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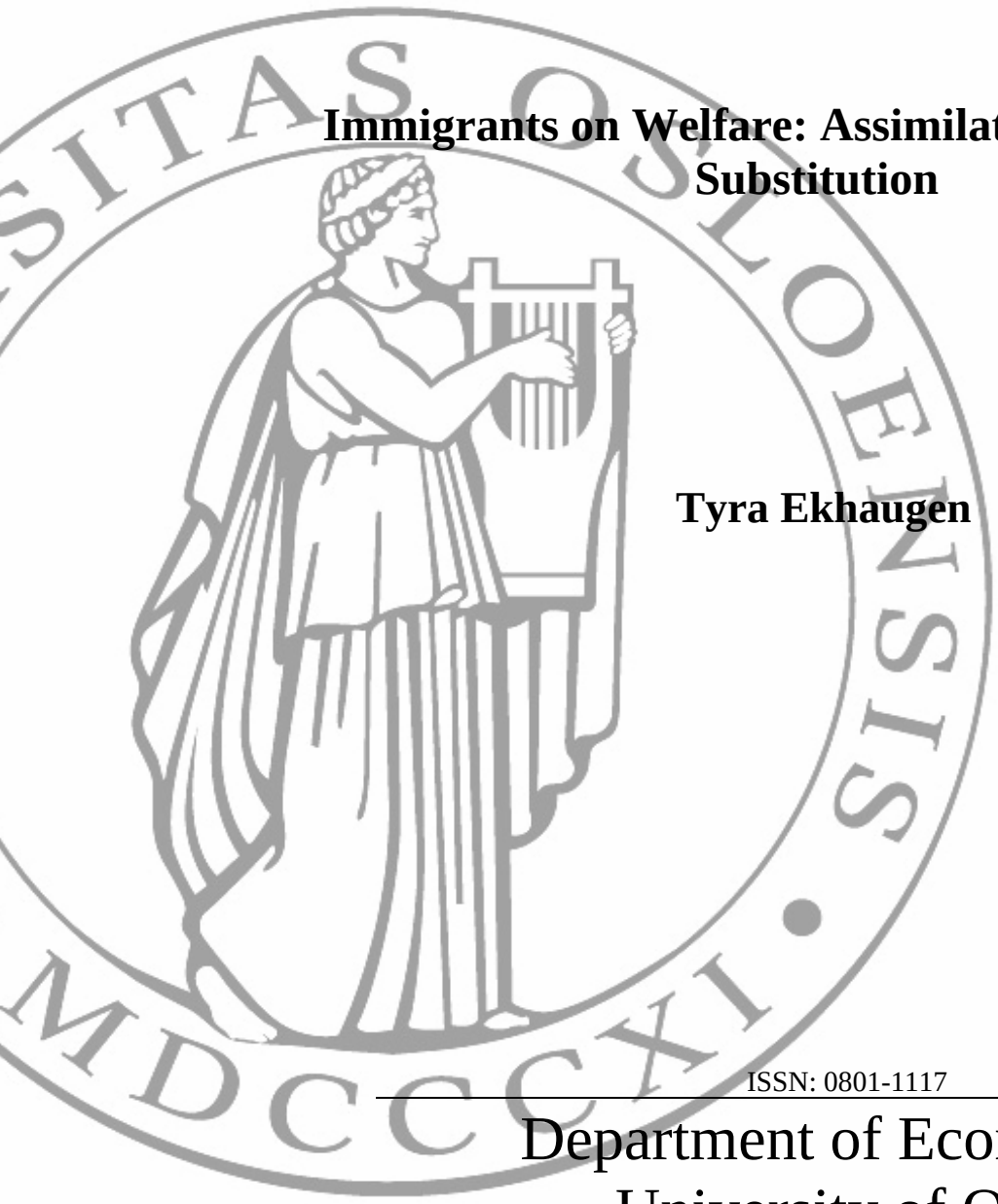

Immigrants on Welfare: Assimilation and Benefit Substitution

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25 July 2005

Immigrants on Welfare: Assimilation and Benefit Substitution*

By Tyra Ekhaugen

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Abstract

Non-western immigrants in Norway are shown to rely heavily on welfare transfers for several years after immigration. While refugee immigrants assimilate slightly out of welfare, other non-western immigrants assimilate rapidly into welfare. Re-migration is selective for both non-western and western immigrants, insofar as the probability of re-migration correlates negatively with the probability of receiving welfare. We argue that previous studies may have reached biased estimates of welfare assimilation, both because they have disregarded the possibility of selective re-migration, and because they have focused only on social assistance, not taking into account the possibility of benefit substitution.

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1. Introduction

The aging populations in many developed welfare economies threaten to cause serious shortages of labor and send dependency-ratios soaring. Most of the countries in question could receive more immigrants from developing countries by introducing a more lenient immigration policy, and thereby perhaps improve their own situation. One possibility is to admit a larger number of labor immigrants; another to relax immigration laws in general. Whereas labor immigrants would almost certainly join the tax-paying part of the population at least the very first period after arrival, those arriving for protection or family reunification could hopefully also make such contributions after a while. The advantage of an overall relaxation would therefore be twofold: increased immigration on humanitarian grounds and a long-term improvement in the host country's dependency-ratio.

An increase in yearly immigration rates could however boost rather than halt the rising dependency-ratio. One determining factor is whether or not the countries manage to attract and keep immigrants with self-supporting skills. Another is their ability to utilize the additional labor and take full advantage of the embedded human capital. The risk of attracting immigrants whose prime motivation for migrating is receiving rather than contributing is an oft-repeated concern. But at least as important as who comes, is who *stays*. Decisions of re-migration may be positively correlated with the immigrant's self-supporting ability, implying that the host country ends up hosting an increasing number of welfare recipients. Egalitarian welfare states could thus find themselves losing out to other, less egalitarian countries in the competition for labor supplying immigrants. This re-migration issue has received little attention in the many analyses of immigrant assimilation, but as exemplified by our Norwegian data, it is potentially important: Among the 33,366 immigrants of working age who

arrived in Norway in 1992-94, 41% re-migrated[1] before 2001. The numbers vary significantly among different groups, ranging from 23% for refugees to 65% for immigrants from OECD-countries.

A dynamic analysis of welfare participation among immigrants can be used to address these questions directly. The existing literature has focused on welfare assimilation, disregarding the possibility of selective re-migration. For the USA and Canada, Borjas and Trejo (1991), Baker and Benjamin (1995) and Borjas and Hilton (1996) find that the probability of welfare participation significantly *increases* with time of residence for immigrants in general. The increase among European guest workers in Germany is found to be insignificant (Riphahn, 1998). Only Hansen and Lofstrom (2003), using Swedish data, concludes optimistically, with a substantial *decrease* in the welfare participation rate among refugees and a somewhat smaller, yet significant, decrease among other immigrants. The existing evidence thus seems to contradict expectations in that the most generous welfare state examined, i.e. Sweden, is the only country where immigrants are found to assimilate out of welfare.

In the present paper, we analyze trends in immigrant welfare participation on Norwegian register data for immigrants arriving in 1956-96, observed yearly from 1992 to 2000. As Norway has a relatively generous welfare transfer system, our data seem well suited for examining questions on attracting and holding on to the "right" immigrants. The data only allows a fully simultaneous analysis of welfare receipiency and re-migration decisions for immigrants arriving in 1992-96, so the analysis covering immigrants who arrived before 1992 is purely descriptive.

[1] Throughout this paper, re-migration is defined as staying out of Norway for at least one calendar year. We choose this term instead of "return migration", as we do not know the new country of destination.

For the past few decades, immigration to Norway has mainly consisted of the following three groups: western labor immigrants, non-western immigrants arriving for family reunification, and refugees and asylum seekers. We expect each group's pattern of welfare participation to be different. As *labor migrants* arrive to work, we expect them to have low welfare participation rates to begin with, but that it increases with age, in line with what we observe for natives. Immigrants arriving for *family reunification* normally do so on a promise of being provided for the very first period by the family members already in the country. Even so, they clearly represent a labor force potential. The extent to which this potential is utilized is a particularly interesting issue, as this group has constituted an increasing share of the immigrants arriving in Norway the last decades. The large number of *refugees and asylum seekers* are expected to live on welfare immediately after arrival. It is however a political goal that even these immigrants should be self-supported within a certain number of years. In the 1990s, which is our period of attention, this target was five years. During these five years, municipalities settling the refugee immigrants received a governmental transfer meant to cover *social assistance* payments; after this period, the municipalities were on their own. Almost similar rules applied in Sweden. The trend seen in Hansen and Lofstrom (2003), that welfare dependency among refugees displays a sharp decrease after a few years of residence, may therefore be the result of the authors' sole focus on social assistance (equating social assistance with welfare receival), which brings into question their optimistic interpretation of this as "assimilation out of welfare". For such an assessment, the possibility of *program substitution* must be taken into account. By employing a comprehensive measure of welfare including the whole specter of welfare programs, we reach a far more pessimistic conclusion than Hansen and Lofstrom. Thus, we show that not only the

level of welfare participation is sensitive to which benefits are included in the concept of welfare (as is also shown in Borjas and Hilton, 1996), but also the *trends*.

We define welfare assimilation as the effect of time of residence on the probability of receiving welfare for an average immigrant in the arrival group. Equalizing the trend in this probability with the trend in the actual *share* of receivers, as is done in the existing literature, is only correct if re-migration does not occur or is entirely random. We obtain an unbiased estimate of welfare assimilation through a dynamic multinomial random-effects logit model, employing the non-parametric maximum likelihood estimator as proposed by Lindsay (1983) and Heckman and Singer (1984). This model allows the possibility of selective re-migration, state dependency in welfare participation, and a flexible modeling of the unobserved individual-specific effects. It thereby facilitates the analysis of welfare assimilation and the selectivity of re-migration, but also – by examining how sensitive immigrant welfare participation is to business cycles – the host country's ability to put the immigrant manpower into active use.

This paper proceeds as follows: Section 2 discusses the various benefits included in our measure of welfare. Section 3 presents the data. Section 4 explores the sensitivity of trends in welfare participation to the measure of welfare. Section 5 contains a presentation of our econometric model and results from the estimation. Section 6 concludes.

2. Welfare in Norway

This section provides a brief description of welfare transfers available to residents of Norway: social assistance, unemployment- and sickness benefits, disability pension and rehabilitation benefits. For most of these benefits specific rules apply to

immigrants, and these must be properly understood in order to reach a correct understanding of assimilation.[2]

Social assistance is generally meant to be a last resort measure, i.e. to function as a safety net, providing income support for residents who do not meet the criteria of other welfare programs and have no private savings. As discussed in the introduction a separate rule applies to refugees[3], for whom social assistance the first five years after arrival is offered as main income. *Disability pension* entitlement is based on the duration of residence and previous work experience in such a way that we can expect participation to be non-existent the first 5-10 years after arrival, increasing thereafter as more immigrants become possible claimants. An increasing participation rate is also expected for *medical and occupational rehabilitation*, as most immigrants must wait between one and four years, depending on workforce participation, for entitlement.[4] Rules concerning *sickness*- and *unemployment benefits* do not point at any specific trends in participation. Entitlement to unemployment benefits requires paid work for at least a substantial part of a calendar year during the three calendar years prior to the claim.[5] This work may have been performed in other EEA-countries. Sickness benefits require paid work for at least two weeks directly prior to the claim.

To summarize, we see that *benefit rules alone* point towards the following pattern of "assimilation": After some five years of residence, refugee social assistance

[2] Rules specific to immigrants are mainly found at the Norwegian Directorate of Immigration's web page, http://www.udi.no (20.01.2005). Rules on social assistance are discussed in Report to the Storting No. 17 (1996-97)", pages 9 and 91; disability pension at http://www.trygdeetaten.no (20.01.2005), and unemployment benefits at http://www.aetat.no (20.01.2005).

[3] A refugee is in this context officially defined as "a person granted asylum, an individual residence permit on humanitarian basis or temporary collective protection, whether they have arrived as asylum seekers, transfer-refugees or through family reunification" (Report to the Storting No. 17, 1996-97). However, most immigrants who arrive for family reunification will not be included by the abovementioned social assistance arrangement the first three years after arrival, as they are meant to be provided for by the family members who receive them (UDI).

[4] Refugees granted asylum are exempt from the restrictions both on rehabilitation and disability pension, given that they are disabled or in need of rehabilitation. There are very few such immigrants.

[5] Unemployment is defined as "full-time unemployment" or "part-time with entitlement to benefits".

participation should decrease sharply, while other benefits such as disability pension and rehabilitation benefits may become more relevant over time.

3. Data

The empirical analyses are based on a database assembled from administrative register data provided by Statistics Norway. It covers the entire Norwegian population and contains detailed information on all kinds of welfare transfers for the years 1992-2000 as well as on individuals' country background, education, family status, income, and other personal characteristics. It also enables us to trace each person's movements in and out of the country from year to year.

Since we have no information about each immigrant's immigration motive, we have to infer immigrant status from country of birth. The Norwegian Directorate of Immigration and Statistics Norway provide some information on immigrants' reasons for coming, leading to the following categorization: Immigrants arriving from refugee countries[6] – *refugee immigrants* – are mainly asylum seekers and transfer-refugees, but also include some immigrants arriving on family reunification. *Western immigrants* arrive from OECD-countries[7] and mainly arrive to work or study. *Non-western, non-refugee immigrants*[8] is a more mixed group. Before the general ban on non-western labor immigration was implemented in 1975, it consisted mainly of guest workers, particularly from Pakistan, Turkey and Morocco. After 1975 it has consisted mainly of immigrants from the same countries arriving on family reunification.

[6] Afghanistan, Algeria, Bosnia-Herzegovina, Chile, Byelorussia, Indonesia, Iraq, Iran, Yugoslavia, Croatia, Lebanon, Myanmar, Sri Lanka, Vietnam, and all of Africa south of Sahara.
[7] OECD-countries by 1973 (excluding Turkey): Western Europe, USA, Canada, Australia, New Zealand, and Japan.
[8] Their countries of origin include Turkey, most of Eastern Europe, South and Middle America, Asia and North Africa, and some of Oceania.

Our data include all immigrants who arrived during 1956-96[9], resided here for at least one of the years 1992-2000 (i.e. who had not by then re-migrated), and who were between 18 and 65 years of age throughout 1992-2000. This gives us a sample of 173,613 immigrants. In Section 4, the whole data set is employed to provide a purely descriptive picture of welfare receipiency among the various immigrant groups, as a function of time spent in Norway. In Section 5, we use a sub-sample of 44,315 immigrants arriving in 1992-96, for which we are able to model welfare receipiency within a simultaneous panel data model that also accounts for the non-random re-migration process.

4. What constitutes an adequate definition of welfare?

This section is devoted to demonstrating, in a purely descriptive manner, that trends in welfare participation can be very sensitive to the definition of welfare receipiency. In particular, due to the possibility of program substitution (a phenomenon recognized as common in Nordberg and Røed, 2002) an overly narrow definition may be misleading. This issue is not debated in the existing literature. The welfare definition used in Borjas and Trejo (1991) and Baker and Benjamin (1995) includes some, but not all, types of benefits, while Riphahn (1998) and Hansen and Lofstrom (2003) only include social assistance.

Figure 1 depicts trends in the claiming of each of the benefits previously discussed, i.e. social assistance, unemployment benefits, disability pension, sickness benefits and rehabilitation benefits.[10] Figure 2 employs a comprehensive measure of welfare, where welfare reception is defined as receiving at least one of the

[9] Very few immigrants arrived in Norway prior to 1956.
[10] To receive a certain benefit a certain year is throughout the analysis defined as receiving it *at least one month* during that year. The only exception is sickness benefits, which are not counted before *three months* have passed to avoid defining too large a group as welfare participants.

abovementioned benefits. Separate curves are drawn for each arrival cohort, 1956-65, 1966-75, 1976-85, 1986-91 and 1992-96, by and large avoiding to confuse assimilation and cohort effects (as discussed in e.g. Borjas, 1985). Note that the 1992-96 cohort includes the sample used in the estimation in Section 5. Throughout this section, we are aware of the limitations of descriptive analysis: The observed trends are not adjusted for age or business cycles; nor is re-migration accounted for.

In Figure 1 we see that the fraction of *refugees* receiving social assistance decreases sharply with time of residence after a peak of 51% three to four years after arrival.[11] This is in line with the findings of Hansen and Lofstrom (2003), whose comparable figure is remarkably similar to ours. However, the development in the reception of other types of benefits suggests that Hansen and Lofstrom's optimistic interpretation of this finding may have been unwarranted. The declining rate of social assistance receipiency is not unambiguously associated with an increasing rate of self-sufficiency. On the contrary, what we see is a pattern of benefit shifting rather than one of benefit termination. One example is the share receiving unemployment benefits, which peaks at 46% *one year after* the peak in social assistance. These peaks are found to include largely the same people, agreeing with the rules on unemployment benefits as cited in Section 2.[12] Hence, leaving social assistance may mean that labor is supplied, but not necessarily for long.

The downward trend in the refugee receipiency of social assistance and unemployment benefits translates neither to the other benefits, nor to the other

[11] The steep *upward* trend the very first years for the 1992-96-cohort could be the result of the refugee wave from former Yugoslavia, accounting for approx. 60% of this cohort. During roughly the first year after arrival, they probably received a type of benefit not recorded in our data before shifting to a *recorded* benefit type two years after arrival. Participation rates for the very first years should therefore not be trusted for this cohort.

[12] As an example, refugees who arrived in 1986-91 and received social assistance the fourth year after arrival had a 59% probability of receiving unemployment benefits the next year, compared to 32% for the immigrants who did not receive social assistance the year before. The rule is that one has to work approximately one year to be entitled to unemployment benefits large enough to live off.

Figure 1: Arrival cohort specific, yearly participation rates for various benefits: social assistance, unemployment benefits, disability pension, rehabilitation benefits and long-term sick leave from employment, from the year of arrival up to 36 years after. The sample consists of all 173,613 immigrants arriving in Norway during 1956-96 who still resided in Norway at least one year during 1992-2000, and who were born during 1935-74. Participation is measured during 1992-2000.

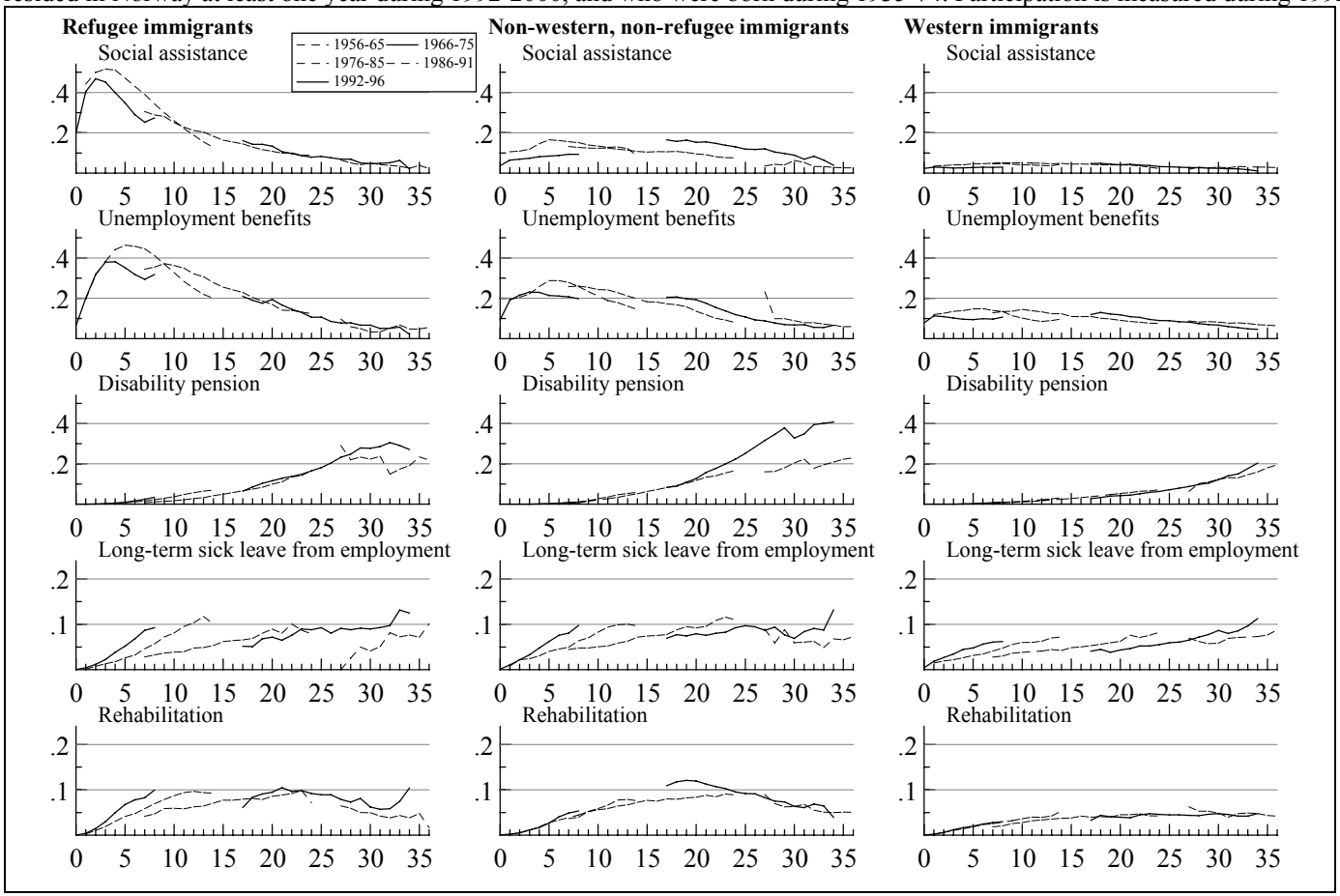
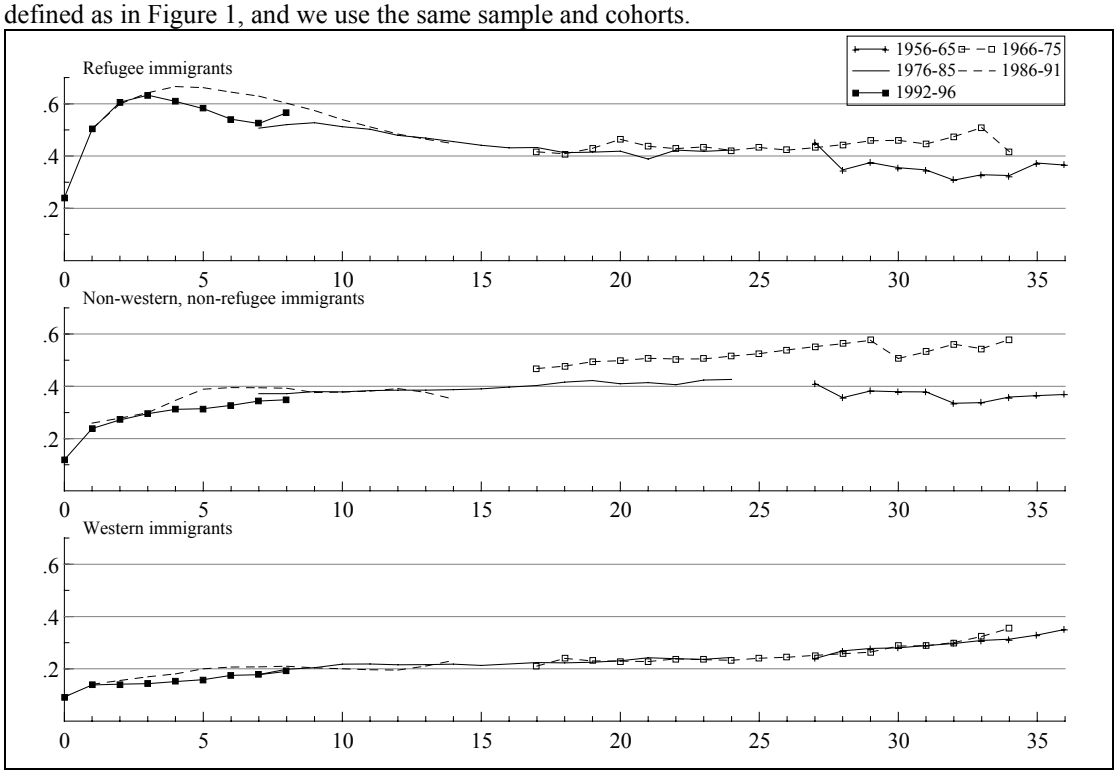


Figure 2: Welfare participation, defined as receiving social assistance, unemployment benefits, disability pension, sickness benefits and/or rehabilitation benefits. Receiving each of these benefits is defined as in Figure 1, and we use the same sample and cohorts.



immigrant groups. From Figure 2 we see that refugee welfare receipiency decreases when comprehensively defined, but much more slowly than the trend in social assistance reception would suggest. It stabilizes for most cohorts above 40% after 15 years of residence. The fraction of *non-western, non-refugee immigrants* claiming welfare increases steadily, and after 17 years of residence it exceeds the welfare propensity among refugees. The 1966-75 cohort, i.e. guest workers who arrived before the temporary moratorium on immigration was introduced in 1975, stands out with a long-term welfare participation share above 50%. Bratsberg et al. (2003) analyses these immigrants and finds their employment rate approximately halved from 1971 to 1997. *Western immigrants*, most likely to arrive for work, are throughout the period least likely to claim welfare. They do show a small increase, but this is mainly due to increasing age.

5. Welfare assimilation and re-migration

The aim of this section is to analyze welfare assimilation, i.e. the effect of time of residence on the probability of claiming welfare for an average immigrant in the arrival cohort. We also want to perform a characterization of how the re-migration process correlates with the propensity of welfare dependency, as well as the sensitivity of immigrant welfare participation to business cycles. The section proceeds as follows: First, the model is explained in some detail, as it differs in several aspects from the models employed in the existing literature (Raaum and Røed, 2005, contains another application of the model we use). We then proceed to describe the data and the estimation procedure. Finally, the results are presented. The model readily permits calculation of *conditional* probabilities (i.e. conditional on the previous year's outcome), as we model transitions, rather than events. Other more comprehensive results are obtained through simulation. Simulation also provides the opportunity to examine model performance and to carry out counterfactual analyses of the effects of business cycles and the selectivity of re-migration.

A. Model

Each person may in each period (year) re-migrate, receive welfare or neither of the two. The ones who re-migrate are excluded from the sample from the subsequent period and onwards. The available data panel yields up to nine yearly observations for each person. These observations cannot be assumed to be statistically independent of each other, as unobserved individual characteristics are likely to persist over time. The model is therefore formulated as a *random effects* multinomial panel data model, where the unobserved component is assumed to follow a discrete distribution with an a priori unknown number of support points. We also take into account that there may

be *state persistence* in welfare participation, i.e. that the probability of receiving welfare in year *t* depends on the welfare participation in year *t*-1. (As an example, two consecutive years of attendance in a rehabilitation program may in fact be generated by the same spell.) To avoid this persistence from being erroneously captured by the unobserved individual characteristics, we formulate a *dynamic* model, in which all parameters may depend on the previous state. This leaves us with an initial conditions problem, which is solved by treating the initial outcome as a separate, yet not statistically independent, entity. Note that we estimate *transitions*, where the baseline event is "having same outcome as last year". We suppress individual subscripts on the variables for convenience.

The following outcome variables are included:

$$y_{wt} = \begin{cases} 1 \text{ if the individual receives welfare at least one month in year } t \\ 0 \text{ otherwise} \end{cases}$$

$$y_{rt} = \begin{cases} 1 \text{ if the individual re-migrates in year } t \\ 0 \text{ otherwise} \end{cases}$$

The model can be expressed as:

$$(1)\ P(y_{w0}=1) = \frac{\exp(x_t^f \beta^f)}{1+\exp(x_t^f \beta^f)}$$

$$(2)\ P(y_{wt}=1 \mid y_{wt-1}=0) = \frac{\exp(x_t^{w_1} \beta^{w_1})}{1+\exp(x_t^{w_1} \beta^{w_1})+\exp(\tilde{x}_t^r \tilde{\beta}^r)},\ t=1,\ ...,8$$

$$(3)\ P(y_{wt}=0 \mid y_{wt-1}=1) = \frac{\exp(x_t^{w_0} \beta^{w_0})}{1+\exp(x_t^{w_0} \beta^{w_0})+\exp(x_t^r \beta^r)},\ t=1,\ ...,8$$

$$(4)\ P(y_{rt}=1 \mid y_{wt-1}=0) = \frac{\exp(\tilde{x}_t^r \tilde{\beta}^r)}{1+\exp(x_t^w \beta^w)+\exp(\tilde{x}_t^r \tilde{\beta}^r)},\ t=1,\ ...,8$$

$$(5)\ P(y_{rt}=1 \mid y_{wt-1}=1) = \frac{\exp(x_t^r \beta^r)}{1+\exp(x_t^{w_0} \beta^{w_0})+\exp(x_t^r \beta^r)},\ t=1,\ ...,8$$

Here,

$$(6)\ x_t^f \beta^f = c\alpha_c^{\,1} + a\lambda_a^{\,1} + b\lambda_b^{\,1} + z\delta_z^{\,1} + d\delta_d^{\,1} + v^1,$$

$$(7)\ x_t^{w_1} \beta^{w_1} = ysm_t{\cdot}m\alpha_{ysm}^{\;\;2} + c\alpha_c^{\,2} + a_t\lambda_a^{\,2} + b_t\lambda_b^{\,2} + z\delta_z^{\,2} + d\delta_d^{\,2} + v^2,$$

$$(8)\ x_t^{w_0} \beta^{w_0} = ysm_t{\cdot}m\alpha_{ysm}^{\;\;3} + c\alpha_c^{\,3} + a_t\lambda_a^{\,3} + b_t\lambda_b^{\,3} + z\delta_z^{\,3} + d\delta_d^{\,3} + v^3,$$

$$(9)\ x_t^r \beta^r = ysm_t{\cdot}m\alpha_{ysm}^{\;\;4} + c\alpha_c^{\,4} + a_t\lambda_a^{\,4} + b_t\lambda_b^{\,4} + z\delta_z^{\,4} + d\delta_d^{\,4} + \phi w_{t-1} + v^4 = \tilde{x}_{it}^r \tilde{\beta}^r + \phi\, w_{t-1}$$

where $ysm{\cdot}m$ is years since arrival interacted with immigrant category; c is country of origin; a is age (set equal to age at arrival in eq. 6, while time-varying in eq. 7-9); b is a vector of year dummy variables (year of observation); z is a vector of individual characteristics (gender, education, marital status, and number of children); d is a vector of county dummy variables; w_{t-1} is a dummy for welfare participation in the previous period; and (v^1, v^2, v^3, v^4) are unobserved, possibly correlated, individual scalar variables. We only estimate four sets of parameters (eq. 4 and 5 are treated as one) as we assume observed and unobserved characteristics to have the same effect on the re-migration propensity regardless of the current state (see eq. 9). Hence welfare participation is allowed to shift the re-migration propensity (through ϕ), but not to change its dependence on other factors. Persons who re-migrate during the year of arrival are excluded from the sample so that the only available options in t=0 are $y_{w0} \in \{0,1\}$.

The four equations must be estimated simultaneously due to the possible statistical dependence between the unobserved covariates (v^1, v^2, v^3, v^4). The likelihood function for one individual can be expressed in terms of observations of outcomes $y=\{y_{wt}, y_{rt}\}$, explanatory variables $x=\{ysm, m, c, a, b, z, d, w_{t-1}\}$, unobserved heterogeneity $v=\{v^1, v^2, v^3, v^4\}$, and unknown parameters $\gamma=\{\alpha_{ysm}, \alpha_c, \lambda_a, \lambda_b, \delta_z, \delta_d, \phi\}$ in the form of

$$L(y,x,v;\gamma) = [(P(y_{w0}=1)^{y_{w0}}(P(y_{w0}=0))^{(1-y_{w0})}]^{y_0}$$

$$(10) \qquad \times \prod_{t\neq 0} \left\{ \begin{array}{l} (P(y_{rt}=1))^{y_{rt}} \\ \{[(P(y_{wt}=1 \mid y_{wt-1}=0))^{y_{wt}}(P(y_{wt}=0 \mid y_{wt-1}=0))^{1-y_{wt}}]^{(1-y_{wt-1})} \\ [(P(y_{wt}=1 \mid y_{wt-1}=1))^{y_{wt}}(P(y_{wt}=0 \mid y_{wt-1}=1))^{1-y_{wt}}]^{y_{wt-1}}\}^{(1-y_{rt})} \end{array} \right\}$$

where the various expressions are inserted from equations (1)-(5). We see that (10) depends on unobserved heterogeneity, and thus cannot be used directly in the data likelihood. Instead, we use the expectation of L (L^* in equation 11 below) with respect to the unobserved variables, i.e. we integrate them out of the likelihood. In order to avoid unjustified restrictions on the joint distributions of unobserved heterogeneity, this is done non-parametrically by using a discrete distribution with an a priori unknown number of support points (Lindsay, 1983; Heckman and Singer, 1984). Given that the elements of v are distributed according to a joint discrete distribution with Q support points, the full likelihood becomes

$$(11) \quad L^*(y,z;\gamma) = \prod \sum_{q=1}^{Q} p_q L(y,z,v_q;\gamma),$$

where the product is taken over all individuals in the data set. We first estimate the model with Q=1 (no unobserved heterogeneity; the unique mass-point contains simply the four intercepts). Then we add new points and re-estimate the model until it is saturated according to a pre-specified criterion. Each mass-point, q, is characterized by a probability, p_q, and a location vector, v_q. As recommended by Baker and Melino (2000), we use the Hannan-Quinn information criterion for model selection.

B. Identification and implementation

We aim to identify the effect of *time of residence* and of *changing macro conditions* on the probability of welfare participation, with due regard to possible changes in the *cohort composition*. This could be accomplished by including natives, assuming that

immigrants and natives respond similarly to changing macro conditions, but since Barth et al. (2004) shows that yearly labor earnings are more sensitive to local unemployment for immigrants from non-OECD countries than for natives, we will not make this assumption. By excluding natives we need more than one immigrant arrival cohort to separate assimilation from calendar time effects. Meanwhile, we must be aware that welfare propensities could differ between later arrival cohorts and earlier ones. Assuming no such time-variance within each country of origin, identification essentially requires that the fraction of immigrants arriving from each country is approximately the same in each arrival cohort. Tables A1-A3 in the Appendix show that this was indeed the case for the "top 10" countries of origin in each immigrant category during 1992-96. We only use immigrants from these countries (see Table 1) in the estimation, as cohort effects for countries further down the list seem more uncertain. Table A1-A3 also show how large a share of the overall immigration immigrants from these countries constituted each year.

Table 1: Countries of origin in the sample used in the estimation; i.e. top 10 countries of origin 1992-96 (in alphabetical order).

Refugee countries	Non-western, non-refugee countries	Western countries
Bosnia Herzegovina	China	Canada
Ethiopia	India	Denmark
Ghana	Morocco	Finland
Iran	Pakistan	France
Iraq	Philippines	Germany
Somalia	Poland	Great Britain
Sri Lanka	Rumania	Holland
Tanzania	Russia	Iceland
Vietnam	Thailand	Sweden
Yugoslavia	Turkey	USA

The 1992-96 cohorts are preferred to a later set because we want to model the possibly selective re-migration process and thus follow the cohorts from the year of arrival onwards. Having access to outcome data for the period 1992-2000, the 1992-96 cohorts yield the longest such panel available, each person contributing up to nine yearly observations. Excluding all immigrants not born during 1935-74 (i.e. not aged

Table 2: Observable characteristics by immigrant category for the sample of 44,315 persons used in the estimation.

	Refugee immigrants	Non-western, non-refugee immigrants	Western immigrants
Share of males	0.50	0.31	0.51
Mean years of education	9.4	9.7	11.7
Mean number of children	1.72	1.25	0.78
Share of singles	0.29	0.25	0.55
Mean age at arrival	33	30	31
Share living in Oslo	0.22	0.37	0.26
Share re-migrating during the outcome period	0.20	0.24	0.60
Number of immigrants arriving each year			
1992	3,461	1,682	3,749
1993	5,908	1,474	4,013
1994	3,152	1,532	4,155
1995	2,077	1,434	4,054
1996	1,578	1,434	4,612
Total number of immigrants in the sample	16,176	7,556	20,583

18-65 throughout the outcome period) and also the ones re-migrating in the year of arrival, gives us a sample of 44,315 immigrants. Some descriptive statistics are presented in Table 2.

According to Table 2 the average western immigrant is more educated, has fewer children and is more likely to be single than the average non-western immigrant. Noting also the very high re-migration propensity, the notion of western immigrants as labor immigrants seems reasonable. Comparing the two non-western immigrant groups, we see that refugee immigrants are more likely to be male, with (slightly) less education and more children than non-refugee immigrants.

The explanatory variables are all dummies, thereby avoiding unjustified linear assumptions.[13] The only exception is age, which is allowed to follow a third-degree polynomial. Modeling four transitions, this gives a huge number of estimated parameters. With the added burden of unobserved heterogeneity, we understand that maximization of (11) is an enormous computational task. In order to be able to

[13] As an example, "years of education" consists of 15 dummies, ranging from lowest to highest observed value.

perform a full-scale estimation (i.e. without a pre-determined number of mass-points), we employ an optimization program tailored for the type of data we use.[14]

C. Results

The selected model contains nine support points in the joint heterogeneity distribution. Through the process of introducing unobserved heterogeneity into the model, the log-likelihood increased with 935.13 units from -135,357.06 (Q=1) to -134,421.93 (Q=9). A total number of 460 parameters were estimated. The most relevant parameter estimates are presented in Table 3, while Table A4 in the Appendix contains the complete results.

Table A4 shows that the probability of *starting out* on welfare varies with country of origin as expected, being generally largest among immigrants from refugee countries, ceteris paribus. As is shown in Table 3, the effect of time of residence also seems to be as expected for the refugee immigrants, indicating a downward trend in the welfare participation propensity, conditional on the participation state in the previous period. Moreover, we see that males are significantly more likely to receive welfare the year of arrival, as well as to make the transition to welfare, but less likely to make the transition from welfare and to re-migrate. Receiving welfare is shown to have a negative effect on the probability of re-migrating during the next period, although the effect is not statistically significant at the 5 percent level.

Figure 3 translates the results in Table 3 concerning transitions to and from welfare to the probabilities of *switching to* and *staying on* welfare, i.e. $P(y_{wt}=1|y_{wt-1}=0)$ and $P(y_{wt}=1|y_{wt-1}=1)$. They are calculated for a reference individual who has 11 years of education, is married with one child and is 35 years old halfway through the

[14] The program is developed by Simen Gaure at the Centre for Information Technology Services, University of Oslo, and the Ragnar Frisch Centre for Economic Research.

Table 3: Selected estimation results.

	β^f Welfare year 0 (eq. 1)		β^{w_1} Transition to welfare (eq. 2)		β^{w_0} Transition from welfare (eq. 3)		β^r Re-migration (eq. 4 and 5)	
	Est.	**Std.e.**	**Est.**	**Std.e.**	**Est.**	**Std.e.**	**Est.**	**Std.e.**
Time spent in Norway (1 year is reference)								
Refugee immigrants								
2 years	-	-	0.015	0.040	0.352*	0.080	0.579*	0.073
3 years	-	-	-0.073	0.049	0.500*	0.081	1.210*	0.084
4 years	-	-	-0.274*	0.053	0.734*	0.082	1.004*	0.102
5 years	-	-	-0.366*	0.057	0.829*	0.084	1.035*	0.120
6 years	-	-	-0.610*	0.062	0.920*	0.088	0.444*	0.146
7 years	-	-	-0.731*	0.069	0.866*	0.095	-0.105	0.176
8 years	-	-	-0.336*	0.095	0.899*	0.113	-0.020	0.236
Non-western, non-refugee immigrants								
2 years	-	-	-0.065	0.057	0.155	0.098	0.888*	0.091
3 years	-	-	-0.063	0.061	-0.043	0.101	1.211*	0.103
4 years	-	-	0.067	0.064	-0.099	0.102	1.171*	0.119
5 years	-	-	-0.018	0.071	-0.128	0.107	1.431*	0.143
6 years	-	-	-0.101	0.081	-0.437*	0.115	0.773*	0.192
7 years	-	-	-0.114	0.094	-0.478*	0.126	0.265	0.263
8 years	-	-	-0.126	0.122	-0.547*	0.151	0.325	0.315
Western immigrants								
2 years	-	-	-0.294*	0.051	0.303*	0.079	0.295*	0.040
3 years	-	-	-0.380*	0.058	0.169	0.085	0.723*	0.053
4 years	-	-	-0.316*	0.061	0.076	0.091	1.071*	0.071
5 years	-	-	-0.241*	0.069	-0.007	0.101	1.294*	0.087
6 years	-	-	-0.177*	0.081	-0.222	0.113	1.164*	0.103
7 years	-	-	-0.136*	0.098	-0.121	0.134	1.061*	0.127
8 years	-	-	-0.059*	0.131	-0.408*	0.191	0.563*	0.175
Calendar year (1994 is reference)								
1993	-1.700*	0.135	-0.575*	0.046	-0.052	0.107	-0.244*	0.055
1995	-2.740*	0.146	-0.115*	0.035	-0.131*	0.061	0.030	0.043
1996	-0.387*	0.103	-0.273*	0.038	0.144*	0.061	0.358*	0.044
1997	-0.403*	0.113	-0.381*	0.039	0.303*	0.061	0.584*	0.045
1998	-	-	-0.453*	0.046	0.607*	0.064	0.697*	0.055
1999	-	-	-0.446*	0.051	0.747*	0.068	1.056*	0.069
2000	-	-	-0.512*	0.056	0.671*	0.074	1.780*	0.078
Welfare year *t*-1	-	-	-	-	-	-	-0.108	0.059
Male	2.603*	0.120	0.237*	0.022	-0.461*	0.024	-0.100*	0.026

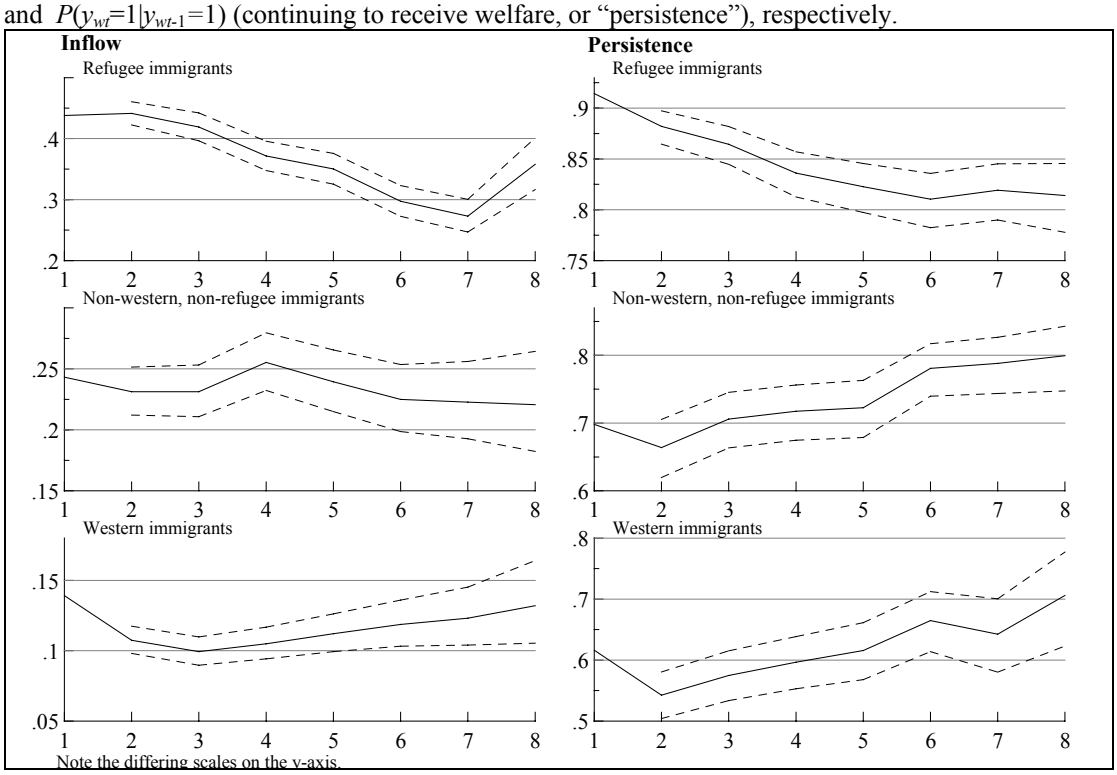
Note: * denotes that the estimate is significant on a 5 percent level.

observation period. The county is set to Oslo, the gender to male, and the year of observation to 1996. For the unobserved heterogeneity, we use the estimated probabilities, p_q, and locations, v_q (q=1, ..., Q; where Q^{est}=9) to construct a constant v for each transition rate, referring to the mean unobserved characteristics. As time of residence is now the only time-varying variable, the time trend is solely down to assimilation effects. Figure 3 also shows whether the effect of time of residence on

the conditional welfare probabilities is statistically significant. In constructing the confidence interval, we vary time of residence for each immigrant category by using the point estimate's upper and lower limit in a 95% point-wise confidence interval, with everything else held constant. As "one year after arrival" is the reference value in the estimation, we are only able to determine whether a significant change has occurred from this year to any other given year, and not between e.g. years six and eight.

Such information on *inflow* and *persistence* is novel to the literature. While these probabilities cannot readily be translated to the *unconditional* probability of receiving welfare, they are potentially interesting in their own right. As an example, an increasing trend and/or a high level of persistence can be seen as more worrying than a similar trend or level of inflow. Refugee immigrants display significantly decreasing probabilities of inflow, and of persistence. Note, however, that they seem to stabilize on a probability of persistence above 80%. Non-western, non-refugee

Figure 3: Point-wise 95% confidence intervals for $P(y_{wt}=1|y_{wt-1}=0)$ (transition to welfare, or "inflow") and $P(y_{wt}=1|y_{wt-1}=1)$ (continuing to receive welfare, or "persistence"), respectively.



immigrants show a hardly significant reduction in the probability of inflow, but also a large and significant increase in the probability of persistence, almost equaling the probability for refugees after eight years of residence. The trend is fairly similar among western immigrants, but the level is much lower throughout the period.

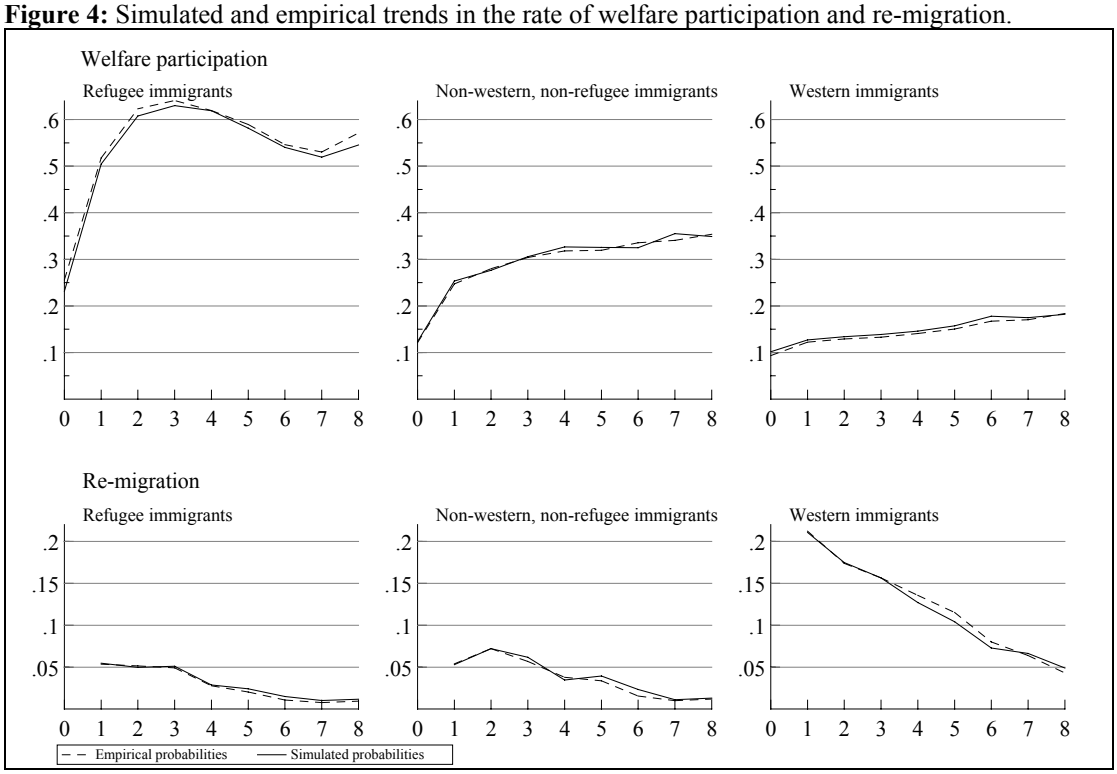
D. Simulation

We use simulation to check model performance as well as for the following exercises. First, we examine how business cycles affect welfare participation. Then, we adjust for increasing age, to show how the welfare participating *share* is affected by time of residence. Finally, in order to understand how the *probability* of welfare participation for an average immigrant in the arrival cohort changes according to time of residence, we adjust for the potentially selective re-migration. By doing so, we are also able to see just how selective re-migration is.

In the simulation we use the immigrants' actual arrival years, and all their observed features. The unobserved characteristics are decided by using the estimated probability, p_q, and location vector, v_q, belonging to each mass point, q=1, ..., Q, where Q^{est}=9. Each person is randomly drawn to belong to one of the nine "types" (mass points), and deposited with the relevant constant, v_q. All transitions (eq. 1-5 above) are decided by random drawings based on the probabilities calculated from the model. From the simulated spells we are able to calculate the rates for welfare participation and re-migration after a given period of residence. Comparing each of these to their empirical counterparts, we see from Figure 4 that the model is indeed capable of reproducing the empirical rates in a reassuring manner.

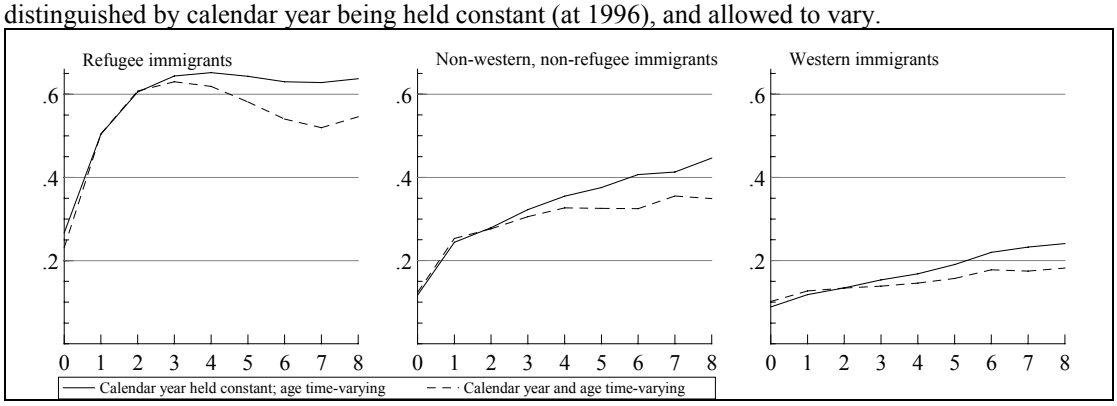
The first simulation exercise performed is to hold the calendar year constant, at 1996, while allowing age and time of residence to vary. In Figure 5 we compare the

Figure 4: Simulated and empirical trends in the rate of welfare participation and re-migration.



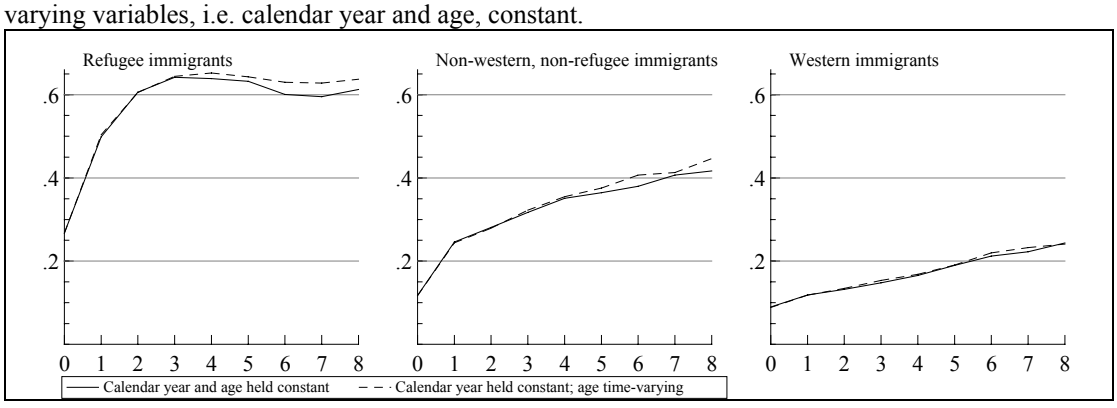
resulting curve with the simulated trend in Figure 4 to establish the effect of calendar time (interpreted as business cycles) on welfare participation among immigrants. Norway went through a recession in 1991-93 and a boom in the late 90s. We see that immigrant welfare participation is surprisingly sensitive to business cycles, exemplified by the finding that the *entire* decrease in welfare participation observed among refugee immigrants after 3-4 years of residence was caused by fortunate business cycles.

Figure 5: The effect of business cycles on the welfare participation rate. These curves are only distinguished by calendar year being held constant (at 1996), and allowed to vary.



In the second exercise, illustrated in Figure 6, both the calendar year and each immigrant's age are held constant. As time of residence is the only time-varying variable, this exercise identifies the effect of time of residence on the immigrant share claiming welfare. By comparing the resulting curve to the one where only the calendar year is held constant we also establish the effect of *age* on welfare participation, shown to be positive. The trend in the welfare participation share will soon be shown *not* to equal the trend in the claimant *probability* for an average immigrant in the arrival cohort, due to selective re-migration. But although the trend in the welfare participation share is not very informative as a measure of assimilation, it may be of interest in its own right. From one to eight years of residence, the claimant share of all immigrant groups substantially increases, and even after eight years only the refugee immigrant group shows signs of stabilizing. The *level* is by far highest among the refugee immigrants, at 61% eight years after arrival.[15] The *trend* is more worrying among the other two groups, with an increase of 17.1 percentage points (69%) from year one to year eight among the non-western, non-refugee immigrants, and 12.5 percentage points, or 105%, among the western immigrants.

Figure 6: Extracting the effect of time of residence on welfare participation by holding all other time-varying variables, i.e. calendar year and age, constant.

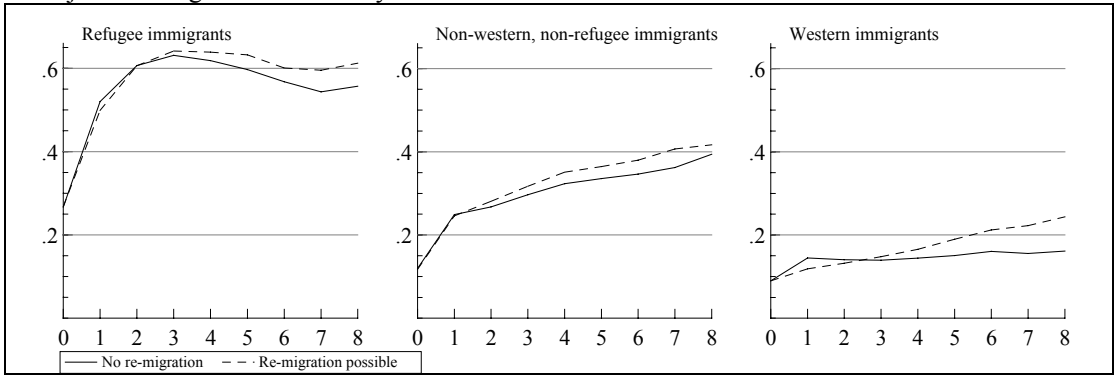


[15] As for the increase the first three years of residence, the very first year may be explained by miscoding (see footnote 11), and more generally by the increasing welfare eligibility of immigrants arriving for family reunification, who are meant to be provided for by relatives at first (footnote 3).

Thus far the panel's composition has been allowed to change with time. Not so for the solid line in Figure 7 where the trend in welfare participation is adjusted not only for all other time-varying variables than time of residence, but also for *non-random re-migration*. In doing so, we see how the probability of claiming welfare evolved with time of residence for an average immigrant in the arrival cohort, and thereby whether the immigrants analyzed assimilated into or out of welfare. This is achieved by "closing the doors on re-migration", i.e. performing a simulation where the only possible transitions are those to and from welfare (eq. 1-3). We still hold age and calendar year constant, so the difference between the two curves (the dotted one being the solid from Figure 6) is due solely to the selectivity of re-migration.

Welfare assimilation is shown to differ between immigrant groups. Refugee immigrants do show signs of assimilating out of welfare, but the decrease is small: 8.8 percentage points (14%) from three to seven years of residence before yet another increase at the end of the panel. The average non-western, non-refugee immigrant, most likely arriving on family reunification, assimilates into welfare. Even from year three to year eight after arrival, when an increase can no longer be explained by eligibility rules, there is an increase of 9.8 percentage points (33%). We also see certain signs of assimilation into welfare among the western immigrants, but the claimant probability is notably lower throughout than is the case for the other groups.

Figure 7: Welfare participation under different assumptions of re-migration possibility. Both curves are adjusted for age and business cycles.



Regarding the selectivity of re-migration, the vertical difference between the curves in Figure 7 shows that the immigrants more likely to contribute to an improved dependency ratio are also more likely to re-migrate. This – for Norway – unfortunate selection is evident in all immigrant groups, but mostly among western immigrants.

6. Conclusion

The purpose of this paper was to examine whether an increase in yearly immigration can halt the soaring dependency-ratio caused by the aging populations of many welfare economies. In most such economies, a general relaxation of immigration laws would mainly generate increased immigration from non-western countries, as legislation on immigration from western countries already is fairly lenient. This is why we have not limited our scope to labor migrants, but instead analyzed *all* immigrants arriving in Norway during 1992-96: western immigrants most likely arriving for work; refugees and asylum seekers; and non-western, non-refugee immigrants most likely arriving for family-reunification.

Welfare assimilation is throughout the paper defined as the expected trend in welfare participation for the average immigrant arriving in each immigrant category. Our analysis indicates a strong tendency for immigrants to assimilate *into* welfare dependency rather than out of it. Non-western immigrants were much more likely to receive welfare at any given point than the average western immigrant, whose expected welfare probability after eight years of residence was 16%. The average refugee immigrant faced a 63% welfare probability after three years of residence, decreasing merely to 55% after eight years of residence. The average non-western, non-refugee immigrant faced a steadily increasing welfare probability, up 15 percentage points (58%), from year one to eight after arrival, landing on 39%.

The cited trends in welfare probabilities were adjusted not only for business cycles and increasing age, but also for the possibility of non-random re-migration. That makes them different from the trends in the welfare participation share calculated for the immigrants *staying*. In the existing literature, these types of trends are used interchangeably as definitions of assimilation, but this hinges on there being no, or entirely random, re-migration. Re-migration from Norway is shown to be highly selective, in that the average re-migrating immigrant has a significantly higher probability of being self-sufficient than the average immigrant who stays. This selectivity is most pronounced among western immigrants. As they also have the highest average education and are known to more likely succeed in the labor market than non-western immigrants, we suspect that re-migration could be a strategy to obtain a higher salary than the relatively egalitarian Norwegian labor market can offer. Immigrants with a low probability of becoming self-supported, on the other hand, fare comparatively better in Norway than in most other countries.

For immigration to be part of the solution to problems caused by an aging population, the host country must be able to put the additional labor into active use. We have found immigrant welfare participation to be surprisingly sensitive to business cycles. Together with the finding in Barth et al. (2004) that yearly labor earnings are more sensitive to local unemployment for non-western immigrants than for natives, there seems to be evidence that immigrants do not constitute a stable source of tax-revenue in Norway today, as their manpower and human capital are not taken advantage of except during very prosperous periods. For later immigrant cohorts to reduce the dependency-ratio, any obstacles facing non-western immigrants in the Norwegian labor market must be overcome. But generally speaking, considering non-western immigrants a stable source of tax-revenue is, simply due to

their background, arguably a tad naïve. Not *all* non-western immigrants arrive from war-ridden underdeveloped countries where education is scarce, but a large share does. The consequences of such immigration should therefore perhaps be assessed from a humanitarian point of view rather than focusing merely on tax-revenue.

Appendix

Table A1: Top 10 *refugee* countries of origin each year 1992-96, and how large a fraction the immigration from these countries constituted of the overall immigration from refugee countries these years.

1992	1993	1994	1995	1996
Yugoslavia .33	Bosnia H. .58	Bosnia H. .52	Bosnia H. .34	Bosnia H. .25
Vietnam .12	Yugoslavia .13	Yugoslavia .09	Yugoslavia .10	Sri Lanka .12
Sri Lanka .09	Iraq .05	Iran .06	Sri Lanka .09	Iraq .11
Iraq .09	Sri Lanka .04	Sri Lanka .06	Iraq .08	Iran .09
Iran .08	Iran .04	Somalia .05	Iran .07	Somalia .07
Somalia .07	Vietnam .04	Vietnam .04	Somalia .07	Vietnam .04
Bosnia H. .03	Somalia .03	Iraq .04	Vietnam .05	Yugoslavia .04
Ghana .03	Ghana .02	Ghana .02	Ethiopia .02	Ethiopia .03
Ethiopia .02	Ethiopia .01	Tanzania .01	Ghana .02	Ghana .03
Lebanon .02	Gambia .01	Chile .01	Croatia .01	Tanzania .02
Sum fractions				
.87	.94	.89	.85	.80

Table A2: Top 10 *non-western, non-refugee* countries of origin each year 1992-96, and how large a fraction the immigration from these countries constituted of the overall immigration from non-western, non-refugee countries these years.

1992	1993	1994	1995	1996
Poland .11	Pakistan .10	Russia .11	Pakistan .12	Russia .11
Pakistan .11	Philippines .10	Pakistan .10	Russia .10	Pakistan .09
China .09	Poland .10	Poland .10	Philippines .09	Thailand .09
Philippines .08	Russia .09	Philippines .09	Poland .09	Philippines .09
Morocco .07	Turkey .07	Turkey .07	Turkey .08	Poland .07
Turkey .07	China .07	China .07	Thailand .07	Turkey .07
Thailand .07	Thailand .06	Thailand .07	China .05	China .06
Russia .06	India .05	India .05	India .05	India .04
India .02	Morocco .05	Morocco .04	Romania .04	Morocco .04
Romania .02	Romania .04	Romania .03	Morocco .04	Romania .03
Sum fractions				
.73	.73	.73	.72	.69

Table A3: Top 10 *western* countries of origin each year 1992-96, and how large a fraction the immigration from these countries constituted of the overall immigration from western countries these years.

1992	1993	1994	1995	1996
Denmark .23	Sweden .24	Sweden .26	Sweden .27	Sweden .33
Sweden .19	Denmark .21	Denmark .19	Denmark .13	Denmark .12
G. Britain .15	G. Britain .14	G. Britain .11	G. Britain .12	G. Britain .09
USA .12	USA .10	USA .08	USA .08	USA .08
Germany .06	Germany .06	Finland .07	Finland .08	Finland .07
Netherlands .06	Finland .04	Germany .06	Germany .07	Germany .07
France .04	France .04	Iceland .05	Iceland .06	Iceland .06
Finland .04	Netherlands .03	France .03	Netherlands .04	Netherlands .04
Iceland .03	Iceland .03	Netherlands .03	France .03	France .03
Japan .01	Canada .02	Faroe Isl. .02	Italy .02	Canada .02
Sum fractions				
.91	.91	.90	.88	.90

Table A4: Complete estimation results, both on observable characteristics and on the distribution of unobserved heterogeneity.

	β^f Welfare year 0		β^{w_1} Transition to welfare		β^{w_0} Transition from welfare		β^r Re-migration	
	Est.	**Std. e.**	**Est.**	**Std. e.**	**Est.**	**Std. e.**	**Est.**	**Std. e.**
Country background (Baseline Bosnia H.)								
Refugee countries								
Ethiopia	-1.642	0.572	-0.260	0.120	0.133	0.133	0.212	0.153
Ghana	-5.664	0.762	-0.651	0.089	1.180	0.119	0.662	0.102
Iran	1.060	0.148	-0.163	0.058	-0.335	0.058	-0.287	0.120
Iraq	2.152	0.166	-0.159	0.065	-0.704	0.061	-0.680	0.157
Somalia	0.153	0.175	0.462	0.064	-0.829	0.071	-0.501	0.158
Sri Lanka	-1.092	0.219	-0.057	0.051	-0.091	0.056	-0.483	0.134
Tanzania	-7.823	1.377	-1.624	0.238	0.803	0.301	0.248	0.158
Vietnam	1.890	0.160	-0.389	0.059	-0.064	0.057	-0.728	0.208
Yugoslavia	-2.074	0.205	-0.355	0.045	-0.197	0.047	0.792	0.089
Non-western, non-refugee countries								
China	-6.983	0.642	-1.634	0.092	2.029	0.155	-0.162	0.124
India	-1.740	0.422	-0.681	0.084	1.334	0.139	-0.102	0.161
Morocco	-0.104	0.209	-0.884	0.083	1.230	0.131	-0.687	0.221
Pakistan	-6.217	0.644	-0.948	0.070	1.236	0.129	-0.438	0.149
Philippines	-4.591	0.614	-1.157	0.077	1.540	0.133	-0.744	0.144
Poland	-1.429	0.322	-0.961	0.069	1.343	0.125	-0.383	0.131
Rumania	-1.070	0.429	-0.889	0.109	1.429	0.150	-0.186	0.186
Russia	-3.809	0.609	-1.174	0.074	1.326	0.131	-0.327	0.126
Thailand	-3.682	0.890	-0.843	0.074	1.604	0.133	-0.962	0.200
Turkey	-1.534	0.248	-0.625	0.074	1.206	0.125	-0.282	0.164
Western countries								
Canada	-6.620	0.844	-1.898	0.158	2.048	0.220	0.067	0.136
Denmark	-3.887	0.354	-1.698	0.063	1.776	0.109	0.814	0.080
Finland	-2.509	0.292	-1.219	0.077	1.578	0.119	0.560	0.091
France	-7.490	0.698	-1.770	0.117	1.861	0.181	0.069	0.104
Germany	-7.387	0.557	-2.032	0.085	2.043	0.135	0.135	0.093
Great Britain	-6.259	0.486	-1.830	0.069	1.891	0.116	-0.052	0.082
Holland	-7.113	0.686	-1.974	0.100	1.999	0.151	0.138	0.105
Iceland	-1.738	0.224	-1.239	0.080	1.708	0.121	0.712	0.095
Sweden	-3.774	0.281	-1.630	0.053	1.658	0.100	0.365	0.078
USA	-6.489	0.511	-1.800	0.080	1.866	0.132	0.281	0.083
Time spent in Norway (Baseline 1 year)								
Refugee immigrants								
2 years	-	-	0.015	0.040	0.352	0.080	0.579	0.073
3 years	-	-	-0.073	0.049	0.500	0.081	1.210	0.084
4 years	-	-	-0.274	0.053	0.734	0.082	1.004	0.102
5 years	-	-	-0.366	0.057	0.829	0.084	1.035	0.120
6 years	-	-	-0.610	0.062	0.920	0.088	0.444	0.146
7 years	-	-	-0.731	0.069	0.866	0.095	-0.105	0.176
8 years	-	-	-0.336	0.095	0.899	0.113	-0.020	0.236
Non-western, non-refugee immigrants								
2 years	-	-	-0.065	0.057	0.155	0.098	0.888	0.091
3 years	-	-	-0.063	0.061	-0.043	0.101	1.211	0.103
4 years	-	-	0.067	0.064	-0.099	0.102	1.171	0.119
5 years	-	-	-0.018	0.071	-0.128	0.107	1.431	0.143
6 years	-	-	-0.101	0.081	-0.437	0.115	0.773	0.192
7 years	-	-	-0.114	0.094	-0.478	0.126	0.265	0.263

	β^{f} Welfare year 0		β^{w_1} Transition to welfare		β^{w_0} Transition from welfare		β^{r} Re-migration	
	Est.	**Std. e.**	**Est.**	**Std. e.**	**Est.**	**Std. e.**	**Est.**	**Std. e.**
8 years	-	-	-0.126	0.122	-0.547	0.151	0.325	0.315
Western immigrants								
2 years	-	-	-0.294	0.051	0.303	0.079	0.295	0.040
3 years	-	-	-0.380	0.058	0.169	0.085	0.723	0.053
4 years	-	-	-0.316	0.061	0.076	0.091	1.071	0.071
5 years	-	-	-0.241	0.069	-0.007	0.101	1.294	0.087
6 years	-	-	-0.177	0.081	-0.222	0.113	1.164	0.103
7 years	-	-	-0.136	0.098	-0.121	0.134	1.061	0.127
8 years	-	-	-0.059	0.131	-0.408	0.191	0.563	0.175
Calendar year								
(Baseline 1994)								
1992	-1.700	0.135	-	-	-	-	-	-
1993	-2.740	0.146	-0.575	0.046	-0.052	0.107	-0.244	0.055
1995	-0.387	0.103	-0.115	0.035	-0.131	0.061	0.030	0.043
1996	-0.403	0.113	-0.273	0.038	0.144	0.061	0.358	0.044
1997	-	-	-0.381	0.039	0.303	0.061	0.584	0.045
1998	-	-	-0.453	0.046	0.607	0.064	0.697	0.055
1999	-	-	-0.446	0.051	0.747	0.068	1.056	0.069
2000	-	-	-0.512	0.056	0.671	0.074	1.780	0.078
Welfare year *t*-1	-	-	-	-	-	-	-0.108	0.059
Male	2.603	0.120	0.237	0.022	-0.461	0.024	-0.100	0.026
Number of children								
(Baseline zero)								
One	0.576	0.104	0.307	0.029	-0.089	0.034	-0.872	0.043
Two	0.418	0.105	0.271	0.029	-0.062	0.032	-1.093	0.045
Three	0.435	0.133	0.197	0.036	-0.197	0.041	-1.243	0.069
Four	0.511	0.193	0.026	0.055	-0.350	0.059	-1.692	0.158
Five	0.485	0.248	-0.051	0.075	-0.478	0.086	-2.102	0.303
Six	0.745	0.349	0.004	0.114	-0.473	0.124	-1.956	0.587
Seven	0.804	0.444	-0.166	0.179	-0.546	0.179	-2.850	0.936
Eight	0.731	0.598	-0.312	0.229	-0.598	0.270	-1.284	0.906
Nine	0.152	0.664	-0.294	0.212	0.117	0.221	-2.666	1.941
Ten	0.536	0.997	0.660	0.496	-0.386	0.406	-	-
Eleven	-0.156	3.961	0.312	2.162	-	-	-	-
Twelve	-0.041	3.064	-	-	-	-	-	-
Single	1.137	0.092	0.424	0.025	-0.544	0.027	-0.154	0.031
County								
(Baseline Østfold)								
Akershus	-0.497	0.191	-0.440	0.051	0.503	0.058	0.016	0.082
Oslo	-0.192	0.165	-0.432	0.046	0.310	0.052	-0.270	0.076
Hedmark	0.203	0.262	-0.185	0.071	0.017	0.078	-0.090	0.111
Oppland	-0.231	0.237	-0.216	0.070	-0.181	0.081	0.136	0.106
Buskerud	-0.128	0.204	-0.229	0.059	0.290	0.066	0.061	0.097
Vestfold	0.138	0.213	-0.002	0.061	0.172	0.067	-0.069	0.107
Telemark	-0.243	0.255	-0.040	0.071	0.106	0.076	0.239	0.106
Aust-Agder	-0.333	0.301	-0.070	0.075	-0.072	0.084	0.061	0.127
Vest-Agder	-0.162	0.223	-0.075	0.061	0.233	0.068	0.066	0.109
Rogaland	-0.402	0.191	-0.311	0.052	0.291	0.060	-0.045	0.081
Hordaland	0.294	0.187	-0.095	0.054	0.011	0.059	0.037	0.084
Sogn og Fjordane	0.290	0.334	-0.290	0.088	0.069	0.098	-0.149	0.130
Møre og Romsdal	-0.364	0.242	-0.138	0.064	0.539	0.072	0.047	0.103
S. Trøndelag	0.062	0.215	-0.212	0.059	0.173	0.066	0.089	0.088
N. Trøndelag	-0.310	0.334	-0.027	0.091	-0.130	0.101	0.526	0.125
Nordland	0.498	0.229	-0.054	0.067	0.162	0.073	0.169	0.095
Troms	0.318	0.279	-0.282	0.074	0.226	0.087	-0.146	0.092

	β^f Welfare year 0		β^{w_1} Transition to welfare		β^{w_0} Transition from welfare		β^r Re-migration	
	Est.	**Std. e.**	**Est.**	**Std. e.**	**Est.**	**Std. e.**	**Est.**	**Std. e.**
Finnmark	1.149	0.285	0.386	0.077	-0.406	0.092	0.303	0.109
Education								
(Baseline zero years)								
6 years	-0.236	0.238	-0.048	0.064	-0.229	0.081	-0.832	0.474
8 years	0.012	0.214	-0.001	0.059	-0.103	0.069	-0.992	0.389
9 years	0.004	0.177	0.498	0.045	0.089	0.051	0.582	0.159
10 years	0.656	0.121	0.950	0.035	-0.147	0.038	1.081	0.122
11 years	0.413	0.179	0.362	0.046	-0.018	0.054	0.595	0.147
12 years	0.362	0.125	0.418	0.038	0.088	0.042	0.263	0.139
13 years	0.242	0.147	0.232	0.041	0.137	0.047	0.683	0.135
14 years	0.009	0.180	0.223	0.047	0.140	0.056	0.966	0.135
15 years	1.465	0.324	0.148	0.103	0.608	0.116	0.825	0.231
16 years	-0.534	0.198	-0.013	0.044	0.316	0.055	1.075	0.123
17 years	-0.335	0.532	-0.175	0.119	1.085	0.163	2.418	0.153
18 years	-0.967	0.271	-0.256	0.058	0.824	0.075	1.420	0.130
19 years	-	-	-1.486	0.415	2.389	1.209	2.668	0.315
20 years	-5.135	0.776	-1.100	0.131	0.862	0.202	1.343	0.172
21 years	-8.011	5.292	-3.041	0.813	0.565	2.603	-0.329	1.053
Age								
Age–mean age	0.020	0.008	0.002	0.002	0.788	0.002	-0.011	0.002
(Age–mean age)^2/mean age	0.007	0.016	-0.012	0.006	2.121	0.007	0.064	0.007
(Age-mean age)^3/(mean age)^2	0.066	0.037	-0.014	0.011	1.270	0.014	-0.124	0.013
Distribution of unobserved heterogeneity								
Probability		*Location*		*Location*		*Location*		*Location*
0.653		-2.567		-0.718		-2.014		-5.948
0.003		-inf.		13.261		-1.841		1.954
0.031		11.019		2.058		-3.173		-5.433
0.069		-1.531		-0.729		-4.298		-7.570
0.010		-2.632		-0.466		-1.555		-0.069
0.022		8.618		-1.424		-2.343		-7.402
0.083		-inf.		1.615		-2.561		-5.796
0.071		17.393		-0.073		-0.942		-8.119
0.057		5.773		-0.191		-1.522		-5.876

Note: We use '*-inf.*' to indicate that the parameter in question approaches minus infinity. In these cases, the estimation routine we use, replaces exp(parameter) with zero, implying defective risk.

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