits, and tax rates results in different values for $E$. We also provide some sensitivity analyses with respect to these assumptions.

A participation elasticity of 0.1 is certainly a rather conservative estimate. There are two main reasons why we think that it might be unrealistic to assume a much higher elasticity. First, unemployment accounts provide the same liquidity insurance as the current one. This may reduce the labour supply effect of the reform relative to a reform where the benefits are simply cut (Chetty (2008)). Second, some unemployed persons may move outside from the labour force, because of the reform. This is because other out-of-work benefits are not included in the account system considered here.

# 6 Results

In this section we present our main results regarding a reform that would replace the current Finnish UI system with a system based on individual unemployment accounts. We first present the baseline case together with a sensitivity analysis with respect to some key assumptions regarding the out-of-work benefits and tax rates. After that we consider various modifications of the unemployment accounts. Finally, we illustrate the importance of the lifetime unemployment distribution.

### 6.1 Baseline results and sensitivity analysis

We first consider our baseline reform. As described above, the mandatory payment rate $t_0 - t_1$ is set so that aggregate payments to the accounts equal the aggregate unemployment benefits paid (5.62% of labour income). We find that 42.3% of the individuals in the lifecycle data would end up with a negative account balance. As explained above, we assume that the reform may increase labour supply only among the remaining 57.7% of the population. The static fiscal effect, generated by the (net) additional pensions, is -1.61% of aggregate labour income.

Table 2 describes the dynamic effects of the reform. The first row reports the relative growth in labour income (or the increase in labour supply). The second row reports the dynamic fiscal effect (the growth in tax revenue due to increased labour supply) relative to aggregate labour income. The third row reports the total fiscal effect, i.e. the sum of the static and dynamic fiscal effects. The last row of Table 2 shows the participation elasticity that would suffice to make the total fiscal effect equal to zero. This is the participation elasticity that would be just large enough so that the positive dynamic fiscal effect would exactly compensate for the negative static fiscal effect.

The table presents these dynamic effects for different assumptions regarding the average unemployment benefits, other out-of-work benefits, and tax rates. In each case, only one assumption is changed relative to the baseline case. In all cases, the increase in the aggregate labour income and the related dynamic fiscal effect are computed assuming a participation elasticity $\beta = 0.1$.

Table 2: Effects of the unemployment account reform relative to total labour income with different parameter values.

| | | *u=0.3W* | *u=0.5W* | *o=0.2W* | *o=0.4W* | *$t_0$=0.3* | *$t_0$=0.4* |
|---|---|---|---|---|---|---|---|
| Growth in labour income, % | 2.00 | 1.67 | 2.35 | 1.59 | 2.70 | 1.74 | 2.35 |
| Dynamic fiscal effect relative to total labour income, % | 1.00 | 0.84 | 1.18 | 0.80 | 1.35 | 0.87 | 1.18 |
| Total fiscal effect relative to total labour income, % | -0.61 | -0.78 | -0.44 | -0.82 | -0.26 | -0.74 | -0.44 |
| Participation elasticity that would make the reform self-financing | 0.161 | 0.193 | 0.137 | 0.203 | 0.119 | 0.185 | 0.137 |

*Note: W is the average cross wage income when employed, u is the average after-tax unemployment benefit, o is the average after-tax level of transfers other than unemployment benefit in non-employment periods and $t_0$ is income tax rate before the reform.*

Consider first the baseline results presented in the first column of Table 2. Aggregate labour income increases by 2.00%, when the participation elasticity is assumed to be

0.1. As mentioned above, we assume that 50% of the additional labour income is taxed through income and consumption taxes, so the dynamic fiscal effect is 1.00%. Since this is not enough to compensate for the static fiscal effect, the total fiscal effect is negative.

The participation elasticity that would suffice to make the total fiscal effect equal to zero is 0.161. Relative to many empirical estimates, this is not a particularly high elasticity. This already suggests that the reform may be self-financing. Unfortunately, however, it cannot be taken for granted.

Consider then the results for different assumptions regarding the benefits and tax rates. The second and the third column illustrate the sensitivity of the results with respect to changes in the average replacement rate of the unemployment benefit. Assuming a higher replacement rate ($u$) induces a larger dynamic effect. This is partly because higher unemployment benefits increase the share of unemployment benefits of all out-of-work benefits. As a result, the reform creates a larger increase in the net financial gain from working for those who end up with a positive account balance. At the same time, a higher unemployment benefit increases the average out-of-work benefit thereby lowering the net financial gain from working in the current system and increasing the relative increase in the net financial gain from working (see equation 8). Assuming a replacement rate of 0.5 (instead of 0.4), for instance, decreases the cut-off participation elasticity from 0.161 to 0.137.

Similarly, increasing the average benefit for other out-of-work benefits works to increase the dynamic effect by increasing the average out-of-work benefit (even though it also decreases the share of unemployment benefits of all out-of-work benefits). Assuming a replacement rate of 0.4 (instead of 0.3), for instance, decreases the cut-off participation elasticity from 0.161 to 0.119.

We can also see from equation 8 that assuming a higher income tax rate before the reform ($t_0$) (keeping the payment rate $t_0 - t_1$ constant) works to increase the dynamic effect. Increasing the tax rate $t_0$ from 0.35 to 0.4 decreases the cut-off elasticity from 0.161 to 0.137.

All the cases considered here lead to a negative total fiscal effect, when a participation elasticity of 0.1 is assumed. Depending on the parameter values the participation elasticity that would suffice to make the reform self-financing varies from 0.119 to 0.203.

## 6.2 The payment rate, account limits, and age restrictions

Next we consider some variations of the unemployment account system. We vary the payment rate and consider upper and lower limits for the accounts. In addition, we consider restricting the account system to younger individuals than in the baseline case.

Table 3 gathers the fiscal and labour supply effects of these experiments. The first rows of the table present the proportion of lifecycles with a negative final balance as well as the proportion of lifecycles where the balance is negative at some point. In the table, the overall fiscal effects are split into a static and a dynamic effect as described above. The increase in the aggregate labour income and the related dynamic fiscal effect are again computed assuming a participation elasticity of 0.1.

For comparison, the effects of our baseline account reform described above are reported in the first column of Table 3. The second and third columns show the results for payment rates equal to 4% and 7%, while the fourth and fifth columns report the results when there is an upper limit of 50 000 euros or a lower limit of 20 000 euros. The last column relates to the age restriction. Here the assumptions regarding the benefits and tax rates $(u, o, t_0, t_p)$ are the same as in the baseline case.

Table 3: Fiscal effects of different unemployment account reforms.

| | | | | **Upper limit 50 000** | **Lower limit 20 000** | **Persons aged under 55 only** |
|---|---|---|---|---|---|---|
| Mandatory payment rate on labour income, % | 5.62 | 4 | 7 | 5.62 | 5.62 | 5.11 |
| **Proportion of lifecycles with** | | | | | | |
| negative final balance, % | 42.3 | 49.0 | 37.9 | 43.2 | 37.0 | 40.2 |
| negative balance ever, % | 71.8 | 75.4 | 69.1 | 72.4 | 71.8 | 70.1 |
| **Effects of the reform relative to total labour income** | | | | | | |
| Static fiscal effect, % | -1.61 | -1.02 | -2.14 | -1.04 | -1.67 | -1.53 |
| Growth in labour income, % | 2.00 | 1.39 | 2.51 | 0.65 | 1.89 | 2.21 |
| Dynamic fiscal effect, % | 1.00 | 0.70 | 1.26 | 0.33 | 0.95 | 1.11 |
| Total fiscal effect, % | -0.61 | -0.33 | -0.89 | -0.72 | -0.73 | -0.43 |
| **Participation elasticity that would make the reform self-financing** | 0.161 | 0.147 | 0.171 | 0.320 | 0.177 | 0.138 |

Consider first changes in the payment rate. A higher payment rate naturally implies higher additional pensions. This works to increase the absolute value of the negative static fiscal effect. On the other hand, it also implies a larger share of persons who end up with positive account balances. This in turn increases dynamic fiscal effect as the labour supply incentives improve for a larger share of the population. The results in table 3 show that changes in the static fiscal effect dominate in the sense that a higher payment worsens the total fiscal effect, and vice versa. In other words, the overall fiscal effect is more likely to be positive, the lower is the payment rate. On the other hand, the lower is the payment rate, the smaller is the number of individuals receiving additional pensions.

It is also possible to control the effects of the unemployment account system by setting an upper or lower limit for account balances. An upper limit for unemployment accounts means that the account payment no longer increase the account balance once the upper limit is reached. The payment is still collected as a tax on labour income. The aim of imposing an upper limit would be to reduce the additional pensions for those who have relatively high lifetime labour income. This improves the static fiscal effect. On the other hand, an upper limit also weakens the positive dynamic effects. First, it implies that some persons who ended up with a positive balance without the upper limit now end up with a negative balance. So fewer individuals receive improved incentives to change their behaviour. Second, also individuals who do not expect to have a negative balance at retirement, but who expect to reach the upper limit at some point before retirement, face no link between benefit withdrawal and the additional pension. In our calculation, we assume that individuals who reach the upper limit at some point in the future do not change their labour supply behaviour before reaching the limit.

By contrast, a lower limit would give some of the persons with long unemployment period in an early stage of their lifecycle a chance to reach a positive final balance. This mechanism works to increase the share of individuals for whom the reform improves incentives. On the other hand, individuals who expect to reach the lower limit at some point, should realize that a small change in the amount of unemployment benefits they draw has no effect on their future pension. In our calculation we assume that individuals who reach the lower limit at some point in the future do not change their labour supply behaviour before reaching the limit. Of course, imposing a lower limit also increases in absolute value the static fiscal cost by increasing additional pensions.

Table 3 shows that the implementation of the upper limit indeed shrinks (in absolute value) both the static and the dynamic fiscal effects compared to the baseline case without limits. However, the total fiscal effect is more negative than in the baseline case (-0.72% vs. -0.61% in the baseline case). Imposing the lower limit in turn increases in absolute value the static fiscal effect. At the same time, it decreases the positive dynamic fiscal effect. The total fiscal effect (-0.73%) is again more negative than in the baseline case. Compared to the baseline case, the cut-off participation elasticity that would suffice to make the reform self-financing increases with both the lower and the upper limit considered. This suggests that imposing limits on the account balance is not necessarily an easy way of making it more likely that the reform is self-financing.

Finally, consider age restrictions. As shown in section 3, unemployment is quite high in the age group 55-64. This is related to the so called unemployment pipeline. By creating relatively long unemployment spells, the existence of the unemployment pipeline may make the unemployment account system less efficient. These considerations motivate us to consider restricting the reform to individuals that are less than 55 years old. The accounts are settled when account holders reach the age of 55 (instead of 65 in the baseline case). After age 55, there are no payments to the accounts. If a person is unemployed when aged 55-64, the unemployment benefits do not affect his/her account balance or additional pension.

The results for this restricted account reform are shown in the last column of Table 3. Now a payment rate of 5.11% of labour income is enough to finance the aggregate unemployment benefits in the status quo. The static and dynamic fiscal effects are now computed relative to total labour income of under 55 year old persons. Compared to the baseline case, the negative static fiscal effect is smaller in absolute value and the dynamic fiscal effect is larger (again, given a participation elasticity of 0.1). The participation elasticity that would suffice to make the reform self-financing falls from 0.161 in the baseline case to 0.138 in this case.

## 6.3 The importance of lifetime unemployment distribution

As discussed in section 4, the total fiscal effect should be positive in a population where lifetime unemployment is relatively evenly distributed. To confirm this conjecture, we apply the unemployment account system to a subpopulation, where lifecycles from the lowest and the highest quintiles of unemployment distribution are excluded. This means that only the persons having 3 - 86 unemployment months during their lifecycles are included. (Of course, restricting the account reform this way would not be possible in practice.)

As in the baseline case, we determine the mandatory payment rate so that the aggregate payments to the accounts equal the aggregate unemployment benefits paid before the reform. It turns out that a payment rate of 3.82% satisfies this condition. The assumptions regarding the benefits and the tax rates $(u, o, t_0, t_p)$ are the same as in the baseline case.

Indeed, we find that the reform works remarkably well in this case. Assuming again a participation elasticity of 0.1, the static and dynamic fiscal effects are now -0.81% and 0.84%, respectively. (Naturally, these figures are relative to the aggregate labour income for the subpopulation considered.) The participation elasticity that would suffice to make the reform self-financing is only 0.097 in this case. This suggests that the distribution of lifetime unemployment is indeed a crucial feature in this context.

One (feasible) way to improve the workings of unemployment accounts may be to restrict it to short-term unemployment periods only. Presumably, those having exceptionally many unemployment months also have very long unemployment spells. So including only short-term unemployment spells should make the distribution of lifetime unemployment covered by the accounts more even.

Unfortunately, our data does not allow us to identify unemployment spells. In many cases, we only know the number of unemployment months within a year. In order to briefly study this issue, we include in the account system the unemployment benefits only for those years that were immediately preceded by a year during which the corresponding individual didn't receive any unemployment benefits. In this case, the payment rate that is required to finance the benefits covered by the accounts is just 1.03%. As a result, the static fiscal effect falls in absolute value and is now only -0.24%. The cut-off participation elasticity that would suffice to make the reform self-financing is only 0.073. Hence, the reform is now indeed very likely to generate a Pareto improvement.[13] On the other hand, since the accounts now cover only a fraction of all unemployment benefits, the welfare gains cannot be very large.

# 7 Integrating unemployment accounts with the pension system

One possibility to make sure that the total fiscal effect of the reform is positive is to subtract the negative balances from earnings-related pensions. This would reduce the static deficit, since the pensions of the persons with negative end balance would be smaller than before the reform. Furthermore, this would increase the dynamic surplus, since also the persons with negative end balances now receive incentives to change their behaviour. Effectively, this means integrating unemployment insurance with the pension system (see Stiglitz and Yun (2005)).

The downside of the integration with the pension system is that a Pareto improvement is no longer possible, since the persons with negative final balance lose some of their pensions. On the other hand, it is possible to take distributional considerations into account in the design of the new system.

Specifically, we first considered an unemployment account system where a negative final balance is subtracted from person's ordinary pension, but only down to a limit of 12 000 euros per year (in 2010 euros). For example, if the person's pension would be 13 000 euros per year and she has a negative final balance that corresponds to 2000 euros

[13] Our results seem to be roughly in line with those in Bovenberg et al. (2012) who also include only short-term unemployment benefits in their account system.

annually, her annual total pension is set at 12 000 euros. (We first convert the final balance into an annuity that is roughly actuarially fair.) In this setting, unemployment accounts improve the incentives also for many individuals who expect to have a negative final balance. At the same time, since the ordinary pensions are determined largely by lifetime income, the limit of 12 000 euros at least partly protects those with low lifetime earnings.

The static fiscal deficit is now reduced and the dynamic fiscal surplus is increased compared to our original account system. We find that a participation elasticity of just 0.107 would suffice to make the reform self-financing. For a participation elasticity of 0.1, the additional pensions (in net terms) amount to 2.9% relative to total labour income. Hence, while the reform would not create a Pareto improvement, it may well increase some reasonable measure of aggregate welfare.

Finally, we consider a reform where the UI and the pension system are fully integrated in the sense that unemployment benefits are taken into account as negative contributions so that withdrawing unemployment benefits lowers accrued pension rights by the same accrual rate that is applied to wage earnings.

In such a system, the UI system in itself no longer transfers resources to those experiencing many unemployment months during their lifecycles. However, to some extent the pension system does that. In particular, since the pension system provides a so called guaranteed pension to individuals with low pension accrual at retirement, it provides a transfer to many of those individuals that are often unemployed. In terms of redistribution, the main difference with the current system is that those that are often unemployed but do not have particularly low lifetime earnings, no longer receive a transfer from other tax payers.

Of course, linking unemployment insurance with the pension system may also change retirement behaviour. This is especially the case in Finland where the unemployment insurance effectively provides an early retirement scheme in the form of the so called unemployment pipeline that we discussed above. The straightforward empirical approach that we have applied so far cannot capture these mechanisms. Therefore, we now turn to a model based approached. We employ a stochastic lifecycle model that features a detailed description of the benefit rules of the Finnish pension and UI systems (for a description of the model see, Lassila et al. (2013)). The model is calibrated to match realistic wage uncertainty and labour supply behaviour, especially at old age. However, the model has not been calibrated to match the lifetime unemployment distribution. Indeed, that distribution is too narrow in the model.

Integrating UI with the pension system in the model is relatively straightforward. Unemployment benefits are treated as negative earnings applying the same accrual rate that is applied to wage income. (In the current system, pensions actually accrues also based on part of the earnings-related unemployment benefits.) In the absence of an increase in labour supply, this decreases pensions. This could be compensated by increasing the accrual rate. In this exercise, however, we keep the accrual rates as fixed and compute how much the reform improves public finances. We also consider the distributional implications. In the model, individuals are divided into 6 groups based on education and gender. These groups have different average age-wage profiles, disability risks, and mortality.

Table 4 displays how this reform changes aggregate labour supply (hours worked), labour income, the present value of pensions, and the present value of "net taxes". By net taxes we mean the difference between certain taxes and transfers in the model. The taxes consists of various social security payments, consumption taxes, and income taxes. The benefits consists of various pension benefits (the national pension, the guarantee-pension, earnings-related pensions, and disability pensions) and unemployment benefits. The change in net taxes is measured relative to aggregate labour income (within the group in question). The bottom row displays the average change across all groups. (The groups are of different size.)

Table 4: The effects of integrating UI with the pension system, %.

| | **Hours worked** | **Labour income** | **Pensions** | **Net taxes** |
|---|---|---|---|---|
| **Men** | | | | |
| Primary education | 1.8 | 1.9 | -0.9 | 2.3 |
| Secondary education | 1.9 | 2.0 | -0.9 | 2.4 |
| Tertiary education | 1.6 | 1.8 | -0.7 | 2.1 |
| **Women** | | | | |
| Primary education | 2.5 | 2.6 | -1.2 | 3.3 |
| Secondary education | 2.5 | 2.5 | -1.4 | 3.2 |
| Tertiary education | 2.0 | 2.2 | -1.1 | 2.7 |
| | | | | |
| **All** | 2.0 | 2.1 | -1.0 | 2.6 |

*Note: The column "Pensions" displays the change in the present value of pension benefits relative to aggregate labour income. Similarly, "Net taxes" refer to the change in net taxes (taxes less benefits) relative to aggregate labour income.*

Consider first the effect on hours worked and labour income. In this model, the two are not the same because individuals with different earnings possibilities may react differently to the reform. Indeed, labour income increase more than hours worked. This means that it is the relatively high-wage individuals (within each group) that increase labour supply the most following the reform. However, the differences are not large. The average increase across all groups is about 2.0% for hours worked and 2.1% for labour income. The labour supply increases are quite similar across education groups. There are probably several countervailing effects here. For one thing, low-wage individuals are more often unemployed than others. This works to increase the effect of the reform among low wage individuals. On the other hand, because of the progressive pension system, their labour supply incentives do not always improve that much due to the reform. There is a difference between the effects among men and women, however. This is because women live longer on average. As a result, the change in the present value of the pension benefits (in absolute terms or relative to labour income) is larger for them.

Not surprisingly, pensions decrease. The average effect is about -1.0% relative to average labour income. Here we also see that the decrease is larger for women than for men. Naturally, net taxes increase. The aggregate effect is about 2.6% relative to labour income.

One way of considering the distributional effects of the reform is to look how net taxes changes in different groups. Net taxes do seem to increase the most among low wage individuals (individuals with a basic or secondary education only). In this sense, the reform is somewhat regressive. However, the differences are not very large. Given the substantial increase in aggregate net taxes, there should also be plenty of scope for compensating measures.

# 8 Conclusions

We have considered a reform that would replace the current Finnish UI system with unemployment accounts. After the reform, individuals pay part of their labour income to individual accounts. When unemployed, they draw their unemployment benefits from these accounts. The account can go negative, so liquidity is as good as in the current system. At retirement, positive balances are converted into additional pensions while negative balances are forgiven. In our analysis, we estimate the static fiscal effect caused by additional pensions for the persons who end up with positive final balances and also the dynamic fiscal effect caused by changes in labour supply. Our results are mainly based on Finnish register data from the years 1988-2010. Using the data, we created a large set of synthetic lifecycles by combining information from different cohorts.

We characterize the fiscal effects of the reform by computing the participation elasticity that would suffice to make the reform self-financing. If the reform is self-financing, there is no need to increase taxes or mandatory payments or cut benefits relative to the current status. In that case, the reform would clearly increase welfare, as many individuals would enjoy high pensions generated by the positive final account balances. As long as the fiscal effects are strictly positive, it should also be possible to increase the economic well-being of those who end up with negative final balances. The fiscal effects depend crucially on the distribution of lifetime unemployment across individuals.

We find that the required participation elasticity is not very high. It is likely to be between 0.1 and 0.2. This suggests that replacing the current UI with unemployment accounts is indeed likely to be welfare increasing.

At the same time, however, it must be recognized that one cannot be certain that the reform would be self-financing. For one thing, some of the empirical estimates for the participation elasticity are less than 0.2. Moreover, the fact that unemployment accounts still provide the same liquidity insurance as the current UI system may weaken its labour supply effects relative to reforms that consists of reducing out-of-work benefits.

In light of these concerns, it would be useful to consider alternative reforms that would either make unemployment accounts even more likely to generate a Pareto improvement, or at least allow taking distributional issues into account. We found, for instance, that including only short-term unemployment periods in the account system, should make the account system more likely to generate a Pareto improvement. We also analysed the possibility of integrating unemployment accounts with the earnings-related pension system. That would allow targeting transfers to individuals that are poor in terms of lifetime income.

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# Appendix: The cohorts used to produce the lifecycles

| Seed cohort | | Cohort 2 | | Cohort 3 | | Cohort 4 | |
|---|---|---|---|---|---|---|---|
| Age at end of the year 2010 | Information for age years | Age at end of the year 2010 | Information for age years | Age at end of the year 1988 | Information for age years | Age at end of the year 1988 | Information for age years |
| 39 | 17-39 | - | - | 39 | 40-61 | 61 | 62-64 |
| 40 | 18-40 | 18 | 17 | 40 | 41-62 | 62 | 63-64 |
| 41 | 19-41 | 19 | 17-18 | 41 | 42-63 | 63 | 64 |
| 42 | 20-42 | 20 | 17-19 | 42 | 43-64 | - | - |
| 43 | 21-43 | 21 | 17-20 | 43 | 44-64 | - | - |
| 44 | 22-44 | 22 | 17-21 | 44 | 45-64 | - | - |
| 45 | 23-45 | 23 | 17-22 | 45 | 46-64 | - | - |
| 46 | 24-46 | 24 | 17-23 | 46 | 47-64 | - | - |
| 47 | 25-47 | 25 | 17-24 | 47 | 48-64 | - | - |
| 48 | 26-48 | 26 | 17-25 | 48 | 49-64 | - | - |
| 49 | 27-49 | 27 | 17-26 | 49 | 50-64 | - | - |
| 50 | 28-50 | 28 | 17-27 | 50 | 51-64 | - | - |
| 51 | 29-51 | 29 | 17-28 | 51 | 52-64 | - | - |
| 52 | 30-52 | 30 | 17-29 | 52 | 53-64 | - | - |
| 53 | 31-53 | 31 | 17-30 | 53 | 54-64 | - | - |
| 54 | 32-54 | 32 | 17-31 | 54 | 55-64 | - | - |
| 55 | 33-55 | 33 | 17-32 | 55 | 56-64 | - | - |
| 56 | 34-56 | 34 | 17-33 | 56 | 57-64 | - | - |
| 57 | 35-57 | 35 | 17-34 | 57 | 58-64 | - | - |
| 58 | 36-58 | 36 | 17-35 | 58 | 59-64 | - | - |
| 59 | 37-59 | 37 | 17-36 | 59 | 60-64 | - | - |
| 60 | 38-60 | 38 | 17-37 | 60 | 61-64 | - | - |