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ABSTRACT

State Dependence in Welfare Receipt: Transitions Before and After a Reform

We study state dependence in welfare receipt and investigate whether welfare transitions changed after a welfare reform. Using data from the German Socio-Economic Panel, we apply dynamic multinomial logit estimators and find that state dependence in welfare receipt is not a central feature of the German welfare system. We find that welfare transitions changed after the reform: transitions from welfare to employment became more likely and persistence in welfare and inactivity declined. We observe a large relative increase in transitions from employment to welfare. Immigrants' responsiveness to the labor market situation increased after the reform.

JEL Classification: I38, J61

Keywords: social assistance, state dependence, unemployment benefit II, immigration, dynamic multinomial logit

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1 Introduction

In many countries, prolonged and repeated periods of welfare receipt cause political debates about the regulation of welfare systems. Not surprisingly, recent decades saw governments reforming their welfare systems to reduce persistence in welfare receipt. Two mechanisms may cause persistence in welfare receipt (Heckman 1981). First, previous welfare receipt can have a causal effect on subsequent receipt by changing the recipient's preferences or constraints. This mechanism is referred to as true state dependence (Heckman and Borjas 1980). Second, observed or unobserved individual characteristics that are not changed by previous welfare receipt may affect the probability of welfare receipt. If these characteristics hold up over time, we will also observe persistence in welfare receipt. This mechanism is referred to as spurious state dependence.

Knowledge about the causes of persistence in welfare receipt is important for governments (see, e.g., Prowse 2012, Könings 2014): efficient policy responses differ in situations where persistence can be fully explained by individual characteristics and situations with true state dependence. In the former case, welfare-to-work programs that emphasize, for example, job search or wage subsidies will hardly have long-term effects as long as individual characteristics remain unchanged. In a situation of true state dependence, these programs can have an impact on labor market states even after the programs ended because the state dependent impact of experiencing welfare receipt can be avoided or shortened.

This paper studies the structural determinants of welfare transitions by scrutinizing the degree of true state dependence in the German welfare system. We are particularly interested in true state dependence as an indicator of the extent to which the experience of past welfare receipt causally affects subsequent welfare receipt. Using data from the German Socio-Economic Panel Study (SOEP), we estimate dynamic multinomial logit models to study transitions between three labor market states (welfare receipt, employment, inactivity). Our results show little evidence of true state dependence. We find that transition patterns changed after a substantial welfare reform

that came into effect in 2005: transitions to employment became more likely and persistence in welfare and inactivity declined. We observe a large relative increase in transitions from employment to welfare. Among immigrants, welfare persistence and welfare-to-employment transitions became more responsive to the labor market after the reform.

Our study of welfare transitions ties in with an international literature on state dependence in welfare receipt which typically applies dynamic discrete choice models. Closest to ours is the contribution by Hansen and Lofstrom (2009) who use data on Swedish men to study the transition between welfare receipt, unemployment, and employment. They find higher state dependence among immigrants than natives. Hansen and Lofstrom (2011) separately study welfare exit and entry of Swedish natives and immigrants and find that the difference in welfare receipt between natives and immigrants results from differences in entry to rather than in exit from welfare. In the literature on welfare state dependence, Hansen et al (2014) analyze Canadian welfare participation and Chay et al (2004) focus on Californian data. Both studies find true state dependence in welfare receipt which varies across population groups. This is confirmed for the case of the U.K. by Cappellari and Jenkins (2008), who find evidence for state dependence but point to its heterogeneity across subsamples.

Furthermore, there is a related international literature on the consequences of welfare reforms for recipient behaviors. Following the 1996 reform of the U.S. federal welfare program, studies addressed a variety of outcomes (for a survey, see Blank 2002), among them the propensity to take up work (e.g., Grogger and Karoly 2005), responses to time limited eligibility, and the relevance of the macroeconomy for labor force participation (Bitler and Hoynes 2010, Ziliak et al 2000). Blank (2002) summarizes evidence of substantial changes in welfare transition patterns in response to the U.S. welfare reforms.[1]

[1] For evidence on reforms in the U.K., Sweden, and Canada see, e.g., Brewer et al. (2006), Edmark (2009), and Fortin et al. (2004).

Some recent studies consider the determinants and dynamics of welfare receipt in Germany. Riphahn and Wunder (2013) compare the characteristics associated with benefit receipt among natives and immigrants and provide a non-parametric study of the groups' respective life cycle trajectories of benefit receipt. However, the paper does not look at state dependence and does not provide a dynamic analysis of the situation before and after the reform. Wunder and Riphahn (2014) model dynamics in welfare receipt using data for the years after the welfare reform in 2005. The study finds substantial differences between immigrants and natives but little evidence for true state dependence. Finally, Königs (2014) analyzes state dependence in social assistance before and after the reform. However, he does not discuss immigrant-native differences. Other studies also explore the connection between welfare reform and the labor market. While Burda and Hunt (2011) see employer expectations, wage moderation, and working time accounts as the key factors behind the German "job miracle" at the end of the last decade, SVR (2011) discuss the role of the welfare reform.[2]

This study contributes to the international literature by providing a comprehensive picture of state dependence in welfare receipt in Germany. First, we extend the literature on welfare transitions that uses standard bivariate estimation approaches (e.g., Cappellari and Jenkins 2009, Hansen et al 2014, Königs 2014) by using a three-state categorization of labor market states: we not only use a clear-cut distinction between welfare recipients and non-recipients. Additionally, we take account of the heterogeneity of non-recipients by splitting the group of non-recipients according to the most conspicuous distinguishing characteristic, i.e. employment status, into employed non-recipients and non-employed non-recipients. In this way, the three-state categorization allows us to differentiate alternative pathways in and out of welfare benefit receipt, as

[2] Fahr and Sunde (2009) and Klinger and Rothe (2012) find that the early Hartz Reforms significantly improved the efficiency of labor market matching, benefiting particularly the long term unemployed. Several studies evaluated the effects of elements of the reform packages (e.g., Huber et al 2011). Caliendo and Hogenacker (2012) summarize that labor market institutions became more efficient and work incentives for the unemployed increased after the reform.

we observe whether welfare recipients are able to take up employment or whether they leave the welfare program without finding employment.

Second, we present separate analyses of transitions before and after the recent reform. The welfare reform introduced considerable changes to the unemployment insurance and the minimum income protection scheme. Since the reform aimed at strengthening work incentives and introduced active job search requirements for benefit eligibility, one might expect that welfare entry and exit changed with the reform. We discuss whether changes in transition patterns may reflect the reform agenda.

Third, we examine heterogeneities in welfare transitions for immigrants and natives, as the literature shows that the patterns of welfare receipt differ for these groups (Barrett and McCarthy 2008). In doing so, we add to the international discussion of heterogeneous response patterns across population subgroups. Particularly in countries with a large immigrant population, it is important to understand the difference in responses to incentive mechanisms between natives and immigrants.

Finally, we contribute to the literature on the connection between individual welfare transitions and aggregate labor market conditions (e.g., Hoynes 2000 and Hoynes et al. 2012). Hoynes (2000) showed the close connection between unemployment and welfare receipt in the United States between 1987 and 1992 when welfare recipients strongly responded to job opportunities and wage growth.

This paper is structured as follows. In section two, we summarize the institutional framework and the key reform elements that might affect state dependence. Section three describes the data and section four the empirical approach. The results are shown in section five and section six presents concluding remarks.

2 Institutions

In response to increasing unemployment rates the German government implemented far-reaching reforms which changed the welfare and the unemployment insurance system (Schneider 2012, Boockmann et al 2015). Because it cut back on some claims against the welfare state the reform received substantial public attention and opposition. Next, we describe the German welfare system before and after the reform and discuss why welfare transitions might have changed. Then, we briefly describe the situation of immigrants.

In case of unemployment, workers are generally covered by the unemployment insurance. Unemployment benefits (*Arbeitslosengeld*) replace up to 67% of previous net earnings. The reform reduced the maximum duration of benefit payment from 32 to 24 months. The benefit is now labeled unemployment benefit I (UB I). Prior to the reform, those who had exhausted their unemployment benefit entitlement and those who were not (yet) entitled to unemployment benefits were eligible for unemployment assistance (*Arbeitslosenhilfe*), a tax-financed means-tested transfer. Unemployment assistance replaced up to 57% of prior net earnings and was available without a time limit. Also, prior to the reform, households could claim social assistance (*Sozialhilfe*) if their total income—independent of its source—fell below the legally defined subsistence level. Social assistance was a means-tested program that, in case of need, could also be paid in addition to labor earnings and unemployment benefits.

The reform then combined unemployment assistance and social assistance in the so-called unemployment benefit II (UB II), a means-tested and tax-financed benefit. Households in need of support may be eligible for UB II, independent of whether their members are employed, receive UB I, or exhausted their UB I eligibility. The benefit covers the legally defined minimum income and is not related to prior earnings. Households in need can claim UB II if their adult members are able to work at least 15 hours per week. If the household members are not able to work,

e.g., due to sickness or disability, the household is—as before—entitled to social assistance. The means test is administered at the household level.

The reform came into effect in January 2005 as one element of a wider reform project. The reform project had several objectives: (a) to improve the effectiveness and efficiency of labor market services. Thus, after the reform, local employment offices introduced differentiated approaches to support the unemployed at an individual level. (b) To activate the unemployed based on the idea of 'fordern and fördern', i.e., 'to assist and demand.' Since the reform, the employment offices explicitly demand individual effort and have the unemployed sign 'agreements on objectives.' At the same time search incentives were increased by shorter durations of unemployment benefit payouts and by an intensified use of sanctions. (c) Finally, labor market regulations were relaxed, e.g., with respect to employment protection, temporary employment, and temporary agency employment (Klinger and Rothe 2012, Caliendo and Hogenacker 2012). It was generally expected that all of these pathways contribute to reduce transfer dependence and to shorten periods of transfer receipt.

The reform adjusted the regulations of earnings allowances and marginal tax rates to increase work incentives (see, e.g., Dietz et al 2011, Ludsteck and Seth 2014) the maximum earnings allowance increased and marginal tax rates declined. In addition to strengthening work incentives, the reform also requires welfare recipients to actively search for jobs: all recipients of UB II have to look for a job and are obliged to discuss their search strategy with the employment office. In contrast, before the reform social assistance benefits were paid independent of labor market status and search effort. These changes may well reduce welfare persistence and state dependence in welfare.

Immigrants are treated like natives within the unemployment insurance, i.e., with respect to unemployment benefit and unemployment assistance before the reform and UB I after the reform. Their eligibility depends on the individual contribution record. The situation for immigrants is

more complex in the minimum income support programs of social assistance and UB II. Individuals without German citizenship can receive minimum income support if they are (i) permanently in Germany, (ii) physically able to work (after the reform), and (iii) potentially allowed to take up employment; the last condition excludes, e.g., asylum seekers. Ethnic Germans (*Aussiedler*) as well as naturalized immigrants are treated like natives.[3]

Prior studies show no difference in take-up behavior for natives and immigrants (see, e.g., Riphahn 2001, Frick and Groh-Samberg 2007, Bruckmeier and Wiemers 2012). However, BMAS (2009) points out that the expiration of UB I generates a substantially higher transition rate to UB II receipt among immigrant than native households: immigrant households and thus their needs are larger while their income and wealth are smaller than natives'. As the public debate about the reforms enhanced awareness of the new benefit program many observers expect a general increase in the propensity to take up benefits given eligibility (e.g., Bruckmeier and Wiemers 2012).

3 Data

Using household data from the German Socio-Economic Panel Study (SOEP) (Wagner et al 2007), we conduct separate analyses for natives and immigrants.[4] We set the immigration status of the household according to the status of the household head.[5] Since the number of immigrant households is small in East Germany, we consider only households in West Germany.[6]

We study welfare transitions before and after 2005, when the last step of the Hartz Reforms was implemented. The pre- and post-reform samples cover the years 2000 to 2004 and 2005 to

[3] Ethnic Germans are former German citizens or those belonging to the German people. After World War II, many migrated to West Germany and were granted German citizenship (Dietz 1999). Immigrants residing in Germany in order to find employment are generally not eligible for benefits. However, a long list of circumstances renders EU citizens eligible for UB II receipt even then (BMAS 2009).

[4] We use the household as the unit of analysis because (i) welfare eligibility is, to a large extent, determined by household circumstance and (ii) our data measure social assistance receipt only at the level of the household. Households are also used as the unit of analysis in a comparable study by Hansen et al (2014), for instance.

[5] This information comes from a "migration background"-indicator in the data, which considers first or second generation immigrant status independent of citizenship (for details, see, Frick and Lohmann 2010).

[6] Other studies use similar sample selection criteria to analyze differences between immigrants and natives (e.g., Kogan 2004, Riphahn 2004). For a discussion see also Schnabel (2015). In contrast, the study by Königs (2014) investigates differences between East Germany and West Germany but *not* between natives and immigrants.

2010, respectively. Households are selected if they are part of the sample in 2000 or 2005, which define the initial states.[7] Recipients of unemployment assistance and UB II are required to be able to work. Therefore, we include only household heads of working age (25-60) and exclude the disabled.

Our dependent variable classifies households into three labor market states that indicate its status at the time of the survey. In a first step, we code all households who receive welfare benefits. Before the reform, we classify a household as receiving welfare if it receives one of the means-tested benefit schemes, i.e., social assistance or unemployment assistance. After the reform, we regard households as welfare recipients if the household receives UB II. To answer our research questions it would be sufficient to classify households as recipients vs. non-recipients. However, in order to refine the analysis and to derive additional insights, we split non-recipient households in two groups: non-recipient households are labelled "employed" if the household head is employed and "inactive" otherwise. The latter group includes household heads who are out of the labor force or unemployed and who may receive unemployment insurance benefits. The rationale for defining an "inactive group" is that these households neither work nor rely on welfare benefits but instead have other non-welfare income (e.g., unemployment insurance benefits or savings).[8] It is possible that welfare receiving households have employed or unemployed heads; in both cases we code welfare receipt because earnings or unemployment benefits are topped up by welfare benefits. As we consider welfare receipt at the point of the interview we cannot distinguish short- and long-term welfare receipt.

Using weighted data to reflect the population of interest, Table 1 reports the observed annual distribution of the three labor market states for the pre-reform years 2000-2004 and the post-reform years 2005-2010. In general, welfare recipient rates are higher after the reform with a

[7] The pre- and the post-reform samples cover periods of different length. We use fewer waves for the pre-reform period than for the post-reform period in order to be able to include the SOEP innovation sample F, which started in 2000.

[8] Across all years we observe that 17% and 30% of inactive native and immigrant households have unemployed heads, respectively.

noticeable jump shortly after the reform came into effect. The increase in recipiency rates is consistent with the decrease in non-take-up after the reform found by Bruckmeier and Wiemers (2012). After the reform, we observe rising employment and falling inactivity, reflecting the positive labor market trend and falling unemployment in this period.

There are remarkable differences between immigrants and natives. The share of immigrant households receiving welfare is more than twice as large as that of natives (e.g., in 2006: 15.2% vs. 7.1%). Correspondingly, the share of immigrant households that are classified as employed is considerably lower than that of natives.

Table 2 reports labor market transitions. Persistence is evident in all states. In the total population, welfare receipt has a persistence rate of more than 70%. Patterns change slightly from before to after the reform: while the welfare exit rate to employment increases (from 18.4% to 20.3%), welfare exit to inactivity becomes less frequent (from 10.3% to 6.1%). Labor market transitions appear to be less favorable for immigrants than for natives: immigrants have a much higher risk of welfare entry and less stable employment than natives. Welfare persistence increases for immigrants (from 68.1% to 75.4%) but not for natives, and welfare exit to employment increases for natives and declines for immigrants after the reform.

Table 3 shows descriptive statistics on our control variables. We follow the literature (e.g., Hansen and Lofstrom 2009, Königs 2014) and chose parsimonious specifications that control for characteristics of the household head, of the household, and of the region. In these three groups we consider first, the household head's age, gender, education, education in Germany, marital status and health status; the number of children below and above age 6 describe the household structure, and year dummies and regional unemployment are used in some specifications to control for period and region-specific business cycle effects. We can control the pre- and post-reform subsamples for natives and immigrants based on Table 3: between the two sampling periods the share of female household heads increased and the mean number of children below age six in

the households declined. The slight increases in mean age and education reflect changes in the population. Compared to natives, immigrant household heads have less education, are more often married, and have more children.[9]

4 Estimation strategy

The conceptual framework of our analysis follows the literature and uses a dynamic discrete choice model: a household chooses the labor market state (inactivity, employment, or welfare receipt) with the highest utility. Let U_{ijt} be the utility of household i in state j at time t:

$$U_{ijt} = \boldsymbol{\beta}_j' \mathbf{x}_{it} + \boldsymbol{\gamma}_j' \mathbf{y}_{i,t-1} + \alpha_{ij} + \varepsilon_{ijt}. \tag{1}$$

Utility depends on the observed household characteristics, $\mathbf{x}_{it}$. $\boldsymbol{\beta}_j$ is a vector of alternative-specific coefficients. The coefficient vector $\boldsymbol{\gamma}_j$ captures the effect of the previous state, $\mathbf{y}_{i,t-1}$, on the current state choice. We take account of household-specific unobserved heterogeneity by including a random error α_{ij}. ε_{ijt} is an idiosyncratic error that is assumed to be independently distributed with a type I extreme value distribution.

Dynamic models of labor market state choice which allow for the presence of unobserved effects raise the problem of endogenous initial conditions: while transitions within the panel of observations are modeled, the transition to the very first observed state has no observed predecessor. We apply the conditional maximum likelihood estimator suggested by Wooldridge (2005) to solve this problem.

The specification of the Wooldridge approach models the unobserved heterogeneity α_{ij} as a function of the initial state $\mathbf{y}_{i0}$, individual-specific explanatory variables $\mathbf{x}_i$, and a new random er-

[9] In an online appendix we show further descriptive statistics by labor market and immigrant status: comparing welfare recipients and employed households, we observe small differences in the number of children while the share of married household heads is clearly smaller among welfare recipients. The share of single parents is considerably higher among welfare recipients than among households classified as inactive or employed. The figures also indicate a difference in average education between employed households and welfare recipients of two years among natives and one year among immigrants.

ror, a_{ij}, that is uncorrelated with the initial state.[10] We assume a_{ij} to be normally distributed with zero mean and variance σ_a^2, i.e., $a_{ij}|(\mathbf{y}_{i0}, \mathbf{x}_i) \sim N(0, \sigma_a^2)$. Hence, the probability that individual i is in state j at time t conditional on observed and unobserved characteristics and the labor market state in $t-1$ can be written as

$$P(Y_{it} = j|\mathbf{x}_i, \mathbf{y}_{i,t-1}, \mathbf{y}_{i0}, \boldsymbol{a}_i) = \frac{\exp(\boldsymbol{\beta}_j'\mathbf{x}_{it} + \boldsymbol{\gamma}_j'\mathbf{y}_{i,t-1} + \boldsymbol{\delta}_{j1}'\mathbf{y}_{i0} + \boldsymbol{\delta}_{j2}'\mathbf{x}_i + a_{ij})}{\sum_{k=1}^{J=3} \exp(\boldsymbol{\beta}_k'\mathbf{x}_{it} + \boldsymbol{\gamma}_k'\mathbf{y}_{i,t-1} + \boldsymbol{\delta}_{k1}'\mathbf{y}_{i0} + \boldsymbol{\delta}_{k2}'\mathbf{x}_i + a_{ik})}. \quad (2)$$

Normalizing the coefficient vectors $\boldsymbol{\beta}_1, \boldsymbol{\gamma}_1, \boldsymbol{\delta}_{11}, \boldsymbol{\delta}_{12}$, and the unobserved heterogeneity, a_{i1}, to zero for the first alternative ($k = 1$), we can estimate a dynamic multinomial logit model with random effects.[11] We use Gauss-Hermite quadrature to integrate the random effect out of the corresponding log-likelihood and estimate the remaining parameters with maximum likelihood.[12]

We use predicted probabilities for an individual randomly sampled from the population to describe state dependence in labor market transitions. To assess the incidence of true state dependence, we compare the predicted probability of welfare persistence to the predicted probability of entering welfare from inactivity.[13] Our reasoning is as follows: if true state dependence exists, then the above two probabilities will differ. Previous welfare recipients will then have a higher probability to receive welfare than previously inactive non-recipients. If true state dependence does not exist or is unimportant, then these probabilities will not be significantly different.

[10] This approach in the spirit of Mundlak (1978) and follows the literature (see, e.g., Stewart 2007, Caliendo and Uhlendorff 2008, Cappellari and Jenkins 2009). Recently, Rabe-Hesketh and Skrondal (2013) discussed an alternative specification of the estimator to avoid potential biases. We present robustness tests along these suggestions in section 5.3 below.

[11] For contributions in the literature on welfare transitions applying the Wooldridge procedure, see Cappellari and Jenkins (2009) or Hansen and Lofstrom (2011). Erdem and Sun (2001) also apply this approach.

[12] We use the Stata program -gllamm- written by Rabe-Hesketh et al (2004).

[13] We do not compare the probability of welfare persistence to the probability of entering welfare from employment because previously employed individuals are generally entitled to unemployment insurance benefits. Thus, they are expected to have a lower probability of entering welfare in the case of job loss.

The calculation of the predicted probabilites $\overline{P}$ requires integrating over the distribution of the random effect (Skrondal and Rabe-Hesketh 2009):

$$\overline{P}(Y_t = j|\mathbf{y}_{t-1}, \mathbf{y}_0, \mathbf{x}^0) = \int \hat{P}(Y_t = j|\mathbf{y}_{t-1}, \mathbf{x}^0, \boldsymbol{\alpha}) h(\boldsymbol{\alpha}|\mathbf{x}, \mathbf{y}_0; \boldsymbol{\delta}) d\boldsymbol{\alpha}, \tag{3}$$

where we set the vector $\mathbf{x}^0$ to equal the sample average of the control variables. $\hat{P}$ is the conditional probability. We assess the uncertainty of the prediction by approximate 95% confidence intervals for the predicted probabilities.[14]

5 Results

This section presents the results obtained from dynamic multinomial logit models. To answer our first and second research question about state dependence in the German welfare system and its change over time, we describe patterns of welfare transitions and highlight changes in the dynamics after the reform in section 5.1. Section 5.2 turns to third question how welfare transitions relate to labor market conditions. The discussion addresses differences between immigrants and natives. We report results on robustness checks in section 5.3.

5.1 Welfare transitions and state dependence

Tables 4 and 5 show the estimation results for the pre- and post-reform period, respectively, by subsample. The estimation results for the total population are in Table A2 in the online appendix. The positive estimates of the γ_j coefficients presented in the first rows indicate persistence in labor market states: employment in $t-1$ is associated with higher log-odds of employment in t and welfare receipt in $t-1$ is associated with higher log-odds of welfare receipt in t, both relative to inactivity.

[14] We use a parametric bootstrap approach with 1000 random draws from the sampling distribution of parameters. The procedure is available in the Stata ado-files -gllapred- and -ci_marg_mu- (Rabe-Hesketh et al 2004, Skrondal and Rabe-Hesketh 2009).

Interestingly, welfare receipt in $t-1$ is linked to higher log-odds of employment in t relative to inactivity. This suggests that the welfare system incentivizes welfare recipients to take up employment. The size and significance of the coefficient of lagged employment as a determinant of welfare receipt in period t change between the pre- and post-reform periods. While the coefficient estimate is near zero (0.07) and statistically insignificant before the reform, it is larger (0.56) and statistically significant in the post-reform period. We return to the employment-to-welfare transition in greater detail below.

The control variables in Tables 4 and 5 generally show similar patterns before and after the reform; e.g., higher education increases the log-odds of employment relative to inactivity and makes transitions to welfare relatively less likely. After the reform, the gender-specific life cycle patterns of labor market transitions are estimated more precisely. The individual-specific error term components significantly improve the model fit. The specification takes account of the potential endogeneity of health and the number of children (see variables labeled M in Tables 4 and 5). The initial labor market state as of period $t = 0$ yields highly significant coefficients, suggesting that the initial state indeed matters in explaining the current state.

Next, we discuss model-based predictions in Table 6 separately for the entire population (Panels A and B), native households (Panels C and D), and immigrant households (Panels E and F).[15] The calculations are based on separate estimations and average characteristics of the respective pre- and post-reform subsamples.[16] In part, these predictions clearly differ from the observed transitions. In particular, the predicted probabilities of welfare persistence are much lower compared to the observed probabilities, suggesting that characteristics explain welfare persistence to a large extent.[17]

[15] The estimation results for natives and immigrants are presented in the online appendix.

[16] For comparison, we also calculated predicted probabilities as the average of individually predicted probabilities. The results are similar in nature to those discussed and are presented in the online appendix.

[17] While the observed probabilities of welfare persistence are about 73% for natives, the predicted probabilities are only about 6%. Other studies report similar results. For example, Hansen and Lofstrom (2009) observe that about 66% of natives stay on welfare in consecutive years. After controlling for initial conditions and heterogeneity, their predicted probability amounts only to about 10%.

The predictions reveal four interesting results. First, they confirm the persistence in labor market states in both sample periods. The probability of each labor market state in t is highest when the household was already in that state in $t-1$. Comparing pre and post periods, we observe a decline in the probability of welfare persistence, from 8.3% to 6.0%, i.e. by 28%. Separate analyses for immigrants and natives show that the decline in welfare persistence is more pronounced among immigrants (Panels C-F).

Second, we find a clear increase in the probability of employment-to-welfare transitions, from 0.9% to 1.6% (Panels A and B). Judging from the non overlapping confidence intervals, the increase is statistically significant. The same pattern is observed for the immigrant and native samples. Although the overall risk of this transition is small, the sharp relative increase by 78 percent for the full sample is noteworthy, because we hardly observe other statistically significant changes over time. In addition, this result is remarkable because individuals are typically entitled to unemployment insurance benefits in the case of job loss (cf. section 2). Hence, one would expect that in the case of a job loss newly unemployed workers move from employment to the state of inactivity, which includes the receipt of unemployment insurance benefits. The increased risk of employment-to-welfare transitions may result from an increased propensity to take up short-term or low paid employment: short-term employment may be insufficient to generate UB I eligibility for the period after the short-term contract expired; low paid employment may not cover household needs and thus may go along with welfare benefit eligibility.

Third, the probability of a transition to employment increased after the reform; in addition, welfare-to-employment transitions are considerably more likely than inactivity-to-employment transitions. The increase in the probability of welfare exit to employment is particularly pronounced among immigrants (from 69% to 83%, Panels E and F). Among immigrants, the probability of inactivity-to-employment transition increased by approximately twenty percentage points, which is the largest absolute change. For both groups, persistence in inactivity declined

after the reform. In general, this suggests that work incentives for welfare recipients and inactive households increased and that newly introduced activation measures might be effective, particularly among immigrants. In addition, this could indicate the availability of new job opportunities.

Next, we examine to what extent the changes in transition probabilities from before to after the reform are explained by changes in characteristics. For that purpose, we simulate post-reform transition probabilities for pre-reform characteristics, i.e., we calculate transition probabilities using household characteristics for the pre-reform period and the coefficients for the post-reform period. We argue that changes in transition probabilities can be attributed to changes in characteristics if the simulated probabilities converge to those originally predicted for the pre-reform period. Changes in labor market transitions may instead be attributed to changes in coefficients if the simulated probabilities converge to those originally predicted for the post-reform period.

Comparing the simulated probabilities and the originally predicted post-reform transitions,[18] we find almost identical results for most transitions, but some differences also emerge. On the one hand, we detect similar probabilities of transitions to employment. Thus, the substantial increases in transitions to employment, particularly among immigrants, are likely due to a change of the behavior of inactive or welfare-receiving households. On the other hand, the simulated probabilities differ from the original probabilities with respect to employment-to-welfare transitions and welfare persistence. The increase in welfare entry from employment is even more pronounced for pre-reform characteristics than for post-reform characteristics. Also, simulated welfare persistence is higher compared to the predictions using post-reform characteristics. This suggests that the change in characteristics even dampens the propensities to enter and to stay on welfare. Altogether, changes in transition patterns do not appear to be driven by changes in characteristics.

[18] The simulated probabilities are in Table A10 in the online appendix. The original post-reform transitions are in Table 6, Panels B, D, and F.

5.2 Welfare transitions and labor market conditions

To address our third research question, this section investigates how welfare transitions relate to the labor market situation. Hoynes (2000) studies this relationship based on Californian administrative data. She confirms significant correlations between local labor markets, the duration of welfare receipt, and recidivism. We add state unemployment rates and their interactions with lagged labor market states to our specifications for the pre- and post-reform periods. This allows us to infer whether welfare transitions vary with labor market conditions.[19] Jointly, the three additional coefficients are statistically significant in three out of four models.

In general, the log-odds of employment decrease and the log-odds of welfare receipt increase with rising unemployment. To ease comparison between the pre- and post-reform periods, we present transition probabilities as a function of the unemployment rate graphically in Figures 1 und 2, after separate estimations for the native and immigrant subsamples.[20]

Among natives, state persistence hardly varies with the unemployment rate (Figure 1.1). Among immigrants, the curve for welfare persistence features a steeper slope after the reform (see dotted line in Figure 2.1). Thus, immigrant welfare persistence became more responsive to unemployment. Also, the downward shift of the curve indicates a general decrease in immigrants' welfare persistence.

For both natives and immigrants, the probability of welfare entry (from inactivity as well as from employment) increases with rising unemployment (Figures 1.2 and 2.2). This pattern hardly changed after the reform. Among immigrants, welfare entry from inactivity is less sensitive to the unemployment rate after than before the reform. As the overall probability of welfare entry declined, the reform incentives may have fostered additional job search activities.

[19] The parameter estimates for the pre- and post-reform period are available in the online appendix.

[20] Due to the small number of observations, the predicted pre- and post-reform transition patterns are not significantly different and we omit the presentation of confidence intervals.

Welfare exit to employment is less likely in periods of high unemployment (Figures 1.3 and 2.3). Overall, the rate of welfare-to-employment transitions increased after the reform; while the responsiveness of welfare exit to the unemployment rate hardly changed for natives it increased for immigrants: the dashed line in Figure 2.3 is considerably steeper after the reform.

In sum, welfare transitions are in part correlated with labor market conditions: immigrants' unemployment gradients of welfare persistence and welfare exit to employment are considerably higher after than before the reform. This increased labor market responsiveness might reflect that immigrants benefit from the job creation in the economic boom early after the reform.

5.3 Robustness checks and extensions

We perform four tests to check the robustness of our results and provide an extension of our empirical evaluation. First, we address a potential measurement error in the initial condition. So far, we used the labor market state as of 2005, which typically was measured shortly after the reform. At that time, former recipients of unemployment insurance benefits might not have been aware of the precise institutional reforms that took effect on January 1, 2005 and they may have falsely indicated their benefit type. We omitted the 2005 data, started our window of observation in 2006 instead and re-estimated the model setting the initial condition to 2006. Based on predictions from these estimation results we find that the results are similar to those presented above.[21] In particular, trends in welfare entry and welfare exit are equivalent to those found in the full sample. Thus, our results are not driven by measurement error in the 2005 data.

Our second robustness check addresses the definition of the dependent variable. A feature of UB II is that it is paid to all households in need of support even if their members are employed (see section 2). Households with employed welfare recipients are called *Aufstocker*. In our definition of the dependent variable, *Aufstocker* are coded as welfare recipients. We re-estimate our

[21] The results are available in the online appendix.

model after coding *Aufstocker* as employed households, instead. Table 7 shows the predictions based on these estimations. We find the expected mechanical changes in transition probabilities: the transition rate from employment to welfare declines compared to Table 6 because households taking up welfare while employed no longer change their state. Also, the transition probability from inactivity to employment increases and that from inactivity to welfare decreases as a consequence of changed definitions. Our first key result, i.e., the decline in welfare persistence after the reform, no longer holds with redefined outcomes. Now, welfare persistence slightly increases after the reform for natives, and for immigrants we hardly observe a change in welfare persistence. Jointly, the results in Tables 6 and 7 suggest, that households who receive welfare while being employed are more likely to leave welfare dependence after than before the reform. This apparently drives the decline in welfare persistence in Table 6. The other two key results, i.e., the strong increase in the transition rate from employment to welfare and the increasing transition rates from inactivity and welfare to employment are generally confirmed with the recoded dependent variable.

As a third robustness check, we re-estimated our transition models controlling for federal state fixed effects. These fixed effect failed to be jointly statistically significant and the predicted transition patterns hardly differ from the overall pattern described in Table 6 above.[22]

Fourth, we respond to the suggestion by Rabe-Hesketh and Skrondal (2013) and test whether our approach to the solution of the initial conditions problem biases the results. In addition to individual-specific averages of time-varying explanatory covariates, we also include initial-period explanatory variables as regressors in a more flexible specification.[23] We find that the relevant results from the extended specification, i.e., the estimated coefficients of the lagged variables and the predicted probabilities of labor market transitions, differ from those of the constrained

[22] The results are available upon request.

[23] Tables A11 and A12 in the online appendix show the estimation results and the corresponding transition matrices, respectively.

specification by less than two percent. We regard this as persuasive evidence that our specification is not biased due to an overly restrictive model.

As an extension of our analysis we evaluate the relevance of the initial conditions control for the overall findings. We calculate predicted transition rates after setting the initial state to welfare receipt. Table 8 reports the results for individuals with average characteristics of welfare recipients. Again, the persistence of inactivity and welfare receipt declines for natives, however, it reaches higher levels than observed in Table 6. Among immigrants a decline in welfare persistence cannot be confirmed. Their welfare persistence again is not significantly higher than the probability of moving from inactivity to welfare. The initial condition controls explain a substantial part of the state dependence observed in the raw data (Table 2): the low welfare persistence for households with average characteristics in Table 6 is largely connected to the control for endogenous initial conditions.

6 Conclusion

We use dynamic multinomial logit models to analyze welfare transitions and to determine the role of state dependence in the German welfare system. We study welfare dynamics before and after a reform and explore the relevance of labor market conditions for welfare transitions. We compare welfare transitions of immigrants and natives accounting for the endogeneity of initial conditions and unobserved heterogeneity.

We draw four main conclusions: first, true state dependence in welfare receipt is not a general or dominant factor for welfare receipt in Germany. The probability of welfare persistence is significantly higher than the probability of entering welfare from inactivity for natives but not for

immigrants.[24] Second, our evidence suggests that the pre- and post-reform transition patterns differ. In particular, the transition to employment became more likely and the persistence in welfare receipt and inactivity declined. While these changes over time are not always statistically significant this may suggest that the reform enhanced labor market attachment and work incentives for welfare recipients and inactive individuals. Third, immigrants' responsiveness to the labor market increased after the reform, e.g., with respect to welfare persistence and welfare exit. Finally, the overall decline in welfare persistence after the reform seems to be due to those households who receive welfare to top up their labor market earnings. After the reform, this group has a higher propensity to leave welfare receipt than prior to the reform.

Our evidence shows that the labor market situation contributes to explain welfare transitions, i.e., welfare entry is lower and welfare exit is higher when unemployment is low. This finding agrees with the results of Hoynes (2000). Our analysis also points to a change after the reform that may not have been intended: there is a substantial increase in the employment-to-welfare transition rate, i.e., the rate at which households start to receive welfare given that the head of the household was employed before. Several explanations are plausible: first, households might have become more likely to fall below the eligibility threshold despite employment if they earn lower incomes than before. Second, employed households may not accumulate sufficient claims for unemployment insurance benefits (UB I) after the reform if their employment spells are shorther than the required minimum contribution period to the unemployment insurance. In that case a loss of employment can generate welfare dependence because a claim against the unemployment insurance for UB I is not established.[25]

[24] Our finding of low relevance of state dependence differs to some extent from Königs (2014) who reports substantial state dependence in social assistance receipt in Germany. The different findings may be explained by differences in the studies' empirical approaches. Importantly, Königs (2014) uses a considerably broader definition of the dependent variable, as his analysis includes the receipt of housing benefits. Therefore, differences in state dependence in his and our outcomes may reflect the difference in state dependence of housing benefits versus welfare. Furthermore, Königs (2014) includes individuals who are not capable of working. Presumably, these individuals have different transition patterns compared to able bodied individuals on whom we focus.

[25] Jahn and Stephan (2012) show that about 18% of those who became unemployed in 2010 moved directly into UB II instead of UB I. Koller and Rudolph (2011) describe that welfare exit after the Hartz Reforms generated unstable employment situations, as only 55% of the new jobs last longer than six months.

Overall, true state dependence is not an important factor in the German welfare system even though its level certainly varies across population groups. The patterns and dynamics of welfare transitions changed from before to after the reform in a way that is consistent with the reform objectives: after the reform, non-working households display higher labor market attachments, and welfare transitions are more responsive to the labor market situation. The reform of the German welfare system may be instructive for other countries that intend to promote work incentives in the presence of troubled labor markets. It seems to be feasible to provide a safety net without a welfare trap.

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Tables and Figures

Table 1
Observed distribution of labor market states by year

Year	State at time t			Sample size
	Inactivity	Employment	Welfare	
A. Total population: pre-reform				
2000	10.44	85.75	3.81	5,082
2001	9.86	86.21	3.93	4,871
2002	11.52	83.73	4.75	4,268
2003	12.17	82.34	5.49	3,951
2004	11.12	82.27	6.60	3,644
Total	10.97	84.2	4.83	21,816
B. Total population: post-reform				
2005	13.14	80.72	6.14	3,873
2006	11.52	80.21	8.27	3,736
2007	10.59	82.33	7.08	3,359
2008	8.87	84.70	6.43	3,057
2009	9.09	85.45	5.46	2,698
2010	8.87	84.04	7.09	2,401
Total	10.51	82.74	6.75	19,124
C. Natives: pre-reform				
2000	9.95	86.96	3.09	4,163
2001	9.17	87.64	3.19	3,997
2002	11.09	85.16	3.75	3,510
2003	11.56	83.72	4.73	3,258
2004	10.94	83.25	5.82	3,016
Total	10.47	85.49	4.03	17,944
D. Natives: post-reform				
2005	12.57	81.86	5.57	3,260
2006	11.40	81.48	7.12	3,145
2007	10.61	83.43	5.96	2,845
2008	8.54	85.70	5.76	2,603
2009	9.17	86.31	4.52	2,313
2010	8.63	85.46	5.92	2,071
Total	10.30	83.87	5.83	16,237
E. Immigrants: pre-reform				
2000	13.73	77.55	8.71	919
2001	14.55	76.49	8.95	874
2002	14.22	74.75	11.03	758
2003	16.04	73.67	10.29	693
2004	12.32	75.99	11.68	628
Total	14.21	75.72	10.07	3,872
F. Immigrants: post-reform				
2005	17.38	72.23	10.40	613
2006	12.26	72.56	15.18	591
2007	10.49	75.38	14.13	514
2008	11.02	78.21	10.77	454
2009	8.57	79.82	11.60	385
2010	10.50	74.38	15.13	330
Total	11.86	75.27	12.87	2,887

Note: Percentage of households weighted using cross-sectional weights.
Source: SOEP 2001-2010.

Table 2
Observed probabilities of labor market transitions

State in $t-1$	State at time t		
	Inactivity	Employment	Welfare
A. Total population: pre-reform			
Inactivity	0.633	0.272	0.095
Employment	0.047	0.944	0.010
Welfare receipt	0.103	0.184	0.712
B. Total population: post-reform			
Inactivity	0.607	0.299	0.095
Employment	0.037	0.950	0.013
Welfare receipt	0.061	0.203	0.736
C. Natives: pre-reform			
Inactivity	0.645	0.281	0.075
Employment	0.043	0.949	0.008
Welfare receipt	0.104	0.168	0.728
D. Natives: post-reform			
Inactivity	0.616	0.305	0.079
Employment	0.034	0.954	0.011
Welfare receipt	0.069	0.204	0.727
E. Immigrants: pre-reform			
Inactivity	0.590	0.242	0.169
Employment	0.066	0.915	0.019
Welfare receipt	0.103	0.216	0.681
F. Immigrants: post-reform			
Inactivity	0.576	0.276	0.149
Employment	0.050	0.928	0.023
Welfare receipt	0.045	0.201	0.754
G. Total population: pooled years			
Inactivity	0.619	0.287	0.095
Employment	0.042	0.947	0.012
Welfare receipt	0.077	0.196	0.727

Note: Share of household heads weighted using cross-sectional weights.
Source: SOEP 2000-2010.

Table 3
Descriptive statistics

	Pre-reform (2000-2004)				Post-reform (2005-2010)			
	Natives		Immigrants		Natives		Immigrants	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Inactivity	0.11	0.31	0.15	0.35	0.10	0.30	0.11	0.32
Employment	0.86	0.35	0.77	0.42	0.86	0.35	0.78	0.42
Welfare	0.04	0.18	0.09	0.28	0.05	0.21	0.11	0.31
Age	43.09	8.57	42.52	9.17	44.25	8.39	43.57	8.74
Female	0.35	0.48	0.27	0.44	0.41	0.49	0.37	0.48
Education in years	12.59	2.74	11.00	2.41	12.75	2.75	11.31	2.52
Married	0.66	0.47	0.79	0.40	0.63	0.48	0.78	0.42
Health status: good	0.60	0.49	0.57	0.50	0.55	0.50	0.54	0.50
School in Germany: no	0.00	0.00	0.60	0.49	0.00	0.00	0.47	0.50
Number of children LT6	0.23	0.52	0.33	0.60	0.17	0.45	0.24	0.52
Number of children GE6	0.57	0.86	0.81	0.99	0.52	0.83	0.80	0.96
Year 2001	0.29	0.45	0.30	0.46	0.00	0.00	0.00	0.00
Year 2002	0.26	0.44	0.26	0.44	0.00	0.00	0.00	0.00
Year 2003	0.24	0.43	0.24	0.42	0.00	0.00	0.00	0.00
Year 2004	0.22	0.41	0.21	0.41	0.00	0.00	0.00	0.00
Year 2006	0.00	0.00	0.00	0.00	0.24	0.43	0.26	0.44
Year 2007	0.00	0.00	0.00	0.00	0.22	0.41	0.23	0.42
Year 2008	0.00	0.00	0.00	0.00	0.20	0.40	0.20	0.40
Year 2009	0.00	0.00	0.00	0.00	0.18	0.38	0.17	0.38
Year 2010	0.00	0.00	0.00	0.00	0.16	0.37	0.15	0.35
Initial condition (in 2005)								
Inactivity	0.10	0.30	0.13	0.34	0.11	0.32	0.17	0.38
Employment	0.87	0.34	0.78	0.41	0.85	0.36	0.74	0.44
Welfare receipt	0.03	0.18	0.09	0.28	0.04	0.19	0.09	0.29
Number of person-year observations	13,781		2,953		12,977		2,274	

Source: SOEP 2000-2010.

Table 4
Separate estimation results for natives and immigrants: pre-reform

Variable	Natives				Immigrants			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.218***	(0.161)	0.302	(0.268)	2.563***	(0.299)	-0.238	(0.390)
Welfare receipt in t-1	1.387***	(0.307)	2.332***	(0.349)	1.548***	(0.399)	1.662***	(0.470)
Age	0.524***	(0.090)	0.297*	(0.161)	0.259**	(0.131)	-0.015	(0.198)
Age squared	-0.649***	(0.100)	-0.359**	(0.178)	-0.344**	(0.147)	0.040	(0.218)
Female	2.151	(2.467)	4.574	(4.261)	-3.645	(3.966)	0.805	(6.039)
Age × Female	-0.193*	(0.115)	-0.226	(0.197)	0.073	(0.188)	-0.051	(0.284)
Age sq. × Female	0.252*	(0.129)	0.234	(0.221)	-0.033	(0.216)	0.041	(0.322)
Education	0.117***	(0.022)	-0.255***	(0.048)	0.106***	(0.039)	0.008	(0.057)
School in Germany: no	—		—		-0.292	(0.219)	0.330	(0.353)
Married	-0.251**	(0.127)	-1.214***	(0.209)	-0.117	(0.238)	-0.488	(0.357)
Health status: good	0.040	(0.123)	-0.308	(0.213)	-0.045	(0.208)	-0.809***	(0.302)
No. of kids LT 6	0.684***	(0.157)	0.720**	(0.308)	0.141	(0.260)	0.709*	(0.375)
No. of kids GE 6	0.191	(0.144)	0.271	(0.238)	0.273	(0.218)	0.635**	(0.305)
Year 2002	-0.245**	(0.113)	-0.062	(0.212)	0.168	(0.199)	0.273	(0.290)
Year 2003	-0.355***	(0.117)	0.183	(0.213)	-0.249	(0.199)	0.068	(0.299)
Year 2004	-0.239*	(0.123)	0.574***	(0.218)	0.175	(0.215)	0.662**	(0.311)
Employed in t=0	2.575***	(0.269)	0.108	(0.373)	1.313***	(0.424)	0.329	(0.490)
Welfare receipt in t=0	0.028	(0.378)	2.232***	(0.486)	-0.429	(0.456)	2.007***	(0.648)
M: Health status: good	0.509**	(0.206)	-0.711**	(0.357)	0.521	(0.348)	0.402	(0.517)
M: No. of kids LT 6	-1.698***	(0.240)	-1.279**	(0.504)	-0.529	(0.373)	-0.312	(0.549)
M: No. of kids GE 6	-0.128	(0.190)	-0.209	(0.311)	-0.367	(0.275)	-0.455	(0.385)
Constant	-11.359***	(1.971)	-4.315	(3.561)	-5.808**	(2.826)	-2.375	(4.317)
$Var(a_{ij})$	2.803	(0.476)	1.647	(0.646)	1.245	(0.586)	1.771	(0.961)
$Cov(a_{i,empl}, a_{i,welf})$	0.204	(0.509)			-0.276	(0.592)		
log likelihood	-3668.710				-1232.784			
No. of household-year observations	13,781				2,953			
No. of households	4,172				922			

Note: Dynamic multinomial logit models with random effects. Dependent variable: labor market state (inactivity, employment, welfare receipt). M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2000-2004.

Table 5
Separate estimation results for natives and immigrants: post-reform

Variable	Natives				Immigrants			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.221***	(0.156)	0.523**	(0.264)	2.091***	(0.354)	0.695	(0.431)
Welfare receipt in t-1	1.472***	(0.286)	1.941***	(0.326)	1.636***	(0.443)	1.877***	(0.456)
Age	0.736***	(0.096)	0.830***	(0.184)	0.726***	(0.242)	-0.261	(0.295)
Age squared	-0.875***	(0.106)	-0.934***	(0.203)	-0.913***	(0.266)	0.208	(0.324)
Female	7.876***	(2.591)	18.760***	(4.910)	7.965	(5.953)	-3.037	(7.365)
Age × Female	-0.485***	(0.121)	-0.908***	(0.226)	-0.508*	(0.276)	0.092	(0.343)
Age sq. × Female	0.600***	(0.137)	1.014***	(0.253)	0.629**	(0.308)	-0.092	(0.387)
Education	0.047**	(0.023)	-0.177***	(0.046)	0.137**	(0.057)	-0.060	(0.079)
School in Germany: no	—		—		0.101	(0.318)	-0.045	(0.416)
Married	-0.685***	(0.136)	-1.906***	(0.237)	-0.675**	(0.332)	-1.051***	(0.394)
Health status: good	-0.116	(0.131)	-0.911***	(0.226)	-0.359	(0.265)	-0.088	(0.337)
No. of kids LT 6	0.388**	(0.161)	0.370	(0.291)	0.316	(0.356)	-0.095	(0.471)
No. of kids GE 6	0.124	(0.146)	0.306	(0.248)	0.341	(0.308)	0.189	(0.373)
Year 2007	0.180	(0.125)	-0.486**	(0.213)	0.054	(0.283)	-0.219	(0.352)
Year 2008	0.330**	(0.133)	-0.332	(0.225)	0.469	(0.306)	-0.525	(0.394)
Year 2009	0.226	(0.138)	-0.919***	(0.254)	0.276	(0.322)	-0.090	(0.400)
Year 2010	0.313**	(0.146)	-0.199	(0.249)	0.061	(0.332)	0.175	(0.411)
Employed in t=0	2.562***	(0.245)	-0.089	(0.374)	2.592***	(0.558)	-0.992	(0.607)
Welfare receipt in t=0	0.371	(0.349)	3.203***	(0.507)	0.391	(0.523)	1.901***	(0.596)
M: Health status: good	0.577**	(0.225)	-0.257	(0.403)	1.209**	(0.507)	-0.600	(0.647)
M: No. of kids LT 6	-1.068***	(0.298)	0.110	(0.520)	-1.655***	(0.603)	-0.775	(0.719)
M: No. of kids GE 6	0.265	(0.164)	-0.054	(0.294)	-0.246	(0.315)	0.461	(0.396)
Constant	-15.202***	(2.086)	-16.502***	(4.077)	-14.694***	(5.345)	7.980	(6.519)
$Var(a_{ij})$	2.484	(0.401)	3.898	(0.963)	1.902	(0.897)	2.413	(1.144)
$Cov(a_{i,empl}, a_{i,welf})$	0.022	(0.497)			-0.475	(0.717)		
log likelihood	-3456.030				-826.853			
No. of household-year observations	12,977				2,274			
No. of households	3,266				616			

Note: Dynamic multinomial logit models with random effects. Dependent variable: labor market state (inactivity, employment, welfare receipt). M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2005-2010.

Table 6
Predicted probabilities of labor market transitions given subsample-period-specific average characteristics

State at time $t-1$	State at time t								
	Inactive			Employment			Welfare		
	Mean	95%-CI		Mean	95%-CI		Mean	95%-CI	
A. Pre-reform									
Inactive	0.246	0.206	0.292	0.718	0.667	0.757	0.037	0.027	0.053
Employment	0.055	0.049	0.061	0.936	0.929	0.942	0.009	0.008	0.012
Welfare	0.089	0.064	0.126	0.828	0.762	0.868	0.083	0.056	0.133
B. Post-reform									
Inactive	0.195	0.161	0.237	0.767	0.724	0.800	0.038	0.029	0.053
Employment	0.042	0.036	0.048	0.942	0.935	0.948	0.016	0.014	0.021
Welfare	0.066	0.046	0.095	0.874	0.835	0.901	0.060	0.045	0.085
C. Natives: pre-reform									
Inactive	0.220	0.180	0.269	0.759	0.705	0.797	0.021	0.014	0.036
Employment	0.050	0.045	0.057	0.943	0.936	0.949	0.007	0.005	0.009
Welfare	0.081	0.053	0.120	0.854	0.787	0.894	0.065	0.040	0.117
D. Natives: post-reform									
Inactive	0.195	0.159	0.242	0.773	0.726	0.812	0.032	0.023	0.048
Employment	0.041	0.036	0.047	0.947	0.939	0.953	0.013	0.010	0.017
Welfare	0.067	0.045	0.100	0.877	0.829	0.907	0.057	0.039	0.089
E. Immigrants: pre-reform									
Inactive	0.362	0.262	0.494	0.521	0.381	0.622	0.118	0.080	0.206
Employment	0.074	0.059	0.095	0.900	0.874	0.916	0.026	0.019	0.045
Welfare	0.123	0.070	0.201	0.693	0.513	0.781	0.184	0.119	0.362
F. Immigrants: post-reform									
Inactive	0.204	0.127	0.326	0.721	0.591	0.793	0.076	0.047	0.134
Employment	0.046	0.033	0.064	0.914	0.885	0.932	0.040	0.028	0.064
Welfare	0.056	0.027	0.105	0.830	0.735	0.884	0.115	0.074	0.188

Note: Calculations are based on separate estimations for all subsamples in both periods. Estimation results are presented in the online appendix. Simulation-based 95% confidence intervals are calculated using 1000 replications.

Table 7
Predicted probabilities of labor market transitions given subsample-period-specific average characteristics (alternative definition of states)

State at time $t-1$	State at time t								
	Inactive			Employment			Welfare		
	Mean	95%-CI		Mean	95%-CI		Mean	95%-CI	
A. Total population: pre-reform									
Inactive	0.253	0.211	0.303	0.723	0.669	0.764	0.025	0.017	0.037
Employment	0.053	0.048	0.059	0.943	0.936	0.948	0.005	0.004	0.007
Welfare	0.104	0.073	0.146	0.850	0.795	0.886	0.047	0.030	0.081
B. Total population: post-reform									
Inactive	0.194	0.160	0.236	0.782	0.739	0.816	0.024	0.017	0.037
Employment	0.040	0.035	0.045	0.953	0.947	0.958	0.008	0.006	0.011
Welfare	0.095	0.066	0.134	0.853	0.801	0.887	0.052	0.036	0.081
C. Natives: pre-reform									
Inactive	0.224	0.183	0.275	0.765	0.712	0.804	0.011	0.007	0.020
Employment	0.049	0.043	0.056	0.948	0.941	0.954	0.003	0.002	0.005
Welfare	0.090	0.059	0.137	0.884	0.829	0.920	0.025	0.014	0.051
D. Natives: post-reform									
Inactive	0.195	0.158	0.239	0.791	0.745	0.827	0.014	0.009	0.025
Employment	0.039	0.034	0.045	0.955	0.948	0.960	0.006	0.005	0.009
Welfare	0.098	0.061	0.149	0.866	0.803	0.909	0.036	0.022	0.065
E. Immigrants: pre-reform									
Inactive	0.391	0.280	0.535	0.504	0.354	0.615	0.105	0.068	0.209
Employment	0.069	0.056	0.089	0.918	0.892	0.931	0.013	0.009	0.029
Welfare	0.156	0.090	0.256	0.708	0.522	0.800	0.136	0.080	0.299
F. Immigrants: post-reform									
Inactive	0.201	0.132	0.316	0.722	0.584	0.802	0.077	0.045	0.153
Employment	0.042	0.030	0.058	0.938	0.915	0.951	0.021	0.014	0.034
Welfare	0.071	0.033	0.131	0.796	0.661	0.867	0.134	0.079	0.256

Note: Calculations are based on separate estimations for all subsamples in both periods. Estimation results are presented in the online appendix. Simulation-based 95% confidence intervals are calculated using 1000 replications. The model was estimated after redefining the dependent variable for welfare-receiving households with employed members to employed instead of welfare.

Table 8
Predicted probabilities of labor market transitions given subsample-period-specific average characteristics of welfare recipients setting initial state to welfare

State at time $t-1$	State at time t								
	Inactive			Employment			Welfare		
	Mean	95%-CI		Mean	95%-CI		Mean	95%-CI	
A. Natives: pre-reform									
Inactive	0.374	0.270	0.505	0.207	0.140	0.284	0.419	0.282	0.539
Employment	0.190	0.126	0.284	0.509	0.401	0.617	0.301	0.187	0.415
Welfare	0.095	0.064	0.137	0.190	0.135	0.251	0.715	0.646	0.776
B. Natives: post-reform									
Inactive	0.236	0.162	0.328	0.251	0.182	0.329	0.513	0.401	0.611
Employment	0.092	0.058	0.140	0.517	0.421	0.623	0.392	0.283	0.490
Welfare	0.070	0.045	0.102	0.270	0.203	0.337	0.660	0.592	0.731
C. Immigrants: pre-reform									
Inactive	0.386	0.256	0.555	0.149	0.079	0.239	0.465	0.292	0.600
Employment	0.186	0.103	0.294	0.570	0.406	0.708	0.245	0.129	0.396
Welfare	0.133	0.089	0.200	0.218	0.145	0.292	0.649	0.559	0.740
D. Immigrants: post-reform									
Inactive	0.244	0.134	0.415	0.221	0.126	0.333	0.535	0.383	0.662
Employment	0.093	0.041	0.181	0.451	0.330	0.605	0.456	0.295	0.578
Welfare	0.063	0.033	0.119	0.261	0.168	0.358	0.676	0.570	0.772

Note: Calculations are based on separate estimations for all subsamples in both periods. Estimation results are presented in the online appendix. Simulation-based 95% confidence intervals are calculated using 1000 replications.

Figure 1
Labor market transitions and unemployment rate (natives)

Fig. 1.1: Persistence in employment and welfare participation

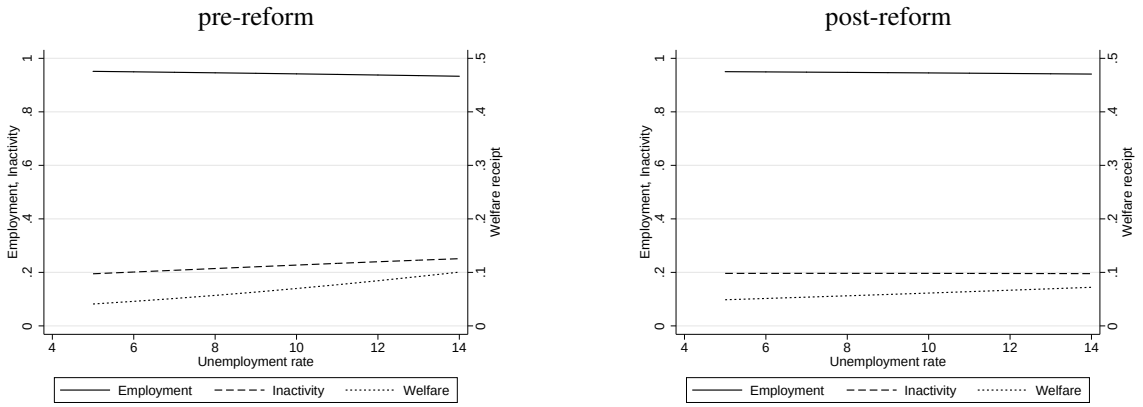


Fig. 1.2: Welfare entry

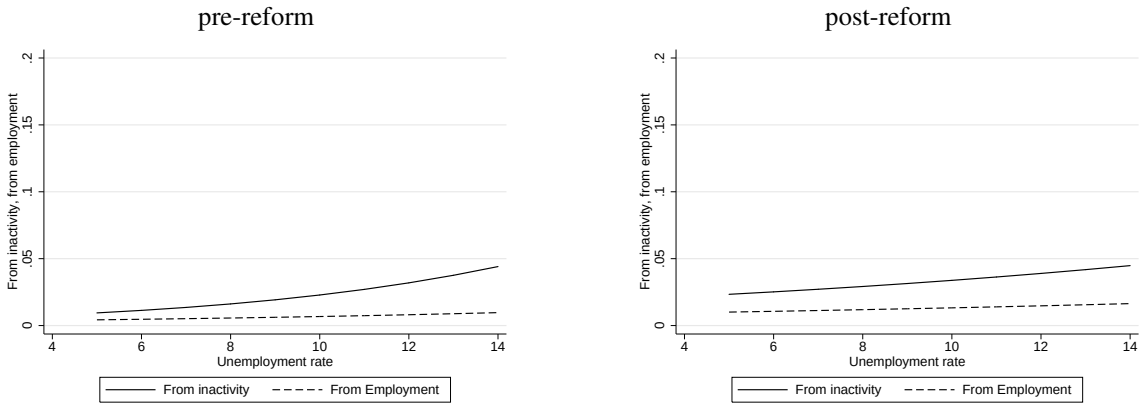
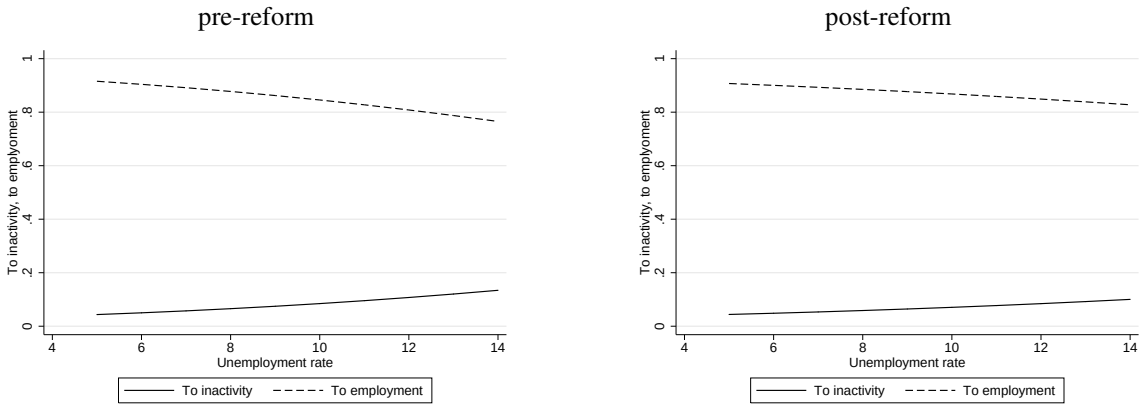


Fig. 1.3: Welfare exit



Note: Predicted probabilities given average characteristics. Figures 1.1 uses a secondary vertical axes to indicate transition probabilities.

Figure 2
Labor market transitions and unemployment rate (immigrants)

Fig. 2.1: Persistence in employment and welfare participation

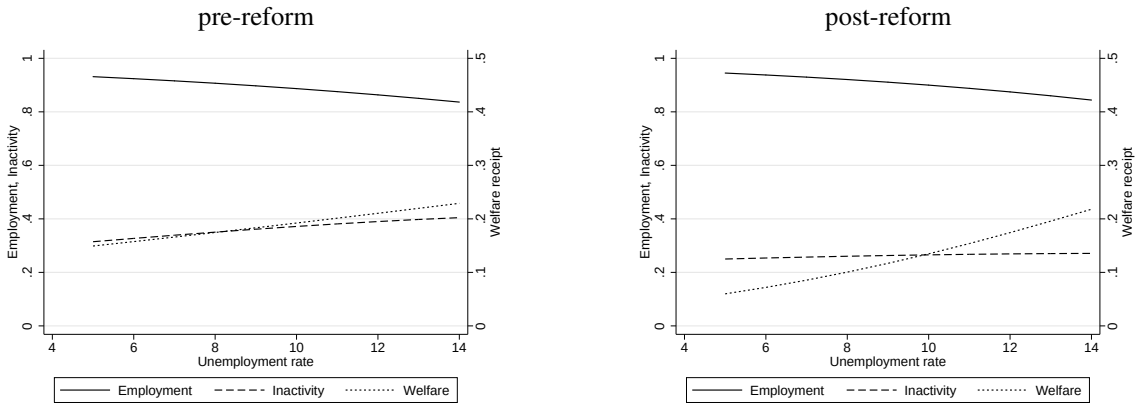


Fig. 2.2: Welfare entry

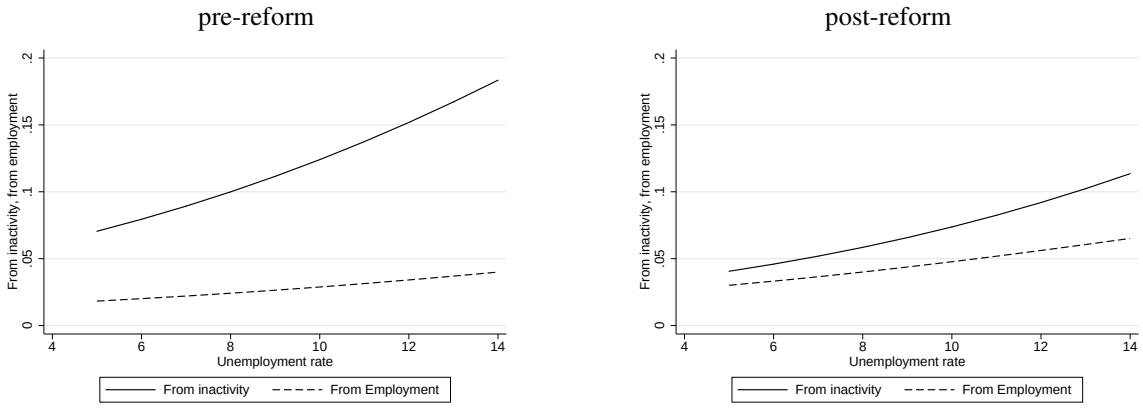
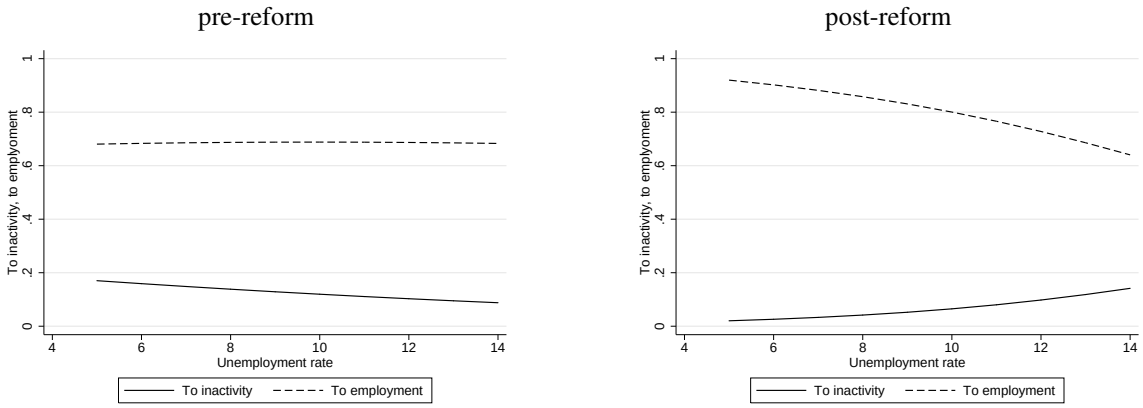


Fig. 2.3: Welfare exit



Note: Predicted probabilities given average characteristics. Figures 2.1 uses a secondary vertical axes to indicate transition probabilities.

Appendix

Supplementary material for

State dependence in welfare receipt: transitions before and after a reform

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Contents

Table A1
Averages of selected variables by labor market state

Variable	Pre-reform			Post-reform		
	Inactivity	Employment	Welfare	Inactivity	Employment	Welfare
A. Natives						
Age	43.91	43.01	42.61	44.00	44.30	43.87
Female	0.65	0.31	0.65	0.69	0.37	0.64
Education in years	12.07	12.74	10.63	12.45	12.87	11.08
Married	0.70	0.67	0.36	0.72	0.63	0.32
Health status: good	0.56	0.62	0.39	0.54	0.56	0.33
School in Germany: no	0.00	0.00	0.00	0.00	0.00	0.00
Number of children LT6	0.36	0.21	0.31	0.34	0.15	0.22
Number of children GE6	0.49	0.57	0.68	0.50	0.52	0.61
Household size	2.92	2.82	2.70	2.98	2.72	2.48
Single person	0.16	0.19	0.22	0.13	0.20	0.28
Single parent	0.07	0.06	0.34	0.07	0.07	0.30
Couple Without Children	0.21	0.21	0.12	0.21	0.23	0.10
Couple with children	0.54	0.52	0.28	0.57	0.49	0.30
Other household type	0.02	0.02	0.03	0.02	0.01	0.02
B. Immigrants						
Age	42.56	42.18	45.42	44.63	43.49	43.10
Female	0.53	0.22	0.29	0.66	0.31	0.55
Education in years	10.52	11.17	10.40	10.79	11.52	10.41
Married	0.81	0.79	0.78	0.82	0.79	0.62
Health status: good	0.51	0.61	0.37	0.47	0.57	0.39
School in Germany: no	0.55	0.59	0.73	0.48	0.47	0.50
Number of children LT6	0.46	0.29	0.40	0.39	0.22	0.21
Number of children GE6	0.68	0.82	0.92	0.72	0.78	1.00
Household size	3.44	3.37	3.66	3.40	3.30	3.23
Single person	0.07	0.10	0.09	0.07	0.08	0.17
Single parent	0.09	0.07	0.12	0.08	0.09	0.27
Couple Without Children	0.17	0.15	0.15	0.16	0.16	0.06
Couple with children	0.63	0.67	0.55	0.68	0.65	0.50
Other household type	0.04	0.02	0.09	0.02	0.02	0.01

Source: SOEP 2001-2004 and 2006-2010.

Table A2
Estimation results: total population

Variable	Pre refom				Post-reform			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.276***	(0.142)	0.071	(0.220)	2.182***	(0.141)	0.561**	(0.223)
Welfare receipt in t-1	1.415***	(0.242)	2.041***	(0.281)	1.485***	(0.238)	1.789***	(0.269)
Age	0.451***	(0.075)	0.162	(0.124)	0.738***	(0.089)	0.550***	(0.153)
Age squared	-0.565***	(0.083)	-0.196	(0.137)	-0.884***	(0.098)	-0.646***	(0.169)
Female	0.535	(2.076)	3.033	(3.408)	7.965***	(2.356)	13.590***	(4.026)
Age × Female	-0.118	(0.097)	-0.155	(0.158)	-0.492***	(0.110)	-0.672***	(0.187)
Age sq. × Female	0.170	(0.110)	0.155	(0.178)	0.610***	(0.124)	0.753***	(0.210)
Education	0.113***	(0.019)	-0.177***	(0.036)	0.055***	(0.021)	-0.178***	(0.041)
School in Germany: no	-0.421***	(0.144)	0.597***	(0.206)	-0.016	(0.200)	0.616**	(0.294)
Married	-0.223**	(0.110)	-1.123***	(0.177)	-0.644***	(0.125)	-1.673***	(0.207)
Health status: good	0.018	(0.105)	-0.473***	(0.173)	-0.158	(0.117)	-0.612***	(0.187)
No. of kids LT 6	0.542***	(0.134)	0.659***	(0.235)	0.381***	(0.146)	0.186	(0.246)
No. of kids GE 6	0.240**	(0.120)	0.416**	(0.186)	0.160	(0.132)	0.218	(0.204)
Year 2002	-0.143	(0.098)	0.061	(0.170)	—		—	
Year 2003	-0.322***	(0.100)	0.153	(0.173)	—		—	
Year 2004	-0.136	(0.106)	0.586***	(0.178)	—		—	
Year 2007	—		—		0.162	(0.115)	-0.385**	(0.181)
Year 2008	—		—		0.355***	(0.122)	-0.387**	(0.195)
Year 2009	—		—		0.229*	(0.127)	-0.674***	(0.212)
Year 2010	—		—		0.266**	(0.133)	-0.067	(0.212)
Employed in t=0	2.301***	(0.227)	0.239	(0.300)	2.576***	(0.222)	-0.382	(0.313)
Welfare receipt in t=0	-0.022	(0.293)	2.295***	(0.396)	0.402	(0.293)	2.991***	(0.410)
M: Health status: good	0.500***	(0.176)	-0.401	(0.293)	0.696***	(0.206)	-0.485	(0.349)
M: No. of kids LT 6	-1.373***	(0.202)	-0.799**	(0.365)	-1.166***	(0.265)	0.040	(0.421)
M: No. of kids GE 6	-0.227	(0.156)	-0.250	(0.241)	0.182	(0.145)	0.194	(0.230)
Constant	-9.783***	(1.623)	-2.826	(2.735)	-15.176***	(1.924)	-9.890***	(3.348)
$Var(a_{ij})$	2.394	(0.380)	1.914	(0.563)	2.440	(0.365)	4.203	(0.847)
$Cov(a_{i,empl}, a_{i,welf})$	0.092	(0.399)			0.036	(0.405)		
log likelihood	-4936.0963				-4317.5091			
No. of household-year observations	16,734				15,251			
No. of households	5,094				3,882			

Note: Dynamic multinomial logit models with random effects. Dependent variable: labor market state (inactivity, employment, welfare receipt). M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2000-2010.

Table A3
Averages of predicted probabilities of labor market transitions given observed characteristics

State at time $t-1$	State at time t								
	Inactive			Employment			Welfare		
	Mean	95%-CI		Mean	95%-CI		Mean	95%-CI	
A. Natives: pre-reform									
Inactive	0.237	0.183	0.304	0.724	0.655	0.777	0.039	0.022	0.070
Employment	0.078	0.057	0.103	0.902	0.873	0.925	0.020	0.011	0.035
Welfare	0.100	0.061	0.152	0.802	0.718	0.855	0.098	0.059	0.173
B. Natives: post-reform									
Inactive	0.218	0.164	0.283	0.730	0.662	0.784	0.053	0.032	0.086
Employment	0.067	0.047	0.091	0.902	0.871	0.927	0.032	0.019	0.050
Welfare	0.091	0.058	0.137	0.823	0.755	0.869	0.086	0.055	0.139
C. Immigrants: pre-reform									
Inactive	0.351	0.216	0.525	0.518	0.345	0.649	0.131	0.063	0.265
Employment	0.097	0.051	0.163	0.860	0.778	0.916	0.043	0.018	0.093
Welfare	0.134	0.061	0.246	0.665	0.457	0.780	0.201	0.108	0.408
D. Immigrants: post-reform									
Inactive	0.225	0.119	0.394	0.663	0.498	0.769	0.112	0.051	0.219
Employment	0.081	0.035	0.152	0.831	0.740	0.901	0.088	0.039	0.164
Welfare	0.080	0.029	0.175	0.752	0.612	0.841	0.168	0.090	0.295

Note: Calculations are based on estimation results in Tables 4 and 5. Simulation-based 95% confidence intervals are calculated using 1000 replications.

Table A4
Estimation results: regional unemployment rate (pre-reform)

Variable	Natives				Immigrants			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	1.995***	(0.397)	1.174*	(0.689)	2.791***	(0.707)	0.797	(1.039)
Welfare receipt in t-1	2.630***	(0.868)	4.047***	(0.787)	-0.076	(1.102)	1.381	(1.118)
Employed in t-1 × unempl. Rate	0.025	(0.041)	-0.088	(0.067)	-0.030	(0.071)	-0.107	(0.104)
Welfare receipt in t-1 × unempl. Rate	-0.125	(0.083)	-0.172**	(0.071)	0.172	(0.111)	0.033	(0.109)
Unemployment rate	-0.063*	(0.037)	0.153***	(0.048)	-0.097	(0.062)	0.106	(0.073)
Age	0.517***	(0.090)	0.339**	(0.163)	0.249*	(0.132)	-0.054	(0.198)
Age squared	-0.642***	(0.100)	-0.403**	(0.180)	-0.337**	(0.148)	0.082	(0.218)
Female	1.878	(2.459)	5.565	(4.312)	-4.375	(4.012)	0.217	(6.044)
Age × Female	-0.180	(0.115)	-0.269	(0.200)	0.106	(0.190)	-0.028	(0.284)
Age sq. × Female	0.239*	(0.129)	0.279	(0.223)	-0.071	(0.218)	0.020	(0.322)
Education	0.121***	(0.023)	-0.265***	(0.048)	0.113***	(0.039)	-0.000	(0.057)
School in Germany: no	—		—		-0.240	(0.220)	0.280	(0.352)
Married	-0.264**	(0.127)	-1.186***	(0.211)	-0.128	(0.240)	-0.463	(0.357)
Health status: good	0.040	(0.123)	-0.313	(0.214)	-0.063	(0.209)	-0.805***	(0.303)
No. of kids LT 6	0.690***	(0.156)	0.739**	(0.310)	0.134	(0.262)	0.678*	(0.372)
No. of kids GE 6	0.196	(0.144)	0.267	(0.239)	0.296	(0.221)	0.644**	(0.305)
Year 2002	-0.217*	(0.113)	-0.116	(0.214)	0.222	(0.201)	0.249	(0.291)
Year 2003	-0.287**	(0.120)	0.052	(0.218)	-0.129	(0.205)	-0.019	(0.307)
Year 2004	-0.163	(0.126)	0.445**	(0.222)	0.303	(0.222)	0.559*	(0.319)
Employed in t=0	2.553***	(0.268)	0.141	(0.376)	1.324***	(0.419)	0.297	(0.492)
Welfare receipt in t=0	0.067	(0.382)	2.153***	(0.480)	-0.373	(0.459)	1.951***	(0.645)
M: Health status: good	0.496**	(0.205)	-0.730**	(0.359)	0.481	(0.350)	0.412	(0.518)
M: No. of kids LT 6	-1.710***	(0.240)	-1.283**	(0.509)	-0.481	(0.376)	-0.344	(0.547)
M: No. of kids GE 6	-0.149	(0.189)	-0.190	(0.313)	-0.382	(0.278)	-0.475	(0.386)
Constant	-10.693***	(2.007)	-6.590*	(3.651)	-4.822*	(2.864)	-2.287	(4.334)
$Var(a_{ij})$	2.737	(0.268)	1.680	(0.693)	1.279	(0.770)	1.713	(0.746)
$Cov(a_{i,empl}, a_{i,welf})$	0.278	(0.615)			-0.300	(0.574)		
log likelihood	-3656.795				-1225.318			
No. of household-year observations	13,781				2,953			
No. of households	4,172				922			

Note: Dynamic multinomial logit models with random effects. Robust standard errors clustered by region in parentheses. Dependent variable: labor market state (inactivity, employment, welfare receipt). M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2000-2004.

Table A5
Estimation results: regional unemployment rate (post-reform)

Variable	Natives				Immigrants			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.268***	(0.373)	0.849	(0.648)	3.521***	(0.750)	2.464**	(1.028)
Welfare receipt in t-1	2.584***	(0.726)	3.202***	(0.781)	4.264***	(1.159)	3.391***	(1.157)
Employed in t-1 × unempl. Rate	-0.005	(0.038)	-0.035	(0.064)	-0.132*	(0.079)	-0.164	(0.111)
Welfare receipt in t-1 × unempl. Rate	-0.118*	(0.071)	-0.131*	(0.074)	-0.260**	(0.123)	-0.136	(0.113)
Unemployment rate	-0.006	(0.035)	0.092*	(0.053)	-0.042	(0.070)	0.138*	(0.080)
Age	0.733***	(0.096)	0.823***	(0.183)	0.714***	(0.234)	-0.418	(0.295)
Age squared	-0.871***	(0.106)	-0.926***	(0.201)	-0.896***	(0.259)	0.388	(0.322)
Female	7.810***	(2.592)	18.635***	(4.876)	8.417	(5.506)	-4.625	(7.047)
Age × Female	-0.482***	(0.121)	-0.902***	(0.224)	-0.533**	(0.255)	0.179	(0.328)
Age sq. × Female	0.597***	(0.137)	1.008***	(0.251)	0.663**	(0.285)	-0.194	(0.369)
Education	0.049**	(0.023)	-0.180***	(0.046)	0.128**	(0.050)	-0.056	(0.069)
School in Germany: no	—		—		0.167	(0.292)	-0.214	(0.425)
Married	-0.680***	(0.136)	-1.864***	(0.235)	-0.513*	(0.296)	-0.836**	(0.360)
Health status: good	-0.120	(0.130)	-0.915***	(0.225)	-0.371	(0.253)	-0.059	(0.325)
No. of kids LT 6	0.393**	(0.161)	0.372	(0.290)	0.357	(0.340)	-0.015	(0.445)
No. of kids GE 6	0.127	(0.146)	0.308	(0.247)	0.393	(0.288)	0.275	(0.352)
Year 2007	0.154	(0.132)	-0.371*	(0.224)	-0.219	(0.284)	-0.154	(0.357)
Year 2008	0.286*	(0.150)	-0.155	(0.251)	-0.018	(0.316)	-0.426	(0.414)
Year 2009	0.188	(0.149)	-0.769***	(0.270)	-0.119	(0.323)	-0.001	(0.412)
Year 2010	0.272*	(0.160)	-0.029	(0.272)	-0.352	(0.343)	0.313	(0.436)
Employed in t=0	2.558***	(0.244)	-0.040	(0.375)	2.231***	(0.482)	-1.488***	(0.572)
Welfare receipt in t=0	0.408	(0.352)	3.145***	(0.504)	0.208	(0.427)	1.628***	(0.522)
M: Health status: good	0.591***	(0.225)	-0.218	(0.399)	1.108**	(0.472)	-0.641	(0.622)
M: No. of kids LT 6	-1.078***	(0.297)	0.111	(0.515)	-1.639***	(0.564)	-0.944	(0.675)
M: No. of kids GE 6	0.259	(0.164)	-0.035	(0.293)	-0.314	(0.287)	0.389	(0.374)
Constant	-15.100***	(2.106)	-17.313***	(4.064)	-14.136***	(5.059)	9.539	(6.459)
$Var(a_{ij})$	2.476	(0.404)	3.643	(0.623)	1.197	(0.514)	1.784	(1.241)
$Cov(a_{i,empl}, a_{i,welf})$	-0.012	(0.467)			-1.462	(0.431)		
log likelihood	-3452.143				-819.835			
No. of household-year observations	12,977				2,274			
No. of households	3,266				616			

Note: Dynamic multinomial logit models with random effects. Robust standard errors clustered by region in parentheses. Dependent variable: labor market state (inactivity, employment, welfare receipt). M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2000-2004.

Table A6
Predicted probabilities of labor market transitions given subsample-specific average characteristics setting the initial condition to 2006

State at time $t-1$	State at time t								
	Inactive			Employment			Welfare		
	Mean	95%-CI		Mean	95%-CI		Mean	95%-CI	
A. Natives, post-reform									
Inactive	0.184	0.143	0.244	0.790	0.727	0.829	0.026	0.016	0.050
Employment	0.038	0.032	0.044	0.953	0.945	0.959	0.009	0.007	0.014
Welfare	0.068	0.038	0.113	0.885	0.820	0.923	0.047	0.027	0.088
B. Immigrants, post-reform									
Inactive	0.149	0.085	0.281	0.779	0.633	0.855	0.073	0.039	0.156
Employment	0.042	0.028	0.064	0.921	0.885	0.940	0.037	0.025	0.065
Welfare	0.041	0.018	0.101	0.850	0.717	0.902	0.109	0.066	0.226

Note: Simulation-based 95% confidence intervals are calculated using 1000 replications.

Table A7
Estimation results: alternative definition of states (total population, pre- and post-reform)

Variable	Pre-reform				Post-reform			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.329***	(0.140)	-0.218	(0.239)	2.196***	(0.139)	0.516**	(0.237)
Welfare receipt in t-1	1.310***	(0.257)	1.646***	(0.296)	0.991***	(0.258)	1.767***	(0.285)
Age	0.461***	(0.074)	0.046	(0.142)	0.724***	(0.087)	0.668***	(0.161)
Age squared	-0.579***	(0.082)	-0.037	(0.155)	-0.866***	(0.096)	-0.777***	(0.178)
Female	1.291	(2.044)	0.412	(3.910)	8.237***	(2.316)	15.247***	(4.253)
Age × Female	-0.154	(0.096)	-0.008	(0.181)	-0.498***	(0.108)	-0.770***	(0.197)
Age sq. × Female	0.215**	(0.108)	-0.041	(0.203)	0.610***	(0.122)	0.873***	(0.221)
Education	0.105***	(0.019)	-0.210***	(0.043)	0.046**	(0.020)	-0.181***	(0.043)
School in Germany: no	-0.446***	(0.142)	0.784***	(0.231)	-0.021	(0.196)	0.832***	(0.301)
Married	-0.209*	(0.109)	-1.560***	(0.204)	-0.707***	(0.122)	-1.778***	(0.215)
Health status: good	-0.004	(0.105)	-0.453**	(0.194)	-0.183	(0.116)	-0.571***	(0.205)
No. of kids LT 6	0.598***	(0.132)	0.514*	(0.263)	0.395***	(0.145)	0.169	(0.263)
No. of kids GE 6	0.262**	(0.119)	0.417**	(0.209)	0.186	(0.130)	0.270	(0.215)
Year 2002	-0.156	(0.097)	0.189	(0.189)	—		—	
Year 2003	-0.291***	(0.100)	0.085	(0.197)	—		—	
Year 2004	-0.097	(0.105)	0.521***	(0.201)	—		—	
Year 2007	—		—		0.111	(0.113)	-0.186	(0.197)
Year 2008	—		—		0.304**	(0.121)	-0.252	(0.214)
Year 2009	—		—		0.152	(0.125)	-0.375	(0.229)
Year 2010	—		—		0.216	(0.132)	0.183	(0.228)
Employed in t=0	2.177***	(0.222)	0.095	(0.325)	2.386***	(0.215)	-0.586*	(0.356)
Welfare receipt in t=0	-0.119	(0.310)	2.611***	(0.422)	1.133***	(0.275)	2.375***	(0.354)
M: Health status: good	0.523***	(0.175)	-0.805**	(0.340)	0.612***	(0.202)	-0.217	(0.366)
M: No. of kids LT 6	-1.434***	(0.199)	-0.288	(0.407)	-1.133***	(0.261)	0.035	(0.448)
M: No. of kids GE 6	-0.277*	(0.155)	-0.105	(0.272)	0.181	(0.142)	0.040	(0.246)
Constant	-9.822***	(1.603)	-0.621	(3.149)	-14.574***	(1.892)	-12.341***	(3.546)
$Var(a_{ij})$	2.243	(0.362)	2.063	(0.426)	2.247	(0.344)	3.438	(0.727)
$Cov(a_{i,empl}, a_{i,welf})$	-0.172	(0.592)			0.691	(0.461)		
log likelihood	-4624.9947				-4039.3653			
No. of household-year observations	16,734				15,251			
No. of households	5,094				3,882			

Note: Dynamic multinomial logit models with random effects. Dependent variable: labor market state (inactivity, employment, welfare receipt), *Aufstocker* are coded as employed. M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2000-2010.

Table A8
Estimation results: alternative definition of states (natives and immigrants, pre-reform)

Variable	Natives				Immigrants			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.246***	(0.158)	0.196	(0.294)	2.747***	(0.295)	-0.853*	(0.443)
Welfare receipt in t-1	1.354***	(0.326)	1.852***	(0.371)	1.429***	(0.420)	1.216**	(0.504)
Age	0.530***	(0.089)	0.161	(0.191)	0.293**	(0.128)	-0.097	(0.230)
Age squared	-0.657***	(0.099)	-0.182	(0.209)	-0.389***	(0.145)	0.171	(0.252)
Female	2.830	(2.433)	0.519	(5.098)	-2.564	(3.833)	2.584	(6.951)
Age × Female	-0.225**	(0.114)	-0.008	(0.236)	0.019	(0.182)	-0.099	(0.325)
Age sq. × Female	0.292**	(0.128)	-0.045	(0.264)	0.032	(0.209)	0.054	(0.367)
Education	0.110***	(0.022)	-0.338***	(0.064)	0.099***	(0.038)	0.003	(0.065)
School in Germany: no	—		—		-0.300	(0.213)	0.429	(0.415)
Married	-0.247**	(0.125)	-1.685***	(0.248)	-0.053	(0.231)	-0.926**	(0.411)
Health status: good	0.033	(0.122)	-0.355	(0.244)	-0.102	(0.206)	-0.742**	(0.337)
No. of kids LT 6	0.719***	(0.155)	0.536	(0.367)	0.249	(0.258)	0.743*	(0.414)
No. of kids GE 6	0.207	(0.143)	0.236	(0.280)	0.302	(0.215)	0.714**	(0.334)
Year 2002	-0.258**	(0.112)	0.163	(0.239)	0.169	(0.199)	0.192	(0.321)
Year 2003	-0.319***	(0.116)	0.128	(0.247)	-0.230	(0.198)	-0.081	(0.337)
Year 2004	-0.201*	(0.121)	0.565**	(0.251)	0.222	(0.213)	0.460	(0.351)
Employed in t=0 (2000)	2.474***	(0.263)	-0.366	(0.418)	1.046**	(0.409)	0.608	(0.536)
Welfare receipt in t=0 (2000)	0.057	(0.401)	2.677***	(0.524)	-0.804*	(0.479)	2.545***	(0.753)
M: Health status: good	0.519**	(0.204)	-1.043**	(0.427)	0.584*	(0.341)	-0.226	(0.597)
M: No. of kids LT 6	-1.720***	(0.237)	-0.827	(0.604)	-0.686*	(0.366)	0.070	(0.608)
M: No. of kids GE 6	-0.162	(0.187)	-0.051	(0.371)	-0.442	(0.272)	-0.401	(0.423)
Constant	-11.366***	(1.949)	-1.103	(4.268)	-6.290**	(2.758)	-1.492	(5.056)
$Var(a_{ij})$	2.654	(0.454)	1.958	(0.705)	1.014	(0.547)	2.184	(1.130)
$Cov(a_{i,empl}, a_{i,welf})$	-0.263	(0.559)			-0.561	(0.645)		
log likelihood	-3458.4535				-1128.8688			
No. of household-year observations	13,781				2,953			
No. of households	4,172				922			

Note: Dynamic multinomial logit models with random effects. Dependent variable: labor market state (inactivity, employment, welfare receipt), *Aufstocker* are coded as employed. M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2000-2004.

Table A9
Estimation results: alternative definition of states (natives and immigrants, post-reform)

Variable	Natives				Immigrants			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.213***	(0.153)	0.706**	(0.293)	2.185***	(0.336)	0.304	(0.412)
Welfare receipt in t-1	0.967***	(0.315)	1.884***	(0.346)	1.312***	(0.441)	1.761***	(0.469)
Age	0.732***	(0.095)	1.006***	(0.219)	0.634***	(0.233)	-0.041	(0.281)
Age squared	-0.868***	(0.105)	-1.126***	(0.240)	-0.805***	(0.255)	-0.037	(0.306)
Female	8.240***	(2.550)	22.617***	(5.793)	6.844	(5.852)	-1.615	(7.097)
Age × Female	-0.495***	(0.119)	-1.101***	(0.264)	-0.447*	(0.270)	0.018	(0.329)
Age sq. × Female	0.606***	(0.134)	1.239***	(0.293)	0.555*	(0.302)	-0.012	(0.369)
Education	0.040*	(0.022)	-0.185***	(0.054)	0.126**	(0.055)	-0.061	(0.071)
School in Germany: no	—		—		0.007	(0.306)	0.005	(0.371)
Married	-0.734***	(0.133)	-2.166***	(0.276)	-0.772**	(0.320)	-1.112***	(0.364)
Health status: good	-0.146	(0.130)	-0.934***	(0.260)	-0.346	(0.262)	-0.095	(0.338)
No. of kids LT 6	0.428***	(0.159)	0.198	(0.329)	0.294	(0.353)	-0.016	(0.459)
No. of kids GE 6	0.148	(0.144)	0.448	(0.281)	0.389	(0.304)	0.130	(0.364)
Year 2007	0.122	(0.124)	-0.232	(0.245)	0.029	(0.280)	-0.141	(0.351)
Year 2008	0.272**	(0.132)	-0.092	(0.257)	0.424	(0.302)	-0.510	(0.403)
Year 2009	0.146	(0.137)	-0.532*	(0.283)	0.221	(0.317)	-0.024	(0.409)
Year 2010	0.254*	(0.145)	0.102	(0.281)	0.047	(0.326)	0.249	(0.410)
Employed in t=0	2.452***	(0.240)	-0.940*	(0.480)	2.177***	(0.503)	-0.257	(0.556)
Welfare receipt in t=0	1.129***	(0.328)	2.625***	(0.452)	0.923*	(0.481)	1.698***	(0.512)
M: Health status: good	0.510**	(0.222)	0.009	(0.460)	1.030**	(0.491)	-0.388	(0.605)
M: No. of kids LT 6	-1.075***	(0.293)	0.404	(0.601)	-1.553***	(0.588)	-0.995	(0.694)
M: No. of kids GE 6	0.264	(0.161)	-0.459	(0.344)	-0.232	(0.311)	0.394	(0.374)
Constant	-14.878***	(2.060)	-20.454***	(4.893)	-12.269**	(5.177)	3.647	(6.260)
$Var(a_{ij})$	2.313	(0.382)	3.866	(0.960)	1.707	(0.794)	1.326	(0.823)
$Cov(a_{i,empl}, a_{i,welf})$	0.158	(0.590)			0.555	(0.619)		
log likelihood	-3196.7524				-801.9247			
No. of household-year observations	12,977				2,274			
No. of households	3,266				616			

Note: Dynamic multinomial logit models with random effects. Dependent variable: labor market state (inactivity, employment, welfare receipt), *Aufstocker* are coded as employed. M: denotes individual-specific averages of a variable. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2005-2010.

Table A10
Simulated predicted probabilities of labor market transitions for pre-reform characteristics and post-reform coefficients

State at time $t-1$	State at time t								
	Inactive			Employment			Welfare		
	Mean	95%-CI		Mean	95%-CI		Mean	95%-CI	
A. Characteristics of total population									
Inactive	0.206	0.172	0.251	0.740	0.694	0.777	0.054	0.040	0.073
Employment	0.046	0.038	0.055	0.930	0.918	0.939	0.024	0.019	0.031
Welfare	0.070	0.048	0.101	0.847	0.802	0.878	0.083	0.061	0.114
B. Characteristics of natives									
Inactive	0.209	0.170	0.255	0.747	0.695	0.789	0.044	0.031	0.066
Employment	0.046	0.038	0.054	0.936	0.925	0.946	0.018	0.014	0.025
Welfare	0.072	0.046	0.111	0.851	0.792	0.887	0.078	0.051	0.121
B. Characteristics of immigrants									
Inactive	0.196	0.122	0.317	0.704	0.564	0.786	0.100	0.062	0.168
Employment	0.044	0.027	0.072	0.902	0.853	0.929	0.054	0.034	0.092
Welfare	0.052	0.023	0.108	0.802	0.688	0.861	0.146	0.095	0.244

Note: Simulation-based 95% confidence intervals are calculated using 1000 replications. Calculations are based on estimation results for post-reform period in Tables A2 and 5.

Table A11
Estimation results: including initial period explanatory variables

Variable	Pre refom				Post-reform			
	Employment		Welfare receipt		Employment		Welfare receipt	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Employed in t-1	2.267***	(0.143)	0.065	(0.219)	2.182***	(0.140)	0.554**	(0.223)
Welfare receipt in t-1	1.413***	(0.242)	2.048***	(0.281)	1.481***	(0.240)	1.819***	(0.270)
Age	0.452***	(0.075)	0.173	(0.125)	0.728***	(0.088)	0.535***	(0.151)
Age squared	-0.568***	(0.084)	-0.206	(0.137)	-0.874***	(0.098)	-0.630***	(0.167)
Female	0.503	(2.080)	2.939	(3.407)	7.915***	(2.357)	13.449***	(3.980)
Age × Female	-0.118	(0.097)	-0.151	(0.158)	-0.488***	(0.110)	-0.667***	(0.185)
Age sq. × Female	0.172	(0.110)	0.150	(0.178)	0.604***	(0.124)	0.747***	(0.208)
Education	0.116***	(0.019)	-0.179***	(0.036)	0.059***	(0.021)	-0.177***	(0.040)
School in Germany: no	-0.416***	(0.145)	0.577***	(0.206)	-0.029	(0.201)	0.649**	(0.290)
Married	-0.212*	(0.111)	-1.109***	(0.177)	-0.619***	(0.124)	-1.682***	(0.206)
Health status: good	0.027	(0.106)	-0.466***	(0.173)	-0.139	(0.118)	-0.638***	(0.188)
No. of kids LT 6	0.539***	(0.134)	0.602**	(0.236)	0.395***	(0.146)	0.206	(0.246)
No. of kids GE 6	0.267**	(0.121)	0.406**	(0.188)	0.151	(0.132)	0.201	(0.203)
Year 2002	-0.141	(0.098)	0.056	(0.170)	—		—	
Year 2003	-0.317***	(0.101)	0.146	(0.173)	—		—	
Year 2004	-0.134	(0.106)	0.572***	(0.178)	—		—	
Year 2007	—		—		0.161	(0.115)	-0.377**	(0.181)
Year 2008	—		—		0.351***	(0.122)	-0.402**	(0.195)
Year 2009	—		—		0.229*	(0.127)	-0.673***	(0.212)
Year 2010	—		—		0.276**	(0.133)	-0.056	(0.211)
Employed in t=0	2.337***	(0.230)	0.252	(0.301)	2.554***	(0.219)	-0.369	(0.312)
Welfare receipt in t=0	0.027	(0.295)	2.298***	(0.396)	0.383	(0.292)	2.896***	(0.407)
M: Health status: good	0.517**	(0.215)	-0.443	(0.353)	0.482*	(0.262)	0.015	(0.440)
M: No. of kids LT 6	-1.499***	(0.209)	-0.813**	(0.376)	-1.700***	(0.329)	-0.163	(0.524)
M: No. of kids GE 6	-0.348**	(0.172)	-0.157	(0.266)	0.368	(0.260)	-0.111	(0.410)
I: Health status: good	-0.028	(0.126)	0.044	(0.197)	0.186	(0.152)	-0.424	(0.258)
I: No. of kids LT 6	0.305**	(0.126)	0.061	(0.189)	0.441**	(0.179)	0.199	(0.294)
I: No. of kids GE 6	0.023	(0.087)	-0.172	(0.127)	-0.126	(0.188)	0.290	(0.298)
Constant	-9.806***	(1.630)	-3.030	(2.740)	-14.992***	(1.922)	-9.510***	(3.316)
$Var(a_{ij})$	2.409	(0.384)	1.879	(0.559)	2.396	(0.359)	3.991	(0.824)
$Cov(a_{i,empl}, a_{i,welf})$	0.094	(0.398)			0.054	(0.408)		
log likelihood	-4927.576				-4297.9657			
No. of household-year observations	16,718				15,215			
No. of households	5,077				3,860			

Note: Dynamic multinomial logit models with random effects. Dependent variable: labor market state (inactivity, employment, welfare receipt). M: denotes individual-specific averages of a variable. I: denotes initial-period explanatory variable. The numbers of individuals differ from those in Table A2 because of missing values of initial-period explanatory variables. Significance level: *<0.1, **<0.05, ***<0.01.
Source: SOEP 2000-2010.

Table A12
Predicted probabilities of labor market transitions given subsample-specific average characteristics (estimations including initial period explanatory variables)

State at time $t-1$	State at time t								
	Inactive			Employment			Welfare		
	Mean	95%-CI		Mean	95%-CI		Mean	95%-CI	
A. Total population, pre-reform									
Inactive	0.244	0.205	0.299	0.719	0.663	0.759	0.037	0.026	0.054
Employment	0.055	0.049	0.061	0.936	0.929	0.942	0.009	0.008	0.012
Welfare	0.089	0.062	0.121	0.828	0.770	0.869	0.083	0.057	0.129
B. Total population, post-reform									
Inactive	0.195	0.164	0.239	0.767	0.724	0.799	0.038	0.028	0.052
Employment	0.042	0.037	0.047	0.942	0.936	0.949	0.016	0.013	0.020
Welfare	0.066	0.046	0.093	0.873	0.835	0.900	0.061	0.045	0.086

Note: Simulation-based 95% confidence intervals are calculated using 1000 replications. Calculations are based on estimation results in Table A11.