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**State dependence in Swedish social assistance in the 1990s:
What happened to those who were single before the
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**State dependence in Swedish social assistance in the 1990s:
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Abstract

Using a dynamic discrete choice model that controls for unobserved heterogeneity and the initial conditions problem, we estimate the state dependence in Swedish social assistance for Swedish-born and foreign-born who were single in 1990 before the recession period started. The estimates of the structural state dependence for Swedish-born singles indicate that it is unaffected by the event of living together with a partner, and the effect is significantly lower for women than for men. For the foreign-born singles, the state dependence for those who stay single the whole decade is equally strong for men and women, and almost not affected when the foreign-born single started to live together with a foreign-born partner.

Keywords: social assistance, state dependence, country of birth, singles, married/cohabitated, unobserved heterogeneity, initial conditions, dynamic random effects probit model, GHK simulator.

JEL Classification: I30, I38, J18.

1 Introduction

Economic and financial crises are tests of the sustainability of a welfare system. Welfare systems combined with fiscal discipline seem to explain the fact that all Scandinavian countries were passing these tests relatively well compared to other countries. Therefore, we would like to learn more about how people's behavior changed when the welfare system was calibrated to handle these shocks and to what extent people fall into welfare traps. In this study, we analyze structural state dependence in social assistance use in Sweden during the economic crisis of the early 1990s, which was widespread and affected most Western European countries. In several respects, Sweden was hit harder than other countries and experienced its most severe macro-economic crisis since the 1930s.¹ Its massive increase in unemployment and rapidly growing budget deficit had large repercussions on the welfare of many citizens. This generated a heavy pressure on Swedish labor market policies and on social assistance, and financial support became increasingly important for the maintenance of significantly more people during the crisis period. When the Swedish economy subsequently picked up during the latter part of the decade, the social assistance curves began to point downwards. In 1999, the proportion of the population on social assistance was almost the same level as in 1990 (Andrén and Andrén, 2013, Figure 1).

Even though the body of literature that focuses on state dependence and social assistance remains small,² some of these studies have analyzed the dynamics of social assistance in Sweden during the 1990s (i.e., Hansen and Lofstrom, 2003, 2009 and Andrén and Andrén, 2013). Therefore, we already know that in Sweden during the 1990s, state dependence in social assistance was higher among immigrants compared to Swedish-born individuals. These results can be supplemented by an analytical design that also incorporates another important characteristic of the Swedish social assistance system: it is a household's disposable income that is evaluated upon the payment of social assistance. The three studies mentioned above required that the household be

¹ In fact, the crisis was to a large extent domestic, and Sweden experienced a fall in the domestic demand larger than any other OECD country with the exception of Finland, which experienced a comparable crisis at that time (Bergmark and Palme, 2003).

² See Chay et al. (1999), Cappellari and Jenkins (2009), and Wunder and Riphahn (2012) for studies on the US, Britain and Germany.

represented by the sampled individual, who could be either Swedish-born or foreign-born. Such a design ignores the fact that a two-adult household can consist of one Swedish-born and one foreign-born individual, which might change the empirical results and, implicitly, the information delivered to the policy makers.

The previous studies that used dynamic binary response models with unobserved heterogeneity are estimated built upon the strict exogeneity assumption. However, this assumption might be questionable for some of the explanatory variables, such as marital status and the number of children in the household. Biewen (2009) analyzed state dependence in poverty in Germany and presented empirical evidence that employment status and household composition are likely influenced by past poverty outcomes. Although the institutional settings of social assistance in Sweden are different from those found in Germany, and the focus of the previous Swedish studies is on state dependence in social assistance and not on poverty, we consider Biewen's (2009) concern and empirical evidence that a household's composition can be influenced by past poverty outcomes. Therefore, to avoid the potential bias driven by household composition, we analyze the persistence of social assistance in Sweden during the 1990s for working-age individuals who were single in 1990 before the recession period started. In our analysis, we control for whether these individuals began to live with a partner, and we also analyze the subgroup of those who were single for the entire decade (see Figure A1). In this way, we avoid the potential feedback effect discussed by Biewen (2009), and we argue that the sample selection is exogenous.

Our results indicates that for those persons who were single in 1990, before the recession period started, finding a partner to live with reduced the propensity to receive social assistance for both Swedish-born and foreign-born women. For Swedish-born men, there is no change in the propensity for social assistance when forming a couple with a foreign-born woman, but for foreign-born men the propensity to receive social assistance increases. Overall, the propensity is reduced for all groups when forming a couple with a Swedish born partner.

The estimates of the structural state dependence for Swedish-born singles indicate that it is unaffected by the event of living together with a partner, and the effect is significantly lower for women than for men. For the foreign-born singles, the state dependence for those who stay single the whole period is equally strong for men and

women, and almost not affected when the foreign-born single started to live together with a foreign-born partner. The state dependence increases to some extent for foreign-born singles, but it decreases when foreign-born single men live together with a Swedish-born woman

These results extend the existing literature by offering empirical evidence for the strength and determinants of structural state dependence with respect to social assistance for both natives and immigrants who were single before a recession period started. These results are also expected to contribute to the literature on interethnic marriages and their economic effects, which is still in its infancy (Furtado and Trejo, 2012).

The rest of the paper is organized as follows. The next section describes the institutional settings of social assistance in Sweden during the 1990s, and Section 3 presents the empirical specification and the estimation method. Section 4 presents the data and Section 5 discusses the results. Section 6 summarizes and concludes the paper.

2 Social assistance in Sweden during the 1990's

Sweden has a generous social security system designed to cover citizens' most important needs during the life course. The term *poor relief* was substituted by *social assistance* in 1956. Different from other countries, social assistance is the last resort intended to give short-term relief to *any household in need*. Therefore, households that receive social assistance might have members who have earnings from work and/or receive payments from other insurances, which are not enough to assure a reasonable standard of living for all members of the household.

A universal right to social assistance was established in 1980 in the Social Services Act, which is a legal framework of general intentions rather than stipulating specific criteria for eligibility and the form of assistance (Giertz, 2004). This right applies to any adult living in a municipality, including foreign citizens with residence permit. If the applicant becomes eligible, the benefit shall give a reasonable level of living rather than a minimal level. Until 1998, the National Board of Health and Welfare was providing general guidelines for the social assistance norm, which were calculated using cost estimates for household expenditure from the Swedish Consumer Agency. In the revised Social Services Act of 1998, the number of items in the general norm was reduced further, in favor of a system with closer detailed analysis of actual items of

expenditure and the regional variations in the benefit levels were replaced by a national uniform benefit level.

A person without means has a right to economic support if no other sources of income are available, meaning that compensation from social insurance should be the primary alternative when eligible. However, almost all the components of the Swedish social insurance are linked to the work history of the individual. Even though, a large proportion of the Swedish workforce is insured, in some cases the insurance qualifications requirements are not fulfilled or the level of compensation is not enough for the household of the individual, and therefore this household might qualify for social assistance. This situation became more frequent during the 1990s, when all insurances increased the severity of the qualification requirements and decreased in the level of compensation of the earnings-related benefit.

The responsibility for financing and providing the benefit rests with the municipalities. Social assistance is granted to households; however parents have no obligation to support children after the age of 18 (or 20 if still in secondary school) and adult children are not obliged to support their parents. Another group of population that might have some different arrangements and requirements for receiving social assistance are the refugees and their relatives. Regardless of their nationality, refugees are placed in municipalities after permit of residence, and then participate in introductory courses on the Swedish language and societal and labor market introduction. The Swedish government also finances the travel costs associated with reuniting relatives. All refugees and their families are encouraged to take 1.5 years of training provided through the Introductory Courses for Newcomer Program for which they are provided a stipend. Prior to 1994, asylum seekers and resettled refugees did not have the option of living with friends or family; they were often redirected to small towns where housing was available. They are initially supported by social assistance.

The level of the social assistance is set to elevate the household above a minimum standard of living and covering expenses for food, housing, childcare, etc. No maximum period for eligibility is specified, but it is renewed in a monthly basis, conditional that recipients show that they made full-time efforts to find a job (if they are unemployed) or to find other solutions to become independent of social assistance.

The total SA benefit 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, and the amount entitled to is referred to as the *social assistance norm*, which is regulated by the welfare recipient's home municipality. In most municipalities, the SA generosity was reduced between 1993 and 1999, and the difference between the average SA benefit level in 1993 and the corresponding level in 1999 is approximately 20 percent (Flood et al. 2004).

Social assistance must be applied for. It is generally acknowledged that many households who are entitled to assistance nevertheless refrain from applying, which indicates that take-up rates are low (Gustafsson, 2002). The application for a given household is made at a social welfare office, where it is processed by a social worker, who is often also the decision-maker. She or he follows certain guidelines defined by type of household (e.g., single, single with children, couples without children, couples with children, etc.). The application is typically made for a period of one month, and is often followed by further applications. However, in some cases there are decisions without documentation and possibilities of appeal. There is consequently a risk that intake organizations affect help-seeking people's chances of obtaining access to the society's last safety net.

The following is a simplified description of the process from the first contact until the decision is taken: individuals contact the Social Services office (Socialtjänsten) in the municipality where they live. Usually, this implies to call and make an appointment. At the visit, the applicants can already submit an application form and details about the financial situation of that their household. This information is normally kept on file for five years, after which it is destroyed. Each application for social assistance is assessed individually with focus on the household's financial situation. People with disposable household's incomes at the lower than income thresholds laid down in the social worker's guidelines for the given household type who cannot make a living in any other way receive social assistance. Even though is not straightforwardly stated in the law, minor savings are not allowed. In the screening process, additionally, to all kind of incomes and saving, the application should include any ownership of housing and car, boat, etc. Therefore, it is expected that the requirement of exhausting all savings and all

valuable assets before becoming eligible stop many qualifying households from applying for social assistance. This self-selection out of the application might become even stronger when become available to household's eligibility on line.³

3 The Econometric specification

In this paper, we use a random effects approach to estimate the structural state dependence for different groups of welfare recipients. The dependent variable of central interest, Y_{it}^* , is a latent continuous measure for the propensity of individual i to receive social assistance in period t . The observed analog of the dependent variable, Y_{it} , equals 1 when $Y_{it}^* \geq 0$, and 0 otherwise, for all t . With this setup, the model may be written as

$$Y_{i1}^* = Z_{i1}\beta_1 + \varepsilon_{i1} \quad (\text{Initial conditions equation}) \quad (1)$$

$$Y_{it}^* = X_{it}\beta_2 + \gamma Y_{it-1} + \varepsilon_{it} \quad (\text{Participation equation}) \quad (2)$$

($i=1, \dots, N; t=2, \dots, T$), where Z_{i1} is a vector of variables explaining the first observation for individual i in the observation window, and X_{it} a vector of variables explaining the remaining observations. The lagged observed outcome variable, Y_{it-1} , on the right-hand side of the participation equation is used to capture the dependence between past and present social assistance use, and γ is the measure of structural state dependence. Having $\gamma > 0$ would imply that the likelihood of being dependent on social assistance in the current period t is greater for those with an earlier experience from period $t-1$ compared to otherwise identical individuals without such an experience. The vector of error terms $\varepsilon_i = (\varepsilon_{i1}, \dots, \varepsilon_{iT})$ is assumed to be multivariate normal and is fully characterized by the following assumption: $\varepsilon_i \sim N(0, \Sigma)$, where Σ is a $T \times T$ positive definite intertemporal covariance matrix.

To receive consistent estimates of structural state dependence, it is necessary to control for unobserved heterogeneity. That is important because we need to separate the effect of innate individual differences in terms of social assistance use from that of structural state dependence. Following Heckman (1981a), the model is estimated within

³ <http://www.socialstyrelsen.se/ekonomisktband/forsorjningsstod/provberakning>

the framework of a multinomial probit model with an unrestricted intertemporal covariance matrix, Σ , except for the time specific variances that are normalized to 1 along the main diagonal.⁴ In relation to the literature that fits dynamic random effects probit models, this implies a very general error structure, much less restrictive than the commonly used component of variance scheme (with or without autocorrelated error components), which is a novelty in the welfare dependency literature.

The random effects approach for dynamic models also requires the specification of the initial conditions of the process, which is acknowledged by equation (1). If the process of social assistance use is in equilibrium or if previously unobserved experiences are independent and exogenous to the behavior observed during the first time period, there would be no problem. However, because we do not observe the whole history of the process for all individuals, this is unlikely to be the case. With a relatively short panel, the initial conditions could potentially have a strong impact on the entire path of events, leading to inconsistent estimates. Fortunately, several solutions have been suggested in the literature on how to address this issue. We follow Heckman (1981b, 1981c), who suggested the specifications of the approximation of the reduced form equation for the initial observations.⁵ Empirically, this is conducted by approximating the observed initial period using a univariate probit with as much pre-sample information as possible, estimating its parameters separately, and allowing the error term to freely correlate with the error terms of the participation equation for the remaining observed time periods. The equation for the observed initial time period is estimated simultaneously with the participation equation related to the remaining time periods within the framework of a multivariate probit with a free covariance structure. Hence, the free error structure for the participation equation is easily augmented with the error structure of the initial time period.

Because the model is defined within a framework of a multivariate probit, a likelihood function needs to be specified. The model described by equations (1) and (2)

⁴ Because this is a discrete choice model, some normalization needs to be imposed because utility levels and scales are irrelevant. To generate consistent estimates, it would be sufficient to normalize the variance of the first time period only. However, because of the estimation method used, we choose to normalize the remaining variances as well.

⁵ Results by Akay (2011) indicate that Heckman's method outperforms other methods in short panels up to 5 time periods, whereas there is no major difference compared to alternative methods for longer panels. See Orme (2001) and Wooldridge (2005) for alternative, commonly used methods.

runs over ten time periods (1990-1999) and therefore generates the following log-likelihood function:

$$L = \sum_{i=1}^N \log[\text{prob}(Y_{i1}, \dots, Y_{i10})], \quad (3)$$

where

$$\text{prob}(Y_{i1}, \dots, Y_{i10}) = \int_{a_{i1}}^{b_{i1}} \dots \int_{a_{i10}}^{b_{i10}} f(\varepsilon_{i1}, \dots, \varepsilon_{i10} | \Sigma) d\varepsilon_{i10}, \dots, d\varepsilon_{i1},$$

with $a_{i1} = -Z_{i1}\beta_1$ and $b_{i1} = \infty$ if $Y_{i1}=1$, whereas $a_{i1} = -\infty$ and $b_{i1} = -Z_{i1}\beta_1$ if $Y_{i1} = 0$, with analogous expressions for the remaining time periods according to equation (2) and $f(\cdot|\Sigma)$ being the multivariate normal density function. Because we allow all covariances in the covariance matrix to be free, the main difficulty in maximizing the likelihood function is related to the 10-fold integral that should be solved for each individual in the sample. This is solved using a smooth recursive conditioning simulator (the GHK-simulator), which simulates rather than numerically evaluates the integrals.⁶

3.1 Structural state dependence for different household compositions

The model defined by equations (1) and (2) contains a single measure for the average structural state dependence, γ , related to the total sample of individuals used in the estimation. In general, that is an interesting parameter; however, in this paper, we have a special focus on the importance of the household composition and its effects on the size of state dependence. In particular, we are interested in how the strength of state dependence changes when an individual is moving from the state of being single to the state of being a cohabitant, and how the effect varies depending on whether the partner is a Swedish-born or a foreign-born individual. Additionally, we would like to know if these effects are different for women and men, with the hypothesis that there are behavioral differences between single women and men when coupling, conditional on previous welfare use.

⁶ For a detailed description of the GHK-simulator, see Train (2003, p126-137). The standard quadrature methods normally used to solve integrals numerically do not work well in practice when the integration problem exceeds five dimensions due to the curse of dimensionality problem; hence, this problem necessitates the use of simulation methods. The empirical work and the numerical problems are all solved using SAS/IML.

To estimate these effects, we respecify the variable specification in the participation equation, allowing the parameter for structural state dependence to vary in those dimensions. That is, we introduce the following specification:

$$\gamma = \underbrace{(\gamma_0 + \gamma_1 W)}_{\text{Singles}} + \underbrace{(\gamma_2 + \gamma_3 W)}_{\text{married with SB}} SB + \underbrace{(\gamma_4 + \gamma_5 W)}_{\text{married with FB}} FB, \quad (4)$$

with W being an indicator variable for being a woman, SB being an indicator variable for coupling with a Swedish-born individual, and FB being an indicator variable for coupling with a foreign-born individual. The reference category for both SB and FB is the state of being single, which implies that the composite parameter $(\gamma_0 + \gamma_1 W)$ is an estimate for those who stay single during the whole period. The parameters in front of SB and FB have analogous interpretations.

4 Data

In this paper, we use data from the same source as Andrén and Andrén (2013): the register-based Swedish Income Panel (SWIP), sampled and organized by Statistics Sweden.⁷ SWIP is a stratified random sample of the population living in Sweden containing both a 1% sample of the Swedish-born population and a 10% sample of the foreign-born population. The stratified panel was initially based on individuals living in Sweden in 1978. Those individuals were followed over time, with repeated yearly cross-sections. To make each yearly cross-sectional subsample representative for its own population, supplementary individuals were added to each sample year to adjust for new births, immigration, emigration and mortality. Additionally, all household members identified through the tax register, including spouses and children up to the age of 18, were attached to the sampled person. This design makes it possible to construct tax-register-based household units, which might be biased to some extent because not all households register their cohabitation; Sweden being a country where cohabitation without formal marriage is rather common.

We select only individuals who were single in 1990 in the two samples of Swedish-born and foreign-born individuals analyzed by Andrén and Andrén (2013) and

⁷ For further information on SWIP, see <http://snd.gu.se/en/>.

follow them, in a balanced panel, until the end of 1999. In addition to living as a single household in 1990, the individuals of our samples are aged 20-50 years and were in the register until the end of 1999. These samples are labeled in all tables and figures as “Single 1990”.

Because we focus on social assistance use in particular, it is necessary to perform the analysis separately for Swedish-born and foreign-born individuals; their welfare participation behavior differs to some extent, and the set of factors that are associated with social assistance use are different for the two groups. For example, the earlier literature presents evidence that the country of birth, the number of years in Sweden and the status as refugee are important determinants of the probability of receiving social assistance for foreign-born individuals. During the 1990s, residence was permitted for a big number of refugees (more than double the previous decade), but they are not included in our analysis and. However, about 34% of the foreign-born in our data are refugees (Table A1 in the Appendix).

We also use information about whether the individuals who were single in 1990 started to live with a partner during the observation period. If this was the case, we control for whether the partner is either Swedish- or foreign-born, which makes it possible to receive estimates for singles as well as for couples in which both members are Swedish-born and couples in which foreign-born (referred as homogenous couples) as well as couples in which one member is a Swedish-born and the other is foreign-born (referred as mixed couples). These estimates allow us to say something about the importance of living together with a partner in relation to social assistance use. Furthermore, it allows us to estimate state dependence for different household types, as described in the empirical specification in Section 3.

This design allows us to supply new results about the state dependence for Swedish-born and foreign-born individuals who were single before the recession period started, but it implies, again, that some of them might build a mixed couple of a Swedish-born and a foreign-born. Therefore, we also analyze the groups Swedish-born and foreign-born individuals who were single the whole observed period. These samples are labeled as “Single 1990-99”.

The dependent variable used in the analysis is discrete and indicates if the household receives social assistance a given year (see Figures 1-3 and Tables A1-A3).

Given that parents have no obligation to support children after the age of 18 (or 20 if still in secondary school), these children can receive social assistance. In our data, there is still the household that receives social assistance. Because the data are based on yearly numbers and social assistance is received on a monthly basis, it is sufficient for the household of the sample person to have received social assistance at least one month during the year in order for the household to be defined as being a social assistance receiver that particular year. Therefore, the results should be interpreted in terms of cross-sectional incidence based on yearly observations and whether the household appears as a social assistance receiver in a given year or not.

In Sweden, between 1990 and 1993 GDP went down by 5% and total employment fell by almost 10%, causing the worst economic crisis in Sweden since the 1930s. In 1990, before the recession period started, the Foreign-born singles have almost a three times higher propensity to receive social assistance than Swedish-born single (Figure 1 and Tables A2 and A3). The whole decade's history of social assistance receipt for these two stocks of singles show that the average rate of social assistance is almost unchanged for the Swedish-born singles during the recession years, but it decreases by about 2.5 percentage points, from 1990 to 1994, for the Foreign-born who were single in 1990. Moreover, during the recession's years, it was no difference in the social assistance by gender for Swedish born singles in 1990: regardless gender, about 6% of them social assistance during 1991-1994 (Table A2). But it was a relatively big difference between Foreign-born women and men in the level of social assistance use: it decreased from 19.34% in 1990 to 17.27% in 1995 for men and from 17.3% to 14.16% for women (Tables A3). However, the use of social assistance is relatively different for the subgroups of those who were single the whole decade (Tables A2-A3): there is almost no change for the Foreign-born (about 16% during 1991-1994), while the Swedish born increased from 7.10% in 1991 to 8.05% in 1993). Moreover, in 1992, it was no difference in the social assistance by gender for both Swedish-born singles (about 7%) and Foreign-born singles in 1992 (about 16%).

An important advantage of register data is that it gives the analyst the opportunity to work with rather large samples. That is important because we are interested in different household compositions, and some household types have low representation in the population. Hence, survey data would typically not allow us to generate estimates

for some of the households that we are interested in. That is especially the case for the foreign-born group, for which we have access to a 10 percent random sample of the foreign-born population living in Sweden. Thus, it is possible to generate estimates with rather good precision in general. Another important benefit of register data in our case is the low degree of attrition. Because few individuals drop out of the sample during the observation window and those individuals who drop out are mainly due to death, emigration and long-term incarceration, we are able to work with large balanced panels of individuals.

Given the assumptions of the econometric framework presented in the previous section, it is important to make sure that the sampling design of our groups is exogenous to some extent. That is, the mechanism used to form the samples should be independent of the behavior that the economic model attempts to explain. Because we aim to estimate structural state dependence in social assistance, we need to be able to argue that the process of being a social assistance receiver does not affect the transition from being single to living together with a partner. If that were the case, it would lead to inconsistent estimates due to selection bias. Although Biewen (2009) presents empirical evidence that, in Germany, there are feedback effects between household composition and poverty, we will argue that, in Sweden, the transition from being single to living together with a partner might have very little or no effect on receiving social assistance.

First, we do not focus on poverty. We focus on social assistance, which might be related to poverty but which works under different behavioral models. As already mentioned in Section 2, in Sweden, the potential monthly screening of a household's income, savings and assets is expected to stop many households that are under poverty line from applying for social assistance. However, during the 1990's, a large part of the recipients of social assistance are of working-age and healthy; they are unemployed and sometimes participating in introductory programs for immigrants, or other kinds of activation programs. Very few of the recipients are working poor (Giertz, 2004). Moreover, due to the economic crisis that made the conditions for social assistance eligibility harder, fewer people received social assistance than would have been the case under the previous more generous conditions. It would be problematic to state that poverty has decreased during the analyzed decade.

Second, our focus on singles rules out the argument that poor economic conditions for the household might also lead to stresses and conflicts within the household that could lead the couple to split up, which can lead to further poverty. This potential feedback effect is particularly problematic in dynamic discrete choice models because the explanatory variables in those models are required to be strictly exogenous. We argue that feedback effects are a minor problem in our analysis within the given design.

The econometric model described in Section 3 controls for the initial conditions problem by estimating a univariate probit model for the observed initial year, allowing its error term to freely correlate with the error terms of the participation equation. This is basically a selection model, which requires an instrument to best secure the identification of the parameter related to the parameter associated with the lagged dependent variable in the participation equation. The equation for the initial conditions therefore requires an exclusion restriction, which is to say that it needs to contain some exogenous variation that does not appear in the participation equation. Heckman (1981c) expressed this as including as much pre-sample information as possible in the initial conditions equation. In the previous dynamic welfare participation literature, surprisingly few studies use or have access to instruments in their analysis, and therefore base their identification on the non-linearity of the functional form assumption. Cappellari and Jenkins (2008) are an exception to this limitation, and they used variables related to family background as such an instrument. In our analysis, we have access to information about previous, out-of-sample social assistance use and include five indicator variables as instruments that control for social assistance use up to five years in the past. The results in Andrén and Andrén (2013) indicate that structural state dependence loses its significance after three years for both Swedish- and foreign-born individuals. It is therefore believed that our set of instruments serves its purpose well.

5 Results

Tables 1a and 1b presents the results from the dynamic discrete choice model for Swedish- and foreign-born singles with respect to the participation equation, while the estimated coefficients for the initial conditions equations are reported separately in Table A4 in the Appendix. The sole purpose of the initial conditions equation is to

control for the endogenous initial time period, and hence, we place less attention on the estimated parameters for those equations in the result discussion here. However, it is worth mentioning that most of the estimated parameters in the initial conditions equations are statistically significant for both Swedish- and foreign-born singles. The set of variables of particular interest is related to the instruments used in the model, which consists of pre-sample information related to social assistance use. For the Swedish-born singles, all parameters for the instruments are statistically significant different from zero, which implies that there is a strong statistical association between the propensity to receive social assistance at the observed first time period and previous experience several years back in time. Hence, the initial conditions equations play an important role here, hedging the endogeneity caused by those with previous out of sample experience. For the foreign-born singles, the situation is somewhat different. The estimated instrumental parameters related to social assistance use, three and four years back in time, lose its statistical significance. Yet, the last instrumental variable related to experience more than five years back in time is positive, large and statistically significant, which indicates that the dependency of previous use of social assistance on the propensity at time t is strong and long lasting. The estimates for the covariances between the error term of the initial conditions equation and the corresponding error term for the participation equation are all significantly different from zero, except for the Swedish-born singles where covariance between the first and the second time period is estimated with less precision.⁸

The more important results in this study are to be found in table 1 which are estimates for the parameters in the participation equations. These estimates indicate how different factors affect the propensity to receive social assistance at time t . However, we have a special interest in how the transition from being single to living with a partner affects the propensity in general, and the structural state dependence in particular, and to what extent it differs for a single person to form a couple with a Swedish-born or a foreign-born partner. We are also interested in whether these effects are different for men and women. Therefore, we have included a number of interaction terms in the

⁸ The estimated covariances may be received on request.

variable specification of the participation equation to account for those effects, rather than estimating separate equations for each case of household configuration.⁹

The estimates presented in Table 1a can be used to determine the marginal index effect on the propensity to live on social assistance for different factors other than those related to forming a couple. For Swedish-born singles, the signs of the estimated parameters are in line with what is expected and show for instance that an increase in the educational level reduces the chance of living on social assistance, while being unemployed at time t increases the same propensity.

Table 1b presents the estimates for various interaction terms between gender and a partner's country of birth and/or previous experience of receiving social assistance, which can be used to retrieve the effects of living together with a partner. The upper part of table 1b presents the estimates related to living with a partner, who is either Swedish-born (*SB*) or foreign-born (*FB*). To determine if the effect differs between men and women, the partner's country of birth variables (*SB* and *FB*) are interacted with an indicator variable for being a woman (*W*). *SB* equals one if the single person starts to live with a Swedish-born person, and zero otherwise; and *FB* indicates if the single person starts to live with a foreign-born person.¹⁰

For Swedish-born singles, the parameter for *SB* is negative and statistically significant, which indicates that the propensity to live on social assistance is reduced for Swedish-born single males who start to live with a *SB* partner compared to the state of being single. The estimate for the interaction term $W \times SB$ is also negative and statistically significant, indicating that the propensity to live on social assistance is reduced even further for Swedish-born single women who started to live together with a Swedish-born partner. Hence, for Swedish-born singles, starting to live together with a Swedish-born partner reduces the propensity to receive social assistance for both men and women, but the effect is stronger for women.

⁹ From the index functions in the participation equations we can form marginal index effects from the index function differences. If we are interested in the effect from forming a couple with a Swedish born person we may create the following index function difference: $X_{1iB} - X_{0iB} = B_1 + B_2W + B_3Lag(SA) + B_4WLag(SA)$, where X_{1iB} is the index function with $SB=1$ and X_{0iB} is the same index function with $SB=0$. Using this expression we can illustrate how the effects look like when the single individual has previous experience of social assistance compared to the case with no such experience for both single men and women.

¹⁰ We have only data on heterosexual couples which means that if a single male couple with a Swedish born partner, it should be understood to be a female partner, and vice versa.

The parameter for FB is positive but not significantly different from zero, indicating that there is no effect on the propensity to receive social assistance for Swedish-born single men who forms a couple with a foreign-born woman. However, single women obtains a statistically significant lower propensity to receive social assistance than men. Interestingly, for the Swedish-born women, the reduction in propensity to receive social assistance is much smaller if they start to live with a foreign-born man compared to the case when the partner is born in Sweden.

Until now we have assumed that the single individual have no previous experience of social assistance. It is quite likely that the effects of forming a couple are different when the single individual has previous experience of social assistance. It might have an effect on what person the single individual will be able to form a couple with.

The lower part of Table 1b presents estimates of interaction effects between starting to live with either a SB-partner or FB-partner and previous experience of social assistance (i.e., $Y_{t-1} \times SB$ and $Y_{t-1} \times FB$) as well as estimates of these two interaction terms with an indicator variable for being a woman (i.e., $Y_{t-1} \times SB \times W$ and $Y_{t-1} \times FB \times W$). None of these four parameters are statistically significant for the group of Swedish-born singles. This implies that previous receipt of social assistance have no additional effect on the propensity to receive social assistance that comes from forming a couple for either men or women. This is somewhat surprising since living together with someone potentially implies two sources of incomes, which should have a reducing effect on the propensity to live on social assistance on average. However, looking at the point estimates of the marginal index effects, it is in reverse, all though not statistically significant.

Turning to the related issue of structural state dependence. The discussion so far indicates that this measure is unaffected when Swedish born singles form of a couple. There is still an effect though, even if it is independent of forming couple, and it is different in size for single men and women born in Sweden. The results in table 1b indicates that the marginal index effect for the structural state dependence is significantly lower for women than it is for men.

We now turn to results for the foreign-born singles. As we already learned from the previous sections, there are major differences between Swedish-born and foreign-

born individuals in terms of social assistance use, and this is confirmed by our estimates reported in Tables 1a and 1b. Almost all parameters reported in Table 1a are significantly different from zero, and their signs are as expected. For instance, focusing on the set of factors that are specific for the foreign-born group, coming from a refugee country implies a higher propensity for social assistance. Compared to singles born in a Nordic country, being single born in a non-European country is associated with a larger propensity for social assistance, while an origin from Western and southern Europe is associated with a slightly lower propensity for social assistance. As expected, more years in Sweden implies a reduced propensity for social assistance.

Turning to the partner related effects reported in Table 1b, both parameters related to single men starting to live with a partner (SB partner or FB partner) are significantly different from zero. When a foreign-born man started to live together with a Swedish-born woman it is associated with a significantly lower marginal index effect on the propensity to receive social assistance, while the effect is in the opposite direction if the same man would live with a foreign-born woman.

These results might suggest that women's preferences are directed towards relatively wealthy men, where foreign-born women have a significantly lower threshold than Swedish-born women. It might also be the case that Swedish-born women have knowledge and/or networks that makes it easier for their foreign-born partner to access and integrate on labor market.

The effect is somewhat different for FB-single women. For them, forming a couple with a Swedish-born man is associated with a significantly reduced effect on the propensity to live on social assistance compared to staying single, and this effect is significantly different from that of FB-men. Interestingly, living together with a foreign-born man also reduces the propensity to receive social assistance, but not to the same extent as when forming a couple with a Swedish-born man. Hence, different pools of household types are associated with different degrees of social assistance use, and the transition from being single to live with a partner clearly affects the foreign-born men and women differently. For foreign-born single men, there is an increased risk of receiving social assistance when starting to live together with a Foreign-born partner. Nonetheless, it appears more beneficiary for foreign-born individuals to live together with a Swedish-born partner. The rationale behind this might be that the Swedish-born

partner has a network and/or information that facilitate an easier/faster access to integration in the Swedish labor market and society in general, and therefore reducing the need for financial relief.

The discussion so far is related to foreign-born singles with no previous experience of social assistance. To take into account previous experience, we need to incorporate the interaction terms presented in the upper part of Table 1b as we did for the Swedish born singles. In contrary to the estimates for the Swedish-born singles, some of these interaction effects are significantly different from zero (i.e., $Y_{t-1} \times SB$ and $Y_{t-1} \times SB \times W$), which means that the benefits from living with a partner in terms of reduced propensity to receive social assistance is affected. However, the significant effects are only related to those foreign-born singles that form a couple with a Swedish born partner.

The estimates indicates that the marginal index effect for foreign-born single men becomes even stronger, exceeding in size the effect with no previous experience. The rationale behind this could be that foreign-born singles with previous experience of social assistance is a much weaker group financially compared to those with no such experience. Therefore, when finding a partner the relative effect is much stronger, which turn out to be the case when the partner is a Swedish-born women.

For foreign-born single women, the effect works in the opposite direction and implies that the propensity to receive social assistance increase slightly compared to the case with no previous experience of social assistance. These differences can in general be related to how men and women form couple.

We now turn to the estimates for the structural state dependence for foreign born singles, and the results are presented in the upper part of Table 1b. Starting with foreign born singles that stay single during the whole period between 1990 and 1999 the marginal index effect is large and significant (1.5). The interaction term between the lagged dependent variable and the indicator variable for women, indicates that the structural state dependence for FB-single women is the same for men and women.

The remaining interaction terms in the upper part of table 1b indicates how the structural state dependence change for foreign born singles when they find a partner. As mentioned earlier the structural state dependence is only affected when the foreign-born single form a couple with a Swedish-born individual. When a single man form a couple

with a Swedish born woman, the structural state dependence is reduced significantly, while if the single person is a women, the point estimate indicates that the structural state dependence is slightly greater than it is for being a single.

Conclusions

In this study we estimated a dynamic random effects probit model for the propensity to live on social assistance for Swedish- and foreign-born singles during the 1990s, controlling for unobserved heterogeneity and the initial conditions problem.

During this decade, when the Swedish welfare system was calibrated to handle the shocks of the country's heaviest recession, some of the singles in 1990 decreased their propensity to live on social assistance (e.g., foreign-born women and foreign-born men), more than others (e.g., Swedish-born women and men, who have almost the same rate of social assistance during the recession years). Therefore, we analyzed how the propensity for social assistance in general and the structural state dependence in particular are affected when singles started to live together with a partner.

Our results indicates that finding a partner to live with reduce the propensity to receive social assistance for both Swedish-born and foreign-born women, while the effect is mixed for men. For Swedish-born men, there is no change in the propensity for social assistance when forming a couple with a foreign-born woman, but for foreign-born men the propensity to receive social assistance increases. Overall, the propensity is reduced for all groups when forming a couple with a Swedish born partner.

The estimates of the structural state dependence for Swedish-born singles indicate that it is unaffected by the event of living together with a partner, but the effect is significantly lower for women than for men. For the foreign-born singles, the picture is somewhat different. The state dependence for those who stay single the whole period is equally strong for men and women and almost not affected when the foreign-born single started to live together with a foreign-born partner. The state dependence increases to some extent for foreign-born singles, but it decreases when foreign-born single men live together with a Swedish-born woman

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Tables and Figures

Table 1a Social Assistance Participation equation estimates, by sample

	Swedish-born				Foreign-born					
	Single 1990		Single 1991-99		Single 1990		Single 1991-99			
	CE	SE	CE	SE	CE	SE	CE	SE		
Age _t /100	-0.080	(0.114)	-0.473	(0.951)	-0.089	(0.097)	-0.375	(0.122)	***	
Educational level _t (CG: Low)										
Secondary	-0.286	(0.021)	***	-0.276	(0.025)	***	-0.159	(0.016)	***	
Post-secondary, or more	-0.739	(0.035)	***	-0.680	(0.043)	***	-0.388	(0.024)	***	
Children at home _t	0.059	(0.015)	***	0.053	(0.023)	**	0.087	(0.008)	***	
City region _t	-0.030	(0.026)		-0.014	(0.031)		-0.041	(0.018)	**	
Municipality characteristics _t (%)										
Social assistance recipient	0.643	(0.073)	***	0.660	(0.087)	***	0.530	(0.051)	***	
Unemployed	-0.180	(0.067)	***	-0.208	(0.079)	***	-0.046	(0.054)	***	
Unemployed _t	0.435	(0.018)	***	0.477	(0.024)	***	0.294	(0.013)	***	
Country of origin (CG: Nordic)										
Western Europe					-0.095	(0.029)	***	-0.088	(0.035)	**
Eastern Europe					0.002	(0.037)		0.011	(0.049)	
Southern Europe					-0.088	(0.035)	**	-0.140	(0.046)	***
Middle East					0.263	(0.033)	***	0.203	(0.047)	***
Rest of the world					0.147	(0.026)	***	0.089	(0.034)	***
Years in Sweden (CG: 0-4 years)										
5 – 9					-0.094	(0.020)	***	-0.117	(0.028)	***
10 – 14					-0.117	(0.024)	***	-0.111	(0.032)	***
15 – 22					-0.147	(0.025)	***	-0.155	(0.033)	***
>22					-0.250	(0.026)	***	-0.257	(0.034)	***
Refugee					0.063	(0.024)	***	0.095	(0.035)	***

Note 1: CE = Coefficient estimates; SE = Standard errors; ***, ** and * indicates statistical significance at the 1%, 5% and 10% level. Note 1 holds for all other tables in the paper that contain the explained notations.

Table 1b Participation equation estimates, by sample

	Swedish-born				Foreign-born			
	Single 1990		Single 1991-99		Single 1990		Single 1991-99	
	CE	SE	CE	SE	CE	SE	CE	SE
Woman (W)	-0.042	(0.025) *	-0.090	(0.028) ***	-0.148	(0.021) ***	-0.136	(0.023) ***
Women with children $_t$	0.239	(0.036) ***	0.303	(0.049) ***	0.161	(0.026) ***	0.231	(0.038) ***
SB-partner (SB_t)	-0.284	(0.046) ***			-0.363	(0.044) ***		
FB-partner (FB_t)	0.102	(0.086)			0.089	(0.027) ***		
Woman with SB-partner ($SB_t \times W$)	-0.250	(0.064) ***			-0.186	(0.066) ***		
Woman with FB-partner ($FB_t \times W$)	-0.328	(0.148) **			-0.408	(0.044) ***		
Structural state dependence in SA								
Y_{t-1}	1.580	(0.043) ***	1.525	(0.049) ***	1.458	(0.034) ***	1.491	(0.039) ***
$Y_{t-1} \times W$	-0.188	(0.035) ***			0.040	(0.025)		
$Y_{t-1} \times SB_t$	-0.124	(0.078)			-0.186	(0.082) **		
$Y_{t-1} \times FB_t$	-0.040	(0.180)			-0.047	(0.038)		
$Y_{t-1} \times SB_t \times W$	0.154	(0.144)			0.275	(0.138) **		
$Y_{t-1} \times FB_t \times W$	0.065	(0.334)			0.100	(0.069)		
Time-dummies	Yes		Yes		Yes		Yes	
Mean Log-likelihood	-1.200		-1.375		-2.407		-2.351	
Number observations	127360		82370		126430		79040	
Number persons	12736		8237		12643		7904	

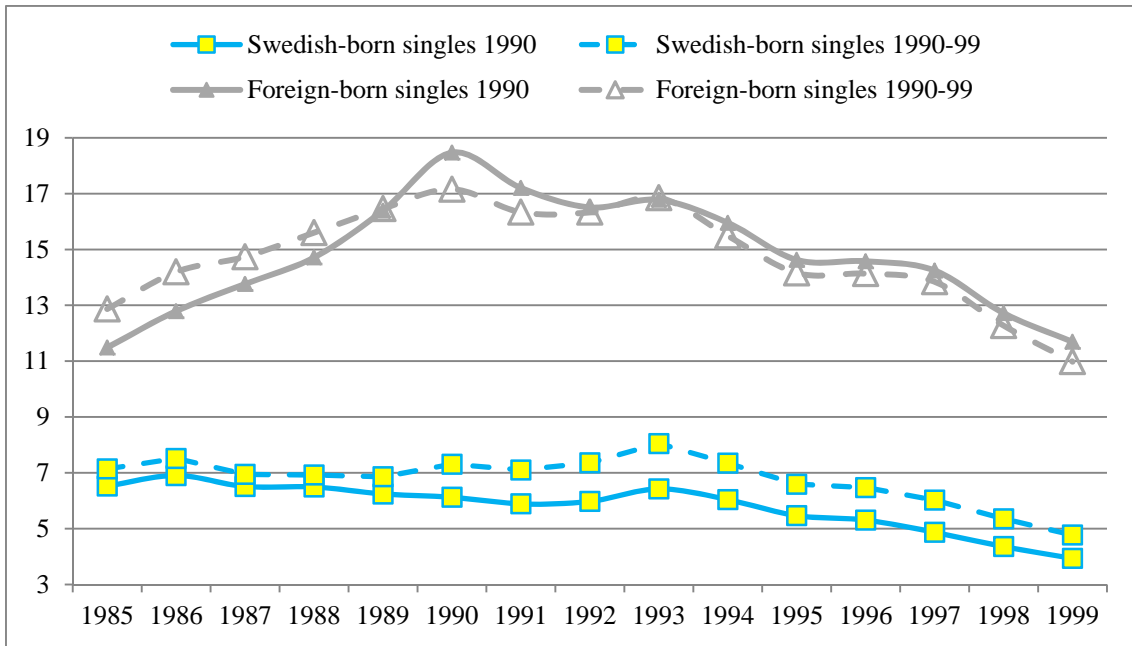


Figure 1 Social assistance rate of singles 1985-99, our samples

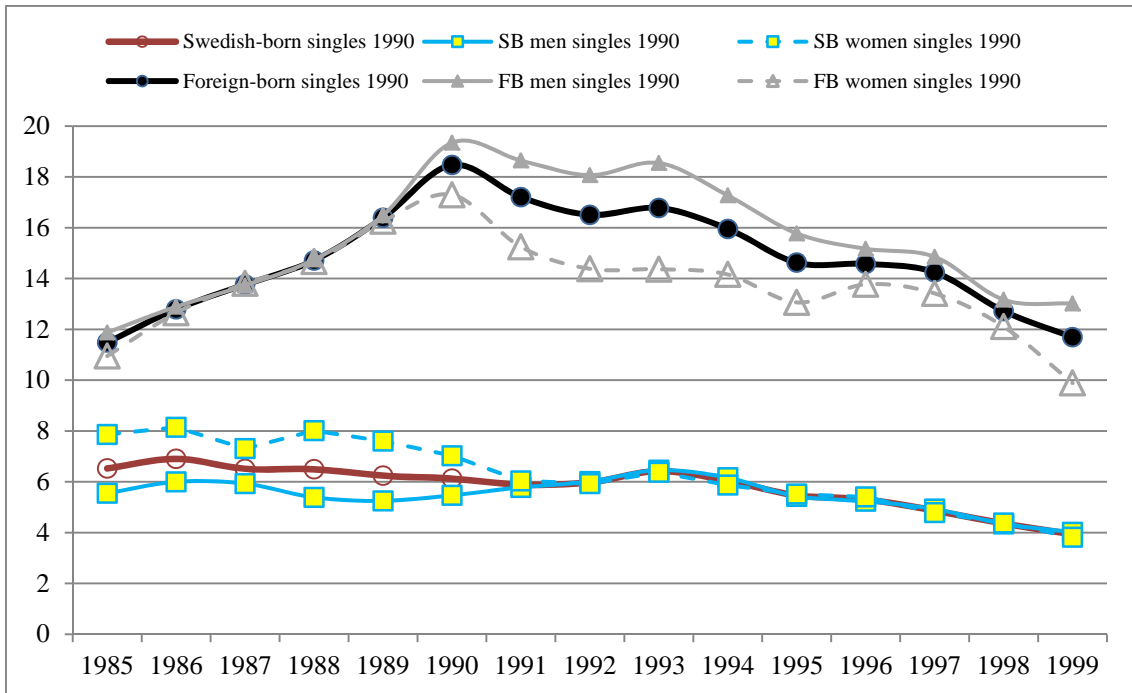


Figure 2 Social assistance rate 1985-99, SB and FB Singles 1990, woman and men

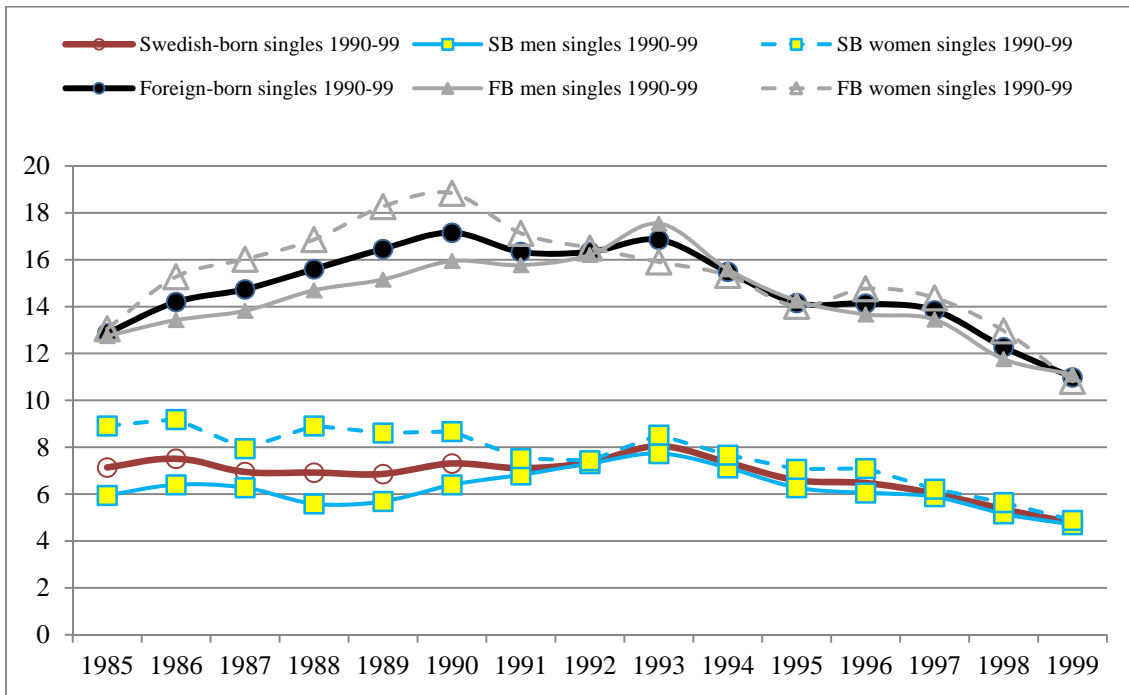


Figure 3 Social assistance rate 1985-99, SB and FB Singles 1990-99, woman and men

Appendix

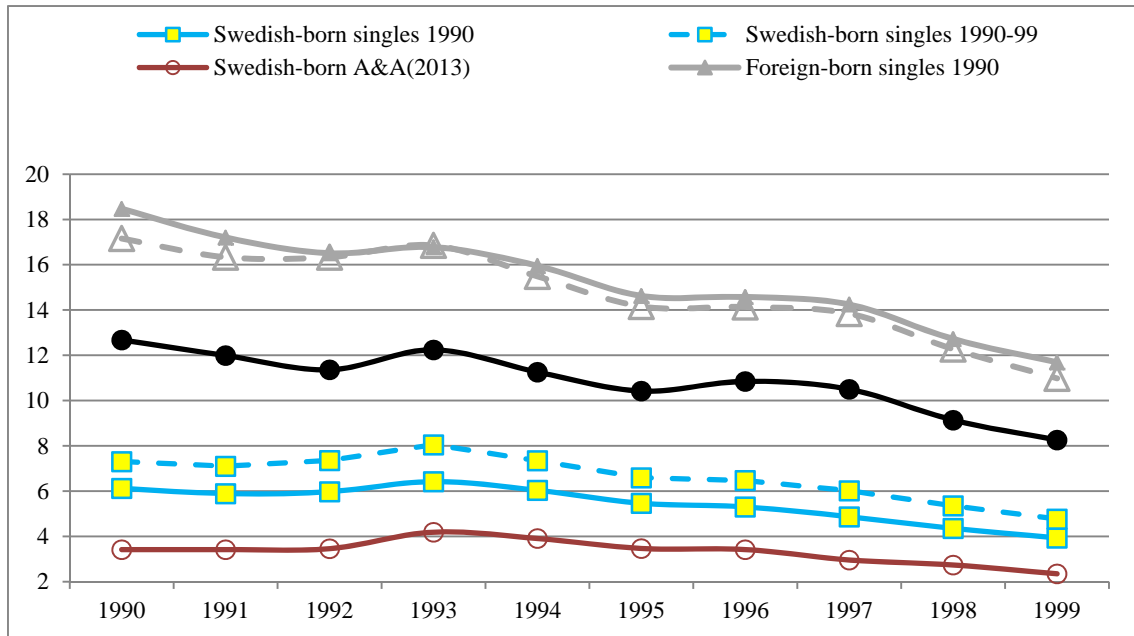


Figure A1 Social assistance rate 1985-99, A&A(2013) samples and our samples

Table A1 Mean observable characteristics in 1990, by sample

	Swedish-born		Foreign-born	
	Single 1990	Single 1990-99	Single 1990	Single 1990-99
Social assistance recipient (%)	6.12	7.31	18.47	17.16
Unemployed (%)	8.36	8.33	9.25	9.41
Age (in years)	31.14	32.39	33.29	34.56
Children at home	0.20	0.19	0.38	0.30
Educational level (%)				
Primary	26.97	29.99	57.91	54.42
Secondary	54.46	53.60	31.59	34.46
Post-secondary, or more	18.57	16.41	10.50	11.12
City region (%)	30.21	29.83	38.20	39.22
Municipality characteristics				
Social assistance recipient (%)	4.11	4.12	4.51	4.53
Unemployed (%)	1.33	1.34	1.25	1.24
Years in the country in 1990 (%)				
0 – 4			30.94	22.89
5 – 9			12.57	12.46
10 – 14			14.02	15.25
15 – 22			22.87	26.66
>22			19.60	22.75
Country of origin (%)				
Nordic countries			43.25	49.63
Western Europe			9.29	9.88
Eastern Europe			9.00	8.89
Southern Europe			8.33	8.41
Middle East			13.64	8.27
Rest of the world			16.50	14.90
Refugee			35.62	30.01
Sample size	12736	8237	12643	7904

Table A2 Social assistance recipient (%) 1985-1999, Swedish-born singles

	Singles 1990			Singles 1990-99		
	All	Men	Women	All	Men	Women
1985	6.52	5.55	7.86	7.14	5.95	8.91
1986	6.90	6.00	8.14	7.51	6.40	9.19
1987	6.51	5.93	7.31	6.94	6.28	7.94
1988	6.49	5.39	8.01	6.92	5.59	8.91
1989	6.24	5.25	7.60	6.86	5.69	8.61
1990	6.12	5.47	7.03	7.31	6.40	8.67
1991	5.89	5.78	6.04	7.10	6.82	7.52
1992	5.98	6.01	5.93	7.36	7.31	7.43
1993	6.42	6.46	6.37	8.05	7.73	8.52
1994	6.04	6.16	5.87	7.34	7.13	7.67
1995	5.46	5.43	5.52	6.59	6.28	7.06
1996	5.31	5.24	5.40	6.47	6.05	7.10
1997	4.87	4.92	4.79	6.02	5.89	6.22
1998	4.36	4.34	4.38	5.35	5.16	5.64
1999	3.93	4.02	3.82	4.77	4.70	4.88
Sample size	12736	7370	5366	8237	4940	3297

Table A3 Social assistance recipient (%) 1985-1999, Foreign-born

	Singles 1990			Singles 1990-99		
	All	Men	Women	All	Men	Women
1985	11.49	11.88	10.95	12.87	12.75	13.06
1986	12.79	12.89	12.65	14.20	13.43	15.27
1987	13.76	13.73	13.81	14.74	13.82	16.02
1988	14.71	14.75	14.66	15.60	14.70	16.86
1989	16.39	16.49	16.25	16.46	15.16	18.27
1990	18.47	19.34	17.30	17.16	15.94	18.84
1991	17.20	18.64	15.24	16.33	15.77	17.13
1992	16.51	18.07	14.38	16.33	16.21	16.50
1993	16.78	18.55	14.37	16.85	17.54	15.90
1994	15.95	17.27	14.16	15.49	15.59	15.33
1995	14.63	15.77	13.06	14.16	14.26	14.02
1996	14.58	15.17	13.77	14.13	13.67	14.77
1997	14.25	14.85	13.41	13.84	13.45	14.38
1998	12.72	13.17	12.11	12.27	11.76	12.97
1999	11.69	13.02	9.89	10.98	11.10	10.81
Sample size	12643	7283	5360	7904	4565	3339

Table A1 Estimates for initial-conditions equation, by sample

	Swedish-born						Foreign-born					
	Single 1990			Single 1990-99			Single 1990			Single 1990-99		
	CE	SE		CE	SE		CE	SE		CE	SE	
Constant	-1.879	(0.133)	***	-1.535	(0.456)	***	-0.980	(0.100)	***	-0.743	(0.128)	***
Age/10	-0.632	(0.274)	**	-1.795	(2.826)		-0.870	(0.217)	***	-1.679	(0.272)	***
Educational level												
Secondary	-0.273	(0.048)	***	-0.246	(0.057)	***	-0.240	(0.044)	***	-0.190	(0.053)	***
Post-secondary, or more	-0.684	(0.098)	***	-0.686	(0.117)	***	-0.456	(0.091)	***	-0.436	(0.114)	***
Woman	-0.133	(0.060)	**	-0.176	(0.072)	**	-0.208	(0.044)	***	-0.053	(0.055)	
Women with children	0.257	(0.099)	***	0.328	(0.123)	***	0.055	(0.063)		0.178	(0.094)	*
Children at home	0.151	(0.049)	***	0.212	(0.060)	***	0.213	(0.022)	***	0.198	(0.040)	***
City region	0.065	(0.067)		0.117	(0.079)		-0.171	(0.040)	***	-0.157	(0.052)	***
Municipality characteristics (%)												
Social assistance recipient	0.502	(0.240)	**	0.369	(0.280)		0.266	(0.143)	*	0.275	(0.183)	
Unemployed	-0.087	(0.386)		-0.330	(0.443)		0.877	(0.249)	***	0.674	(0.317)	**
Unemployed _t	0.450	(0.059)	***	0.474	(0.072)	***	0.282	(0.044)	***	0.348	(0.055)	***
Social assistance recipient												
1985	0.290	(0.068)	***	0.316	(0.080)	***	0.333	(0.052)	***	0.332	(0.063)	***
1986	0.252	(0.070)	***	0.205	(0.083)	**	0.040	(0.053)		0.059	(0.065)	
1987	0.252	(0.067)	***	0.316	(0.080)	***	0.020	(0.049)		0.072	(0.064)	
1988	0.393	(0.062)	***	0.463	(0.074)	***	0.136	(0.044)	***	0.195	(0.058)	***
1989	1.138	(0.059)	***	1.074	(0.072)	***	1.088	(0.038)	***	1.038	(0.050)	***

Note: The variable specification of the equations for Foreign-born includes also groups of dummies for country of birth and years in Sweden, the same as the one reported in the table of estimates for participation equation.