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Never give up?

The persistence of welfare participation in Sweden

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Economics

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Abstract:
Welfare persistence is estimated and compared between Swedish-born and foreign-born households during the 1990s. This is done within the framework of a dynamic discrete choice model controlling for the initial condition and permanent unobserved heterogeneity. We control for three types of persistence in terms of observed and unobserved heterogeneity, serial correlation, and structural state dependence, the focus being on the latter measure. The results show that state dependence in Swedish welfare participation was strong. This effect was three times as large for the foreign-born compared to Swedish-born, but when this effect is distributed over time, it disappears after three years for both groups. Contrary to previous studies, our results for foreign-born are that both country of origin and time in the country of destination have only small impacts on welfare participation.

1 Introduction

In Sweden, as in many other OECD countries, the share of the working-age population receiving income-replacement benefits (particularly old-age, disability, and social assistance) continued to increase in the 1990s (OECD, 2003), and afterwards. To a large extent this was a reflection of the economic recession that had major consequences on the labour market and resulted in both a substantial drop in the labour force participation rate and a dramatic increase in the unemployment rate. This paper focus on welfare persistence in Sweden, where improved labor-market conditions are believed to be one of the factors explaining the number of social assistance recipients decreased during the end of the 1990s and the first half of the 2000s. However, the long-term recipients continued to stand for a major part of social assistance expenditures. This suggests a strong persistence in welfare participation.

Two potential explanations of this behavior have been emphasized in the literature (Heckman 1981a and c). One explanation is that the experience in itself alters the cost or the stigma related to welfare participation, shifting the structure of the individual's preferences and increasing the propensity of remaining on welfare in the following period. This kind of persistence is often referred to as a "true" or structural state dependence. If this type of persistence is strong in the population, efforts should be made to avoid short-term economic policies that increase people's likelihood of being exposed to this experience. An alternative explanation is that the observed persistence is a result of innate individual differences which comes from permanent unobserved heterogeneity across individuals. This implies that some individuals have a larger propensity to live on welfare than others. If this is the case it means that current participation has no structural effect on the future propensity to participate and is referred to as "spurious" state dependence.

The international literature on welfare participation is vast (see Danziger et al., 1981; Lichter et al., 1997; Moffit, 1992 and Barrett and McCarthy, 2008 for literature surveys). However, the body of literature focusing on state dependence and social assistance is still very small (see Chay et al., 1999 and Cappellari and Jenkins, 2009 for studies on the US and Brittan).

Hansen and Lofstrom (2003, 2006, 2009) have a series of papers that focus on the dynamics of welfare participation of both immigrants and natives in Sweden. Their

results show that after controlling for observed characteristics welfare participation is still higher among immigrants relative to natives, but the difference tends to fall at a very slow rate with the length of time in the country (Hansen and Lofstrom, 2003). Additionally, they find that differences in welfare use are explained to a large extent by differences in unobserved characteristics, and by the fact that immigrants have a higher rate of entry into welfare among as opposed to a lower rate of exit (Hansen and Lofstrom, 2006). They also find that refugees exhibit a greater degree of structural state dependence relative to natives, but the structural state dependence between natives and non-refugees was very similar (Hansen and Lofstrom, 2009). We have a similar setting as the Hansen and Lofstrom's papers by focusing on differences in Swedish welfare participation between Swedish born and foreign-born.

We extend the existing literature by describing of the strength and determinants of the "true" state dependence with respect to social assistance and to what extent it differ between natives and foreign-born. We do that by estimating the magnitude of the "true" state dependence in welfare participation and investigate how observed factors (individual and macro-related factors) are associated with this dependence. In a second step, the model is respecified and extended with a distributed lag structure with the purpose to investigate how the "true" state dependence in welfare persists over time. The structure and significance of this dependence is important to understand in order for policy makers to be able to impose relevant policy measures.

In order to explore the "true" state dependence it is necessary to investigate the dynamic structure of welfare participation, accounting for unobserved individual differences and separating them from a possible "true" state dependence. This is done using a general time stationary dynamic discrete choice model proposed by Heckman (1981a). It incorporates state dependence while controlling for the initial condition problem and for individual unobserved heterogeneity using a general intertemporal covariance structure. The analysis is based on two cohorts of (Swedish-born and foreign-born) individuals that are followed from 1990 to 1999.

The rest of the paper is organized in the following way. The next section describes the welfare system in Sweden during the analyzed period. The data is presented in Section 3 and the empirical specification and the estimation method are described in

Section 4. Section 5 presents and discusses the results and section 6 sums up and concludes the paper.

## 2 Welfare participation in Sweden

The Swedish law gives all households the right to a minimum standard of living, implying that if a person is completely without any financial means, the state will pay for an apartment, childcare, food etc. with the requirement that the welfare applicant makes a full-time effort to find a job, or to receive incomes from other sources. This means that the applicant cannot voluntarily give up a job in order to live on social assistance. Furthermore, personal assets (with some exceptions) must be spent before any social assistance may be received.

The total welfare benefit offered by the state consists of two parts. The first part is a regulated component that covers expenditures for housing, childcare, and similar expenses. The second part covers the more basic daily consumption needs of the household, such as food and clothing. The level of the second component is referred to as the social assistance norm and is regulated by the welfare recipient's home municipality. The National Board of Health and Welfare provide guidelines to the municipalities in order to harmonize the level across the country.

The assistance application process takes place at the social welfare office, typically on monthly basis. It is the individual who chooses to visit the welfare office, while a social worker decides whether the household of the applicant is entitled to welfare benefits. The decision is based on an interview process, going through the complete financial situation of the household. The applicant cannot voluntarily give up a job in order to live on social assistance. With some exceptions, household assets must be exhausted before social assistance may be received.

During the 1990s the number of social assistance recipients increased dramatically due to the economic recession, and the participation rate peaked in 1997 (Figure 1). The number of welfare participants increased by almost 50 percent between 1990 and 1997, but has since then been decreasing steadily until 2008, when a new economic crises evolved. The increasing number of welfare recipients during the 1990s also implied major changes in the composition of the total stock of recipients, which cannot be seen in yearly figures. The shares of short-term (i.e., 1-3 months per year) and long-term (i.e., 10-12 months per year) welfare recipients are high and fluctuate a lot during the

analyzed period, especially among the foreign-born recipients. Figure 2 shows that during the analyzed period the share of the long-term recipients doubled for the Swedish-born, while it tripled for the foreign-born, which is an indication of a state dependency that apparently was a bit stronger for the latter group. Apparently there are great differences between the two groups in terms of participation behavior. The interesting question is whether this is due to behavioural differences on an individual basis or if it is related to structural factors?
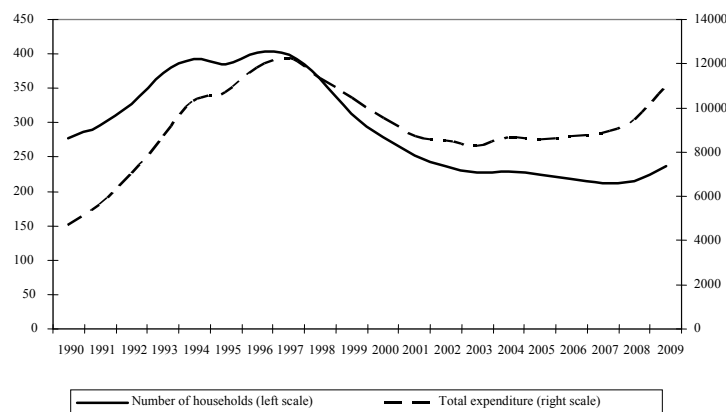
Figure 1 Welfare recipients and total social assistance expenditures
Note: Welfare recipients is expressed in thousands individuals and total expenditure in millions SEK.
Source: Statistics Sweden.

a) Swedish-born   b) Foreign-born
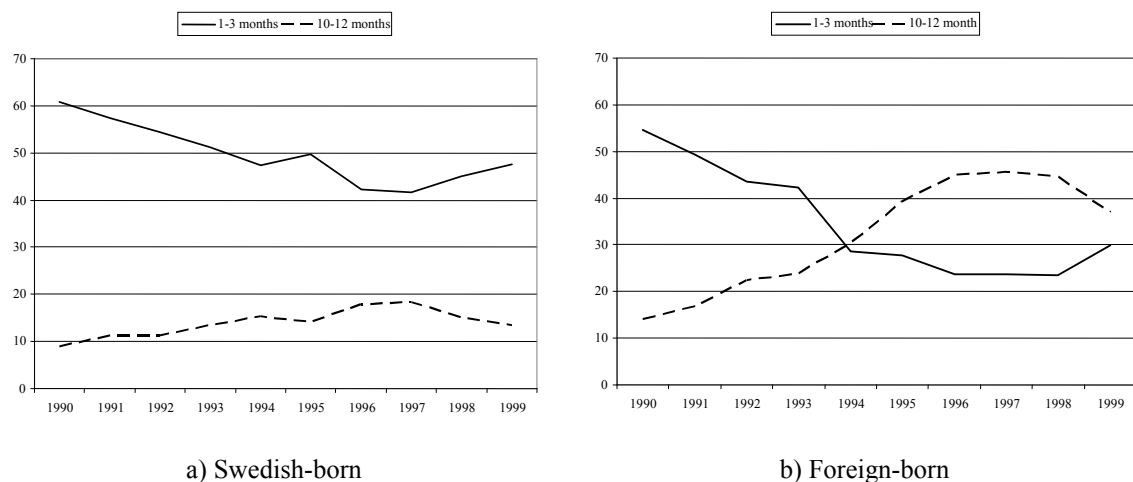
Figure 2 Short-term and long-term welfare recipients (percent)
Note: The calculated shares are based on the SWIP samples of recipients in each year.

3 Data

The data analyzed in this paper was extracted from the register-based Swedish Income Panel (SWIP), a stratified random sample of the population living in Sweden, drawn by Statistics Sweden every year since 1978. SWIP contains both a 1% sample of the Swedish-born population and a 10% sample of the foreign-born population.[1] Demographic variables going back to 1968 and several variables from income registers (based on tax data) for all sampled individuals and their partners are reported (with repeated yearly cross-sectional data extracts).

Given this design and the aim of our paper to understand the persistence of welfare participation (which is connected to the willingness to work), we select only individuals who were working-age during the entire analyzed period (i.e., those aged 18-50 in 1990), excluding students and early-retired people in 1990, and also excluding later "drop-outs" due to emigration, death, or other reason that they are not longer in the tax register during 1991-1999.

Given the fact that social assistance is applied for by the household, our data shows whether the household of the sampled person received social assistance at least once during a calendar year (we know how many months of assistance, but not if they were in one or more spells). In households with more than one working-age adult, it is not possible to identify how many adults qualified for social assistance. However, following Hansen and Lofstrom (2003, 2006), we let the household be represented by the sampled individual. In the literature it is often the ambition to describe the household by the characteristics of the household head. Unfortunately, SWIP offers no such information. As a substitute for the household head we use the characteristics of the sample person(e.g., age and education) as factors related to the person originally sampled into SWIP. Furthermore, the stratified random samples as given would have resulted in very large data sets when considering the full time period, which led us to reduce the sample to around 10 000 individuals in the initial year of 1990. In order to balance the panel, some individuals had to be dropped; the final samples of individuals were reduced to 8 205 and 8 407 for the Swedish-born and the foreign-born, respectively.

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[1] More information can be found at the Swedish National Data Service's home page: http://snd.gu.se/en.

3.1 Variable definitions and characteristics

The variables used as observed explanatory factors in the analysis are presented in Table 1, which shows mean values for the whole period. Comparing natives and foreign-born we see that average age is about the same, while a relatively larger proportion of the Swedish-born social assistance recipients are found in the youngest age category.

Table 1 Mean observable characteristics of welfare recipients, 1990 – 1999

	Swedish-born			Foreign-born		
	Total	Welfare recipients	No welfare recipients	Total	Welfare recipients	No welfare recipients
Age	39.9	35.3	40.0	40.1	36.6	40.5
Age 18-30 (%)	19.1	35.0	18.6	15.6	24.7	14.5
Age 31-40 (%)	31.5	35.1	31.4	35.2	42.9	34.2
Age 41-50 (%)	49.4	29.9	50.0	49.2	32.4	51.2
Educational level						
Primary school (%)	22.8	44.1	22.1	37.2	53.9	35.2
Secondary School (%)	51.2	51.8	51.2	42.6	36.6	43.3
Post secondary School (%)	25.9	4.1	26.7	20.2	9.4	21.5
Children aged less than 6 (%)	16.7	17.2	16.7	17.4	24.7	16.5
Cohabitant (%)	59.8	21.2	61.2	61.4	43.0	63.6
City region (%)	24.5	30.2	24.3	36.6	45.4	35.6
Unemployed (%)	13.5	40.9	12.5	20.9	37.4	18.9
Regional rate of welfare participation	4.9	5.4	4.8	5.6	5.9	5.5
SA norm (SEK)	7 797	7 977	7 791	8 008	8 011	8 008
Average regional welfare duration	4.6	4.6	4.6	6.6	6.7	6.6
Sample size	82 050	2 738	79 312	84 070	9 138	74 932

The educational level of the two groups does not differ much, even though there is a slight concentration on secondary schooling for the Swedish-born and primary schooling for the foreign-born. The number of children is usually a factor that is related to welfare recipients, especially when younger children are involved. We can see that the shares of Swedish- and foreign-born households with children younger than six are about equal in size. However, if we look at foreign-born welfare recipients, then this is much larger than among the Swedish-born. Hence, the presence of young children in the household seems to be a more important factor among the foreign-born.

Cohabitation is another factor that is related to welfare dependence. It is often noted in the literature that the event of a divorce or a separation is an important route

into welfare dependency. However, while this might be the case for the Swedish-born group, the situation is somewhat different for the foreign-born. This is because the proportion of married welfare recipients being twice as large among the foreign-born and that during the mid 1990s the number of married welfare recipients increased substantially. The potential negative marriage effect on welfare participation is therefore expected to be much smaller in the foreign-born group.

Large city region is another factor that might be related to welfare participation. We know that in general, foreign-born people choose to live in larger cities (se table 1). Hence, foreign-born welfare recipients also tend to live in large city regions to a large extent: 45% compared to 30% among the Swedish-born.

Unemployment is another important factor that explains whether households end up on welfare, and around 40% of the welfare recipients in both groups have been unemployed during the year. The unemployment variable is binary, and an individual is defined to have been unemployed during a year if he or she has received any cash assistance or unemployment insurance during the year. This implies that a sample person could have been unemployed only very briefly during the year. The design also implies that we miss those who are unemployed and are not entitled to cash assistance or unemployment insurance, which is a group that to a large extent are directed to social assistance. People not entitled to unemployment benefits are usually very young and without previous work experience, since eligibility for unemployment benefit usually requires some work history.

Regional rate of welfare participation is a variable that is based on sub-groups of welfare recipients who appear in SWIP. Hence, for the Swedish-born we calculate the average participation rate for each municipality in Sweden. The inclusion of this variable is based on the idea that households in a municipality with a large number of welfare recipients, and that are at the margin of being a welfare recipients themselves are more likely to take the step into the welfare office compared to households in other areas. On the other hand, there might be an alternative mechanism at work. It is also quite possible that welfare office generosity differs among municipalities and that it is easier to receive social assistance in some regions compared to others, which therefore generates a positive relationship between welfare participation and the average regional

participation rate. At any rate, we are unable to differentiate between these two effects in the model.

Another structural variable is the social assistance norm. Unfortunately, we do not have access to the norm for each municipality, so we have to work with a proxy. It is reasonable to believe that the norm is related to the disposable income of welfare recipients. We therefore calculate the average disposable income of welfare recipients in each of the municipalities in Sweden and over time, using the full sample of SWIP. Hence, if the disposable income of welfare recipients increases, it is plausible to believe that the social assistance norm has increased as well, which means that this proxy should serve its purpose. This implies that if the norm is increasing, more people should be eligible for social assistance, and hence more people will receive social assistance.

The average regional welfare duration is related to the regional rate of welfare participation, but the link is not obvious. There could be regions with low rates of participation, but with longer welfare spells. There could also be other combinations. When looking at a simple unconditional correlation measure, we find a positive relation although weak, which implies that the dispersion is great. It is therefore difficult to say if and how average regional welfare duration is related to the welfare participation rate.

For the foreign-born we have a group of variables that are important for success on the labor market, namely the number of years in the country, the country of origin, and whether or not the country of origin is a refugee country; that is, whether or not the person arrived in Sweden was a refugee.

Table 2 shows the participation rates for different sub-groups of the 1990 cohort, and then how they change over time. The first part is related to the Swedish-born group, where participation rate has been calculated for three age groups. In the initial year, we see that the youngest group had the largest participation rate. We know that the participation rate increased from 1990 until 1997 for the group as a whole. However, there are differences between the age groups: For the youngest group, the participation rate decreased between 1990 and 1995, while it at the same time increased for the middle group.

Table 2 Welfare participation by cohorts over time: 1990–1999

	Participation rate (%)			
	1990	1995	1999	Percentage difference 1990-1999
Swedish-born cohorts				
All	***3.4***	***3.5***	***2.4***	***-29.4***
Age (18 – 30)	5.5	4.9	3.4	-38.2
Age (31 – 40)	2.9	4.0	2.7	-6.9
Age (41 – 50)	1.9	1.6	1.1	-42.1
Foreign-born cohorts				
All	***12.7***	***10.4***	***8.3***	***-34.6***
Age (18 – 30)	18.6	14.0	10.9	-41.4
Age (31 – 40)	13.3	11.6	9.0	-32.3
Age (41 – 50)	6.3	5.6	4.8	-23.8
Years in the country, (in 1990)				
0 – 4	29.9	20.5	15.3	-48.8
5 – 9	12.0	11.8	10.0	-16.7
10 – 14	7.4	8.1	6.9	-6.8
15 – 22	6.5	6.4	5.6	-13.8
>22	3.9	4.2	3.2	-17.9
Country of origin [2]				
Nordic country	7.1	6.8	5.3	-25.4
Western Europe	3.5	3.9	2.5	-28.6
Eastern Europe	12.7	7.4	6.1	-52.0
Southern Europe	5.4	6.1	5.3	-1.9
Middle East	30.2	22.6	19.9	-34.1
Rest of the world	22.4	18.0	12.3	-45.1
Refugee country[3]	20.8	15.5	12.5	-39.9

The foreign-born group is more heterogeneous, and it is therefore interesting to look at variables that are important to labor market outcome. A general trend related to all factors is that time consistently reduced the participation rate for the cohort under investigation. Looking at the different age groups, we see about the same patterns as for the Swedish-born but on a higher level. For example, in the initial year the participation rate was four times as large. The number of years in the country is an important variable and we see that those who have been in the country for longer than 22 years have converged to what could be interpreted as a long-run level of around 3%. This is of

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[2] Categories: Nordic (Denmark, Finland, Norway, Iceland), Western Europe (Germany, France, Benelux, Switzerland, Austria, UK, Ireland), Eastern Europe (Poland, Hungary, Albania, Bulgaria, Romania, Czechoslovakia, countries in the former Soviet Union), Southern Europe (Greece, Yugoslavia, Andorra, Italy, Portugal, San Marino, Spain, the Vatican state), Middle East (Arab countries, Iraq, Iran, Turkey), and the rest of the world.
[3] Refugee countries according to the Swedish Immigration Board: Afghanistan, Bangladesh, Bosnia, Bulgaria, Chile, Cuba, China, Croatia, Ethiopia, India, Iran, Iraq, Sri Lanka, Lebanon, Moldavia, Pakistan, Peru, Poland, Romania, Russia, other states of the former Soviet Union, Somalia, Syria, Togo, Turkey, Ukraine, Uganda, Vietnam, and Yugoslavia.

course a relatively old group of people and they should therefore be compared with the oldest age category, which shows relatively low participation rates as well.

When looking at country of origin we see that there is a distinct difference between those from Europe and those with an origin outside Europe, where the later group has a much higher participation rate. The same applies to those who come to Sweden as refugees.

4 The Empirical Specification

Earlier studies often noted that individuals with previous experience of welfare had an increased risk of future participation, perhaps because the experience (in itself) alters the cost or stigma related to receiving assistance, shifting the individual preference structures and increasing the likelihood of remaining on welfare for a longer period. If this is true, efforts should be made to avoid short-term economic policies that increase the likelihood of people's being exposed to this experience. Alternatively, the observed persistence might be due to innate individual differences, with some individuals having a greater propensity to live on welfare than others. If these differences among people are not properly controlled for when analyzing the patterns of welfare participation, then observed persistence will not necessarily be related to preferential changes in individual preferences.

We assume an economic agent i with perfect foresight who in each time period t makes a discrete decision about welfare participation with the objective of maximizing his or her expected lifetime utility. Even though the decision is discrete, it is based on a latent continuous measure Y_{it}^*, representing the individual i propensity to participate in period t. This measure is based on the difference between the individual utility with and without welfare in period t. Whenever the utility with welfare is greater than the utility without welfare, an individual will choose the welfare alternative. Hence, it is the difference in utilities that is the relevant measure when an individual is making a decision. However, an individual's current utility difference is also a function of the utility difference in the previous period, t-1. The utility difference in period t may therefore be expressed in the following way:

$$Y_{it}^* = X_{it}\beta + \sum_{j=1}^{s} \gamma_j Y_{it-j} + v_{it} \quad \text{with} \quad Y_{it} = \begin{cases} 1 & Y_{it}^* \geq 0 \\ 0 & Y_{it}^* < 0 \end{cases}. \quad (1)$$

$$i = 1,...,N; t = 1,...,T; s = 1,...,s^{*}.$$

The error term v_{it} is assumed to be independent of X_{it} and is independently distributed over i. Within the observations of each individual, v_{it} is assumed to be distributed multivariate normal with a mean zero and a general intertemporal covariance matrix Ω. $Y_{i;t-j}$ is a dummy variable that shows if the individual i received social assistance in the year $t-j$, where $j = 1,2..., s$, with s being the first year in the sickness history of the individual, or the maximum of time periods back in time that we control for.

The availability of panel data provides for the possibility to distinguish average behavior from individual behavior by specifying the error term v_{it} into $f(\alpha_i, u_{it})$, , where α_i controls for the effect of unobserved individual specific factors and u_{it} is a residual that controls for factors other than the individual-specific characteristics not observed, and that appear random, by the investigator. Hence, the existence of an individual specific unobserved permanent component allows individuals who are homogenous in their observed characteristics to be heterogeneous in their response variables. This model is consistent with McFadden's (1973) random utility model applied in an intertemporal context.

4.1 Welfare persistence

Specification (1) allows for three different sources of persistence after controlling for observed explanatory factors. Persistence can be a result of serial correlation in the error term u_{it}, a results of unobserved heterogeneity α_i, or a result of "true" or structural state dependence through the term $\sum_{j=1}^{s}\gamma_j Y_{i,t-j}$. Although all three sources are interesting, the focus will be on the size and distribution of the components of the "true" state dependence, while controlling for the other two sources. If the components in the intertemporal covariance matrix are significantly different from zero, then unobserved individual specific heterogeneity and serial correlation will affect the estimates for the state dependence if not controlled for.

As indicated, the existence of a "true" state dependence will be tested in this study. The measure γ_j captures the idea that the effect of an experience in the previous period has a real and behavioral effect on the choice in the current period. In a first step the structure is limited to a first order Markov process that captures the correlation between pair-wise observations over time. Having $\gamma_j > 0$ would imply that the

likelihood of being dependent on welfare in the current period is larger for those with an earlier experience compared to others without such an experience. In a second step we relax the assumption of a first order Markov process and allow for more lags; we can then see how many years it takes to lose the increased risk of returning to welfare dependency as a result of the first initial experience.

To investigate the factors affecting the first order state dependence, the overall effect will be decomposed into several observed explanatory factors that potentially affect the size of the state dependence. That is, a linear approximation will be applied in the following way: $\gamma = z\delta$, with z being a vector of observed factors, and δ being a vector of parameters. With this specification, a deeper understanding of the factors behind the event can be gained.

Distinguishing between true (structural) and spurious state dependence is of considerable interest, since they have very different policy implications. A policy that temporarily increases the probability of participation has different implications for future probabilities in a model with true state dependence than in a model where the persistence is solely due to serial correlation and/or unobserved heterogeneity.

4.2 Estimation and identification

The estimation method applied in this study is based on maximum likelihood technique, which requires the formulation of a likelihood function. The model as described by equation (1) is based on ten time periods (1990-1999), resulting in the following log-likelihood function:

$$L = \sum_{i=1}^{N} \log[prob(Y_{i1}, Y_{i2}, ..., Y_{i10})] , \qquad (2)$$

where

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$$\text{Prob}(Y_{i1}, Y_{i2}, ..., Y_{i10}) = \int_{a_{i1}}^{b_{i1}} \cdots \int_{a_{i10}}^{b_{i10}} (v_{i1}, ..., v_{i10}) dv_{i10}, ..., dv_{i1}$$

$a_{it} = -X_{it}\beta$ and $b_{it} = \infty$ if $Y_{it} = 1$, while $a_{it} = -\infty$ and $b_{it} = -X_{it}\beta$ if $Y_{it} = 0$. $f(.)$ is the multivariate normal density function. The standard difficulty in this problem is the evaluation of the ten fold integral in equation (2), which will be solved using a smooth recursive conditioning simulator (GHK simulator) that simulates the multivariate

probabilities rather than evaluating them numerically.[4] The likelihood function described above may therefore be rewritten as:

$$L_{SML} = \frac{1}{R} \sum_{i=1}^{R} \prod_{t=1}^{T} Q_t \left(\eta_1^r, ..., \eta_{t-1}^r \right),$$ (3)

where $\prod_{t=1}^{T} Q_t$ represents the sequence of conditional probabilities, and η_t^r the random draws from the truncated normal density (for an intuitive description of the procedure, see Train, 2003).[5]

Since this is a dynamic model, two additional complications need to be solved in order to receive consistent estimates of the parameters of interest: the initial condition problem and the necessity of separating the effect of unobserved individual characteristics from the possible effect of "true" state dependence. The first problem is related to the fact that we are unable to observe the data generating process from its beginning for all individuals. That is, some individuals has previous experience of welfare participation who are not accounted for in the initial year of the observed series, which generates a conditional relationship causing inconsistent estimates of the parameters of interest. If the process is in equilibrium or if the previous experience is independent and exogenous of the behavior observed during the first time period, then there is no problem. However, this is unlikely to be the case. The problem of the initial condition declines with the length of the panel, but the panel length in this study is only ten time periods, something that requires special attention. Heckman (1981b) proposes a statistical approximation method that solves the problem with reasonable precision.[6]

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[4] The GHK recursive simulator, (Geweke, 1991; Hajivasssiliou and McFadden, 1990; and Keane, 1990, 1994) is based on the observation that the choice probabilities in the multinomial probit model can be written as a sequence of conditional probabilities that may be simulated recursively. This simulator is of particular interest because it has been shown in a rather exhaustive study of many alternative probability simulators by Hajivassiliou, McFadden, and Ruud (1996) to be the most accurate and reliable simulator of all those considered (see also Gouriéroux and Monfort, 1993; and Keane, 1993, which focus explicitly on applications of simulation methods to panel data). An additional beneficial feature of the GHK simulator is that it is rather easy to implement for this kind of model.

[5] The simulated likelihood is a continuous and differentiable function of the parameters to be estimated. In addition, the simulated likelihood function is an unbiased estimator of the likelihood function (Börsch-Supan and Hajivassiliou, 1993). However, in order to receive consistency in the simulated estimation, the number of simulated draws R has to be large enough. Under certain regularity conditions, a sufficient rate is $R/\sqrt{N} \to \infty$ as $N \to \infty$ in order to obtain consistent, asymptotically normal and efficient estimates (Hajivassiliou and Ruud, 1994).

[6] See Orme (2001) and Wooldridge (2005) for alternative methods. Simulations show that Heckmans method perform better compared to the other two methods.

This is done by approximating the initial state in the sample using a univariate probit model, estimating its parameter separately and allowing its error term to freely correlate with the error terms of the remaining time periods and thereby circumvent the endogeneity problem. Here the initial state equation is estimated simultaneously with the participation equation.

The second problem to consider is the problem of distinguishing between "true" and spurious state dependence, which is the same as separating the effects of unobserved individual characteristics from the potential effect of "true" state dependence. The solution to this problem is related to the assumptions made on the residual term in equation (1). In the literature there are many examples of more or less restrictive ways of dealing with the residual term in order to separate out the individual specific effects. Two alternative specifications will be used and compared with the general error structure of the main model. The general error structure of the main model is based on a free covariance structure that allows individual covariances in the covariance matrix to deviate from each other. The more restrictive structures used are (1) a first-order Markov process ($v_{it} = \rho v_{i,t-1} + u_{it}$) allowing for serial correlation and assuming that no other effects remain in the residual term, and (2) a conventional component of variance scheme ($v_{it} = \alpha_i + u_{it}$).[7]

In order to identify the parameters of the main model, it is necessary to impose some normalizations. For the coefficients of the model to be consistently estimated, it is sufficient to normalize the variance of the first time period only (the initial condition equation), which means that it is possible to allow for heteroscedasticity over time. However, when using the GHK simulator, such normalization causes an asymmetry in the simulated error structure, biasing the standard errors (for the coefficients of the participation equation) received from the estimated information matrix using standard numerical methods such as the finite difference approach. Therefore, the variances for all time periods have been normalized to one, imposing homoscedasticity over time.[8]

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[7] Specification (1) corresponds to $\rho_{t,t+k} = \rho^k$, and (2) corresponds to $\rho_{t,t+k} = \sigma_\alpha^2 / 1 + \sigma_\alpha^2$.

[8] When testing for this restriction, it turned out not to be a problem, since any deviation from homoscedasticity was absorbed by the remaining free components of the covariance matrix. The information matrix is approximated using the BHHH method.

5 Results

Welfare participation differs greatly among different groups of people and those most exposed are typically young people, single mothers, and immigrants. In this study we separate the analysis between those born in Sweden and those born elsewhere. This is important since it is well-known that the welfare behavior differs greatly between these groups and that the factors affecting their participation behavior are different, as could be seen in the data section. These differences are believed to be part of the state dependence as well, which will receive special attention in the sections below.

5.1 Swedish-born individuals

Table 3 contains estimates from the dynamic discrete choice model for the Swedish-born group, and is based on a simulated maximum likelihood function using 40 simulated draws per individual and time period. The table shows the estimates of the initial condition equation and the participation equation, and the estimates of the fixed time effects that were estimated as part of the participation equation. The parameters of the initial condition equation are of less interest since its main purpose was to control for the endogenous initial period. The focus will therefore be on the participation equation.

The fixed time effects are all significant and their sizes follow the general time trend in welfare participation that peaked 1997. The overall results are in line with those found in the literature. The effect from continuous age is negative, implying that the likelihood of receiving social assistance decreases with age. This corresponds to the situation that young people more often are exposed to welfare, since they are new on the labor market and not yet established. For each additional age-year, the likelihood of going on welfare decreases by 0.2 percentage points.

Table 3 Estimation results of welfare participation by Swedish-born, 1990-1999

	Initial condition		Participation equation		
	PE	SE	PE	SE	ME[9]
Age/100	-0.599	0.391	-1.103 *	0.211	-0.048
Educational level (CG: Primary school)					
Secondary school	-0.383 *	0.062	-0.262 *	0.035	-0.012
Post Secondary school	-0.867 *	0.123	-0.741 *	0.058	-0.032
City region	0.027	0.081	-0.056	0.043	-0.003
Married/Cohabitant	-0.638 *	0.069	-0.436 *	0.031	-0.020
Children < 6 years	0.348 *	0.072	0.128 *	0.034	0.006
Unemployed	0.723 *	0.077	0.401 *	0.028	0.023
Municipal rate of SA-participation/10	0.961 *	0.289	0.839 *	0.109	0.033
Social assistance (SA) norm/10K	0.164	0.174	0.258 *	0.047	0.012
Average municipal duration of SA /10	-0.268	0.218	-0.384 *	0.086	-0.023
Structural state dependence			0.897 *	0.072	0.041
Structural state dependence (100 draws)			0.872 *	0.068	
Fixed time effects	YES (see Table A3)				

		Alternative error schemes		
	General error structure	First order Markov	Component of variance	
Log likelihood	-6627.42	-6938.76	-6675.43	
LR-test		622.68*	95.96*	

Note 1: n=82050; the critical value at 45 degrees of freedom is 61.65.
Note 2: PE = Parameter estimates; SE = Standard errors; ME = Marginal effects. * indicates significance at the 5% level. LR-test refers to a log likelihood ratio test comparing alternative specifications where the main specification works as base. Note 2 holds for all other tables in the paper that contain the explained notations.
Note 3: The estimated intertemporal covariance matrix is presented in Table A1 in the Appendix.

It is also well established that years of education is negatively associated with the propensity to live on welfare, and the results here indicate that an increase in the educational level reduces the risk of going on welfare. The transition from primary schooling to a secondary schooling degree reduces the likelihood by 1.2 percentage points and this figure more than doubles in the transition to a post secondary degree. Official statistics show that there is a great deal of regional variation in welfare expenditure as well as in the number of participants among municipalities. It has been estimated that around 70 % of the variation in welfare cost among municipalities can be explained by labor market conditions and population structure. One would expect that the labor market conditions would be more favorable in city regions, since the supply of

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[9] The marginal effects calculated here are based on the full model and represent the mean marginal effects over time and individuals: $\frac{1}{NT}\sum_{i=1}^{N}\sum_{t=1}^{T}\frac{\partial}{\partial x_1}\Phi^*(y_{it}=1|x)$, with $\Phi^*(y_{it}=1|x)$ being the marginal probability function for period t, where all other time periods have been integrated out. For simplicity reasons, the discrete variables have all been treated as being continuous. However, the continuous treatment is believed to be a good approximation of the discrete counterpart. The derivatives are calculated using a finite difference formula.

jobs is greater there compared to the countryside. However, no such spillover effect from employment opportunities on living in a city region could be found here.

When looking at simple correlation measures between city region and welfare participation, one typically receives significant correlation estimates, even though they are small. However, when controlling for unobserved individual differences these effects typically disappear. This could be an indication of a sorting structure which implies that individuals with a higher propensity to end up on welfare tend to stay in city regions.

In the literature it is typically argued that unemployment together with household separations explain the major part of the temporary need for social assistance in some households. One would therefore expect that cohabitation and marital status would reduce the likelihood of living on welfare. This is confirmed by the results, indicating that living together with someone in a household reduces the likelihood of going on welfare by 2 percentage points.

Households with children typically have a strained economic situation, especially when both parents and their children are young, since being young is associated with lower earnings. Having children below the age of six increases the likelihood of welfare dependence by 0.6 percentage points.

Being unemployed seems to be one obvious reason why some people end up living on welfare. But when the analysis is made on the general population aged 18-50 and related to a random individual from that population, the link is not that strong. This is because most people depending on unemployment insurance and not social assistance when unemployed. The likelihood of being dependent on welfare when unemployed increases by only 2.3 percentage points, which is by no means the largest effect in the model.

A more interesting effect on individual welfare behavior comes from the local (municipal) average welfare participation rate. This variable stems from the effect of the influence of environmental or local networks on welfare participation. Åslund and Fredriksson (2005) investigated whether the size and the characteristics of ethnic enclaves have any causal effect on welfare use among immigrants. They found that individual welfare use increased by 2.6 percentage points in response to an increase in the share of welfare recipients by 10 percent. This is in line with our study, which also

finds a positive relation between the share of welfare recipients and the individual propensity to live on welfare: When the share of welfare recipients increases by 1 percentage point, the propensity increases by 0.3 percentage points.

The size of the social assistance norm mechanically regulates the size of the group of people eligible for social assistance. If the norm is larger, the eligible group become larger, and obviously a larger group of people then have the possibility to live on welfare. However, it is reasonable to believe that the largest effect concerns those on the margin of being a welfare participant, which implies that the overall effect on the population should be quite small. If the yearly norm is increased by 10 000 SEK the propensity to receive social assistance increases by 1.2 percentage points.[10]

Another interesting variable measures whether the local (municipal) average duration on welfare affects the propensity to live on welfare. To be more exact, the measure represents the local average number of welfare months during a given year, which should be seen as a proxy for dependency duration, or the strength of the dependency that welfare recipients have in a given municipality. The variable is found to have a negative effect on the propensity to live on welfare. The rationale behind this relationship is not obvious. In the data we find no statistical relation between local welfare duration and unemployment or welfare participation if we look at simple unconditional correlation measures. However, we find a strong and positive statistical relationship between local welfare duration and the local rate of welfare participation (0.28) and large city regions (0.23). This implies that when the local rate of welfare participation and the local average welfare duration are both high, the unconditional effect on welfare participation is cancelled, and when controlling for individual heterogeneity the effect becomes negative. At this point it is still an unanswered question whether this effect is behavioural or spurious.

The last variable in the specification is related to welfare persistence, and the effects of welfare participation over time. That is, when people are introduced to social assistance, a change in their propensity takes place that makes it harder to leave the welfare state, which implies negative duration dependence. In the dynamic literature using continuous duration models, this is a phenomenon that is often noted and investigated. The finding of negative duration dependence is subject to more than one

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[10] 10,000 SEK corresponds to 1,075 EUR (January, 2012).

interpretation that differs depending on whether the analysis controls for unobserved heterogeneity. When that is not the case, the duration dependence might be spurious.

The effects of "true" state dependence, which is measured using a first order Markov process, constitute the single largest participation effect among those included in the analysis. It implies that if an individual receives welfare in the previous year, he or she has a 4.1 percentage point increased propensity to receive it in the present year. This has important policy implications since any short-term economic policy measure that increases the participation rate will have long-term consequences that might be difficult to solve, at least in the short-run.

The general error structure was, in a second step, restricted to a specific structure: a first order Markov process and a component of variance structure. Table 3 reports the corresponding log-likelihood values and likelihood-ratio tests. As can be seen, the general structure offers a significant improvement. However, the component of variance structure seems to be a relatively good approximation to the general structure in this case. The general behavior of the coefficient for structural state dependence is that it is biased upwards, and that the more restrictive the error structure is, the more the bias increases.

5.2 Foreign-born individuals

We now turn to the second group under investigation in this study, namely the foreign-born group. The results from the simulated maximum likelihood function are presented in Table 4. As with the Swedish-born group, this table contains parameter estimates from the initial condition equation as well as from the main participation equation, which includes fixed time effect dummies. Additionally it contains extra observable factors directly related to the foreign-born group, namely country of origin, number of years in the country, and whether the individual came from a refugee country. As before, the discussion will focus on the parameters from the participation equation.

The level of the fixed time effects are much smaller compared to those in the Swedish-born group, and the evolution over time is bimodal, with a first peak in 1994/95 and a second and larger peak in 1998. It is always difficult to interpret intercepts since they are affected by both the variables included and the choice of reference dummy for groups of dummies. However, the general trend is similar to that of the Swedish-born group.

Table 4 Estimation results of welfare participation by foreign-born, 1991-1999

	Initial condition		Participation equation		
	PE	SE	PE	SE	ME
Age/100	-0.637 *	0.281	-0.732 *	0.161	-0.093
Educational level (CG: Primary school)					
Secondary school	-0.200 *	0.050	-0.128 *	0.023	-0.016
Post Secondary school	-0.706 *	0.107	-0.387 *	0.033	-0.044
City region	-0.044	0.049	0.015	0.026	0.005
Married/Cohabitant	-0.491 *	0.047	-0.308 *	0.021	-0.041
Children < 6 years	0.208 *	0.046	0.121 *	0.022	0.014
Unemployed	0.393 *	0.055	0.288 *	0.018	0.051
Municipal rate of SA-participation/10	0.357 *	0.174	0.432 *	0.065	0.041
Social assistance (SA) norm/10K	-0.076	0.177	0.094 *	0.028	0.011
Average municipal duration of SA /10	0.191	0.192	-0.274 *	0.081	-0.049
Country of origin (CG: Nordic countries)					
Western Europe	-0.344 *	0.095	-0.244 *	0.052	-0.030
Eastern Europe	-0.061	0.106	-0.025 *	0.055	-0.010
Southern Europe	-0.488 *	0.106	-0.158 *	0.053	-0.021
Middle East	0.296 *	0.098	0.379 *	0.048	0.036
Rest of the world	0.295 *	0.069	0.262 *	0.038	0.031
Years since immigration (CG: 0-4 years)					
5-9 years	-0.505 *	0.059	-0.128 *	0.027	-0.015
10-14 years	-0.667 *	0.065	-0.231 *	0.033	-0.028
15-22 years	-0.590 *	0.063	-0.330 *	0.035	-0.039
>22 years	-0.701 *	0.076	-0.441 *	0.039	-0.053
Refugee	0.362 *	0.079	0.070 *	0.035	0.010
Structural state dependence			1.041 *	0.053	0.125
Structural state dependence (100 draws)			1.018 *	0.047	0.125
Fixed time effects	YES (see Table A3)				

		Alternative error schemes		
	General error structure	First order Markov	Component of variance	
Log likelihood	-6627.42	-6938.76	-6675.43	
LR-test		622.68*	95.96*	

Note: n=84070; the estimated intertemporal covariance matrix is presented in Table A2 in the Appendix. See Table 3 for additional notes.

The observed factors in common with the Swedish-born group show about the same effects on welfare propensity when it comes to direction, but there are some differences related to size that are worth mentioning. Continuous age shows a twice as large effect, which means that the welfare behavior differs more among different age groups than for the Swedish-born. Being young and being born in another country are two factors working in the same direction in terms of propensity for welfare participation.

The effects of higher education are at about the same level, while the effect of living in a large city region is almost twice as large, even though it is still very small. Marital status is an important factor, and living together with someone reduces the

likelihood by 4 percentage points, which is twice the number for the Swedish-born. We know from the data section that the share of the welfare receiving households with several family members are growing among immigrants. However, this is a phenomenon that appeared in the second half of the 1990s, and we are analyzing and following a random sample taken in 1990, which obviously does not follow this pattern. Hence, the described phenomenon is mainly related to newly arrived immigrants and refugees arriving in the country with their whole families.

A related factor is the presence of younger children in the household. Having children is often associated with an increased risk of living on welfare, and having children younger than age six increases the likelihood by 1.4 percentage points; an effect twice the number of the natives.

Unemployment is a natural cause for welfare dependency, especially for immigrants where it increases the propensity by 4.1 percentage points. The situation is especially difficult when an individual is new in the country, and has an origin outside Europe. The matching problem on the labor market is related to both structural and individual factors that make it difficult for immigrants to integrate.

The effect of regional rate of welfare participation and the size of the welfare norm is about the same for immigrants as for the Swedish-born. The local average welfare duration on the other hand is much larger though, and as for the Swedes the effect is negative.

Country of origin is important, and the country-groups in the specification are in relation to Nordic-born people, a group very similar in their characteristics to the Swedish-born group. Compared to the Nordic-born, we can identify two groups: one with a larger propensity for welfare and another with a lower propensity. If from Western or Southern of Europe, the propensity is reduced by 2-3 percentage points compared to the Nordic group. People from Eastern Europe have about the same propensity as the Nordics. If from the Middle East or the rest of the world, the effect is an increase in the propensity for welfare by 3-4 percentage points compared to the Nordic group. From these results it is very clear that there is a distinct difference whether a person is from Europe or from a country outside Europe in terms of welfare participation.

The second important immigrant-specific factor for welfare participation is the number of years since immigration. The comparison group consist of those who had been in the country for less than five years. Compared to this group it is clear that the longer the person has been in the country, the more unlikely it is that he or she ends up on welfare. A person who has been in Sweden for more than 22 years has a 5.3 percentage point reduction in propensity, compared to the newly arrived, and this is one of the largest effects in this specification.

During the 1990s, Sweden received a large number of refugees, and many of them stayed in Sweden for many years. This implied a large increase in welfare use, since they came in large numbers and often had problems integrating into the labor market. Our group does not include all these new refugees and therefore the effect is relatively modest, corresponding to a propensity increase by 1 percentage point.

The last measure related to welfare persistence is more interesting. The effect from structural state dependence is very large and three times as large compared to the Swedish-born. This implies that previous experience of welfare increases the propensity by 12.5 percentage points.

As for the Swedish-born, the effect on the fit of the model was tested for different more restrictive error structures. The conclusion is about the same here, with a significant difference between the general error structure and the two alternative error structures, and an increased bias in the coefficient of the structural state dependence that increases when restrictions are imposed on the error structure.

5.3 Welfare persistence/dependency?

The results presented above show that the structural state dependence in social assistance participation exists, is important, and differs greatly between Swedish-born and foreign-born people. In this section the effect of structural state dependence is decomposed and analyzed with respect to a number of observed factors in order to see how the size of the structural state dependence may change due to changes in those factors. Table 5 presents the parameter estimates for the different factors, and some effects do stands out. For the Swedish-born there are four significant coefficients, including the constant term. The first significant parameter is related to living in a city region and reduces the size of state dependence. From the earlier discussion we know that living in a city region increases the likelihood of receiving social assistance in

general. However, this likelihood is reduced if the person received social assistance in the previous period. This implies that the persistence in social assistance is lower in city regions, even though the probability to receive social assistance is larger in general. One possible explanation for this could be the greater supply of jobs in urban regions, which increases the possibility for households to live on their own earnings.

Table 5 Average marginal effects on structural state dependence, by country of birth

	Swedish-born			Foreign born		
	PE	SE	ME	PE	SE	ME
Constant	0.621 *	0.235	-	0.286	0.156	-
Age/100	0.551	0.352	0.024	0.671 *	0.214	0.078
City region	-0.162 *	0.078	-0.007	-0.070	0.041	-0.008
Cohabitant	0.098	0.067	0.004	0.153 *	0.034	0.018
Unemployed	-0.445 *	0.055	-0.020	-0.423 *	0.032	-0.049
Municipal rate of SA participation/10	0.311	0.199	0.013	0.205	0.106	0.024
SA norm/10K	-0.066	0.116	-0.003	0.407 *	0.132	0.047
Average municipal duration of SA/10	0.597 *	0.189	0.027	0.383 *	0.150	0.045
Country of origin (CG: Nordic countries)						
Western Europe				0.150	0.096	0.017
Eastern Europe				0.177 *	0.084	0.021
Southern Europe				0.152	0.080	0.018
Middle East				0.138	0.071	0.016
Rest of the world				-0.029	0.054	-0.003
Years since immigration (CG: 0-4 years)						
5-9 years				-0.061	0.055	-0.007
10-14 years				-0.152 *	0.059	-0.018
15-22 years				-0.061	0.062	-0.007
>22 years				-0.006	0.065	-0.001
Refugee				-0.057	0.053	-0.007

The second significant parameter refers to unemployment which also has a negative effect on the state dependence. This means that the overall probability to live on welfare when unemployed, is reduced if the household received social assistance in the previous period, which is to say that state dependence is decreasing with the event of being unemployed. Since this analysis is based on a general population we know that most people receive cash assistance or unemployment insurance when being unemployed. We therefore believe that the estimated effect of unemployment on state dependence is contaminated by this general behavior.

The third significant effect for the Swedish-born refers to the effect from the average regional welfare duration. The effect is positive, which means that the persistence is stronger in regions with high average welfare durations, which is an indication that group behavior has an influence on the individual.

The foreign-born group has more factors to consider and therefore more significant effects can be found. As could be seen in the previous sections, marriage and cohabitation is an important factor and is strongly related to receiving social assistance. Apparently it has an important effect on structural state dependence as well. Being unemployed has a negative effect on the size of structural state dependence, and the size of this effect is about the same as for the Swedish-born. Another important factor for the foreign-born as opposed to the Swedish-born is the size of the social assistance norm. If the norm is increasing in the present period, then the size of the structural state dependence is also increasing, and therefore the persistence of social assistance is strengthened. This effect could not be found for the Swedish-born.

Country of origin is another factor that could potentially be of importance for any state dependence. However, only small effects could be found and only the group from Eastern Europe show a significant increased effect. Somewhat surprisingly we found no increased effect of being from a refugee country.

To further analyze the behavior and size of structural state dependence in welfare participation, we include more lags to investigate how many years into the future the experience of social assistance affects the likelihood of receiving social assistance. Table 6 includes the estimated coefficients and the corresponding marginal effects for those coefficients that were significant when using a third order autoregressive specification. It turns out that the number of lags that were significant was the same for both Swedish-born and foreign-born people. However, the initial year effect was more than three times as large for the foreign-born group.

Table 6 A third order autoregressive specification of structural state dependence

Period	Swedish-born			Foreign born		
	PE	SE	ME	PE	SE	ME
t-1	0.763 *	0.092	0.028	1.001 *	0.076	0.099
t-2	0.450 *	0.101	0.016	0.253 *	0.070	0.024
t-3	0.241 *	0.099	0.009	0.190 *	0.079	0.021

Note: * indicate significance at the 5 percent level.

6 Summary and Conclusions

We estimate the size and the shape of structural state dependence in welfare participation in terms of social assistance in Sweden for foreign-born and Swedish born. The effects were estimated using a dynamic discrete choice model controlling for the initial condition and unobserved heterogeneity. Four parts of the structural state dependence were analysed.

The first part focused on the estimated size of the structural state dependence within the framework of a first order Markov process as an aggregated measure. We found that the effect is three times as large for immigrants as it is for natives. Furthermore, among the explanatory variables included in the specification, structural state dependence accounted for the single largest effect for both natives and immigrants with marginal effects of 4.1 and 12.5 percentage points, respectively. Hence, the behavioural response to the experience of social assistance is very strong and significant and has long-term consequences, especially among immigrants. This aggregated effect from structural state dependence is expected to vary within each group.

In the second step of the analysis we therefore disaggregated the effect with respect to a number of explanatory variables we believe could affect state dependence. For the natives, surprisingly few observed factors turned out to be significant. Living in a city region and being unemployed had a negative effect on structural state dependence, while average regional welfare duration showed a positive association. For the foreign-born, being unemployed was found to be negatively associated with state dependence, while the size of the social assistance norm, the average regional welfare duration, and age had a positive effect. Country of origin and the number of years in the country of destination are two other important determinants for the likelihood of receiving welfare in general. However, it turns out that they had only very low influence on state dependence among immigrants.

The third part of the analysis relaxed the assumption of a first order Markov process and allowed for more lags. Three lags turned out to be significant for both natives and immigrants, which means that the increased likelihood of returning to social assistance disappears after three years. The difference in effect between natives and immigrants was largest in the first year, and dramatically decreased in size in the second year. While the marginal effect continued to shrink for the natives, the size of the

marginal effect was about the same after three years as after two at just above 2 percentage points. The size of the marginal effect reduced to a number slightly below 2 percentage points in the following year, but was not significant. Even though the number of significant years (lags) remained the same for natives and immigrants, it seems like the persistence was to some extent stronger in the latter group, point estimates being slightly higher.

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Appendix

Table A1 Estimated intertemporal covariance matrix for Swedish-born

Time	T=1	t=2	t=3	t=4	t=5	t=6	t=7	t=8	t=9	t=10
t=1	1.0	0.418	0.479	0.466	0.446	0.493	0.411	0.446	0.351	0.399
t=2		1.0	0.409	0.465	0.456	0.452	0.438	0.383	0.397	0.369
t=3			1.0	0.414	0.497	0.523	0.476	0.410	0.412	0.385
t=4				1.0	0.457	0.455	0.527	0.511	0.489	0.452
t=5					1.0	0.476	0.494	0.459	0.510	0.381
t=6						1.0	0.503	0.529	0.525	0.486
t=7							1.0	0.443	0.512	0.459
t=8								1.0	0.456	0.515
t=9									1.0	0.530
t=10										1.0

Note: All parameters are significant at the 1% level

Table A2 Estimated intertemporal covariance matrix for foreign-born

Time	t=1	t=2	t=3	t=4	t=5	t=6	t=7	t=8	t=9	T=10
t=1	1.0	0.402	0.437	0.396	0.425	0.405	0.383	0.345	0.349	0.273
t=2		1.0	0.361	0.425	0.441	0.442	0.410	0.351	0.385	0.296
t=3			1.0	0.318	0.454	0.445	0.395	0.372	0.374	0.297
t=4				1.0	0.403	0.349	0.476	0.413	0.452	0.325
t=5					1.0	0.402	0.486	0.457	0.518	0.374
t=6						1.0	0.398	0.518	0.471	0.369
t=7							1.0	0.461	0.555	0.434
t=8								1.0	0.473	0.413
t=9									1.0	0.355
t=10										1.0

Note: All parameters are significant at the 1% level

Table A3 Estimated fixed time effects in the initial condition equations

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Swedish-born	-1.694[*]	-1.723[*]	-1.795[*]	-1.719[*]	-1.841[*]	-1.918[*]	-1.868[*]	-1.954[*]	-1.946[*]	-1.941[*]
Foreign-born	-0.679*	-1.117*	-1.170*	-1.104*	-1.221*	-1.222*	-1.132*	-1.168*	-1.281*	-1.195*

Note: All parameters are significant at the 1% level