Are Homeowners Really More Unemployed?[*]

Jakob Roland Munch[†]

Institute of Economics

University of Copenhagen

Michael Rosholm

Department of Economics

University of Aarhus

Michael Svarer

Department of Economics

University of Aarhus

Abstract

This paper investigates the effects of homeownership on labour mobility and unemployment duration. We distinguish between finding employment locally or being geographically mobile. We find that homeownership hampers the propensity to move for job reasons, but improves the chances of finding local jobs, which is in accordance with the predictions from our theoretical model. The overall hazard rate into employment is higher for homeowners, such that there is a negative correlation between homeownership and unemployment duration. Our empirical findings thus contradict the so-called Oswald hypothesis, even if support is found for the main mechanism behind the hypothesis, namely that home ownership hampers mobility.

Keywords: Homeownership, labour mobility, unemployment duration.

JEL Classification: C41, J61, J64, R23.

1 Introduction

Homeownership may influence labour market outcomes in several ways, but, in particular, one link between homeownership and unemployment has been emphasised recently. Oswald (1996) presents evidence that unemployment rates and the proportion of homeowners are positively correlated for a number of countries and regions. The proposed mechanism suggests that homeowners are much less mobile than renters due to costs associated with the buying and selling of their homes, and so they are relatively inflexible in the labour market. Thus, if the proportion of homeowners is high, then the work force is more immobile, which tends to result in higher structural unemployment due to an insufficient supply of labour. In his original work, Oswald presents evidence showing that countries or regions with a 10 percentage point higher share of homeowners have a two percentage point higher unemployment rate.

Homeowners in most Western countries receive favourable tax treatment of the capital invested in their homes (see Hendershott and White (2000)), which, *ceteris paribus*, tends to raise the proportion of homeowners. In light of this, it is not surprising that Oswald's hypothesis – that homeownership causes unemployment – has received considerable attention, and has been investigated more thoroughly in subsequent studies. Nickell and Layard (1996) show in an analysis of 20 OECD countries that when other explanatory covariates are included (such as unionisation rate, coverage rate, degree of wage coordination, replacement rate of UI benefits, duration of UI benefits), the effect of homeownership is reduced from 2 to around 1.3 percentage points. In addition, Green and Hendershott (2001a) conduct an extended analysis for states in the US and find that the relationship only holds for households with middle-aged individuals. In the present study, we also present aggregate data for Danish regions that support the Oswald hypothesis to some extent.

The studies mentioned above all use aggregate data to draw inferences concerning individual behavior. In order for their conclusions to prevail, the positive association between ownership and unemployment should be established on individual data, which is the subject of this paper. Specifically, we investigate whether the positive correlation found between aggregate unemployment and homeownership arises from a positive correlation between unemployment duration and homeownership on the individual level, which is the hypothesised cause of the correlation in aggregate data.

The main innovation of our analysis is the recognition that while homeownership may reduce geographical mobility and the willingness to move for jobs, there is a countervailing effect; in order to avoid having to move, individuals will set lower reservation wages for

accepting jobs in the local labour market. This is likely to increase the transition rate into employment locally, and lower the transition rate into employment outside the local labour market. The net effect on unemployment depends on the empirical magnitudes of each of these two effects. We demonstrate this in a stylised job search model. The theoretical finding that homeowners are less inclined to be geographically mobile and therefore have longer spells of unemployment is the main mechanism proposed behind the Oswald hypothesis. In empirical work, the lesson from the theoretical model emphasises the importance of distinguishing between jobs found in the local labour market (not involving a change of residence) and in distant labour markets (where a change of residence would be necessary). Using a very rich register-based data set of Danish workers' event histories, we test the theoretical predictions in a competing risks duration model with two different employment destinations from unemployment; local jobs and jobs outside the local labour market.

We are not the first to look at this issue from a micro data perspective, but there are only a few recent studies that have done so, and none of them consider competing risks. Coulson and Fischer (2002) test the hypothesis on PSID data from the U.S that owners have poorer labour market outcomes than do renters. Both in terms unemployment duration and wages, they find that this is *not* the case. On the contrary, they find that homeowners fare much better than do renters in the labour market. Coulson and Fischer (2002), however, can be criticized on one major point. They do not consider the potential selection bias issue that is present. This selection bias can arise because some households are inherently less mobile than others (e.g., they could have a preference for stability), and such households are more likely to choose owner occupation, as the fixed costs associated with buying and selling a house are amortised over a longer period, and so user costs are lower. In the event of unforeseen unemployment, these households might be less willing to move for a job, but this is not because of their choice of housing. Rather, it should be attributed to the household's preference for stability. In other words, tenure choice is endogenous to the process that describes individual labour market transitions and failure to take that into account can result in inconsistent estimates of the effect of ownership on the escape rate from unemployment.

A number of studies have addressed the potential selection bias issue. Green and Hendershott (2001b) (also using U.S. PSID data) and Brunet and Lesueur (2003) (using French micro data) use a modified version of Heckman's selection model to purge the empirical model of endogeneity. Specifically, they estimate the probability of being a homeowner and use the predicted value in a duration model for spells of unemployment. Both studies obtain estimates that support the Oswald hypothesis. A concern in these

studies is the way in which they try to correct for selectivity bias. This is acknowledged by Brunet and Lesueur (2003), who state that their procedure does not incorporate a rigorous statistical correction for selectivity bias. A rigorous statistical procedure to correct for selectivity bias is applied by Van Leuvensteijn and Koning (2004). They consider different mechanisms to explain the Oswald hypothesis, and analyse the duration of job spells in the Netherlands, while explicitly controlling for selection bias by simultaneously estimating a binary choice equation for the selection into homeownership and transitions in the labour market. The selection into homeownership is allowed to be correlated with the duration of employment by specifying a bivariate distribution for two unobserved variables, one of which affects the selection process and the other the duration of employment spells. They suggest that the negative correlation between homeownership and unemployment could be attributed to owners' lower job mobility and their increased risk of becoming unemployed. After correcting for self-selection into homeownership, they find that homeownership has no significant impact on job-to-job mobility and that employed homeowners have a lower probability of becoming unemployed, i.e., they find no empirical support for these alternative mechanisms underlying the hypothesis.

We address selection bias in a model that is similar to Van Leuvensteijn and Koning (2004). The selection into homeownership is allowed to be correlated with the duration of unemployment by specifying a bivariate distribution for two unobserved variables, one of which affects the selection process and the other the hazard rate into employment.

As mentioned above, to accommodate for the theoretical predictions in our empirical framework, we estimate a competing risks duration model with two destination specific hazard rates for the transitions from unemployment to employment locally or employment in a geographically distant labour market. In line with the hypothesis, homeownership should have a negative effect on the transition rate from unemployment to jobs involving geographical mobility.

We also investigate whether the overall effect of homeownership on unemployment duration is positive, since this is what the correlations found in aggregate data suggest. According to our search model, the effect of homeownership on the local job hazard rate should be positive, so the negative effect on the "mobility" hazard should dominate the positive effect on the local job hazard.

Our findings suggest that homeownership indeed lowers the propensity to move geographically for jobs while unemployed. Also in line with expectations, homeownership is shown to have a positive effect on the probability of finding employment in the local labour market. However, this positive effect on the hazard rate out of unemployment in the local labour market dominates the negative effect on the mobility hazard, such that

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the overall hazard rate is higher for homeowners. Our empirical findings thus contradicts the so-called Oswald hypothesis, even if support is found for the main mechanism behind the hypothesis, namely that homeownership hampers mobility. The theoretical model suggests an explanation for the negative overall correlation between homeownership and unemployment duration; in countries where geography, history or culture facilitate/necessitate higher geographical mobility for reasons unrelated to homeownership (think of the U.S. vs. continental European countries), it is possible that the effect on the 'mobility' hazard dominates in the overall effect of homeownership on unemployment duration, whereas the opposite may be the case in countries with low 'innate' geographical mobility. This line of argument also illustrates how the macro data correlation found in some of the above-mentioned studies may reflect spurious correlation rather than causality: if innate geographical mobility is high, the proportion of homeowners will be low. At the same time, when mobility is high, geographical mismatches in labour demand and supply are more easily accommodated, and hence unemployment may be low.

The rest of the paper is organised as follows. The next section presents the theoretical search model. Section 3 describes data and briefly characterises the Danish labour and housing markets. Section 4 specifies the empirical model, section 5 presents the estimation results, and section 6 provides conclusions.

2 Theoretical model

In this section, a two-region job search model is set up in order to present the main idea of the paper formally. There are two labour markets, a local labour market and a national labour market, excluding the local market. We assume that the two regions are geographically separated, so workers must live and work in the same region, i.e., commuting is not possible. Let the arrival rate for job offers in the local labour market be α_l and denote the arrival rate for job offers in the national labour market as α_n. The wage offer distribution, $F(w)$, is taken to be identical for the two regions. Unemployed workers receive unemployment insurance (UI) benefits, b, and the discount rate is ρ. Jobs are assumed to last forever, implying that the asset value of employment with wage rate w is

$$V^E(w) = w/\rho. \tag{1}$$

Consider first a situation where the unemployed can move residence between the two regions without incurring any moving costs. Think of this as living in rented housing.[1]

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[1]The assumption of zero mobility costs for renters is for simplicity only. It is sufficient for the model's

Following standard search theory, the expected discounted lifetime income for an unemployed person, V^U, can be expressed as the solution to the asset pricing equation

$$\rho V^U = b + (\alpha_l + \alpha_n) \int_{w^*}^{\overline{w}} \left(\frac{w}{\rho} - V^U \right) dF(w), \tag{2}$$

where w^* is the reservation wage. The reservation wage is the solution to an optimisation problem, where the worker maximises the expected present discounted value of future income streams. Such an optimal reservation wage exists because the value of employment increases in the wage, w, whereas the value of unemployment does not, i.e., employment is more favourable than continued search for wages above w^*. Since the reservation wage is defined by $w^* = \rho V^U$, it can be expressed as

$$w^* = b + \frac{\alpha_l + \alpha_n}{\rho} \int_{w^*}^{\overline{w}} (w - w^*) dF(w). \tag{3}$$

Clearly, in this simple setup, an unemployed worker living in rental housing is indifferent regarding whether to accept a job locally or in a geographically distant region, and hence the reservation wage is the same for accepting a job offer in the two labour markets.

Now, if the unemployed worker lives in owner-occupied housing, accepting a job offer outside the local labour market involves costs associated with selling the house and buying a new one (or finding a rental apartment), c, since the worker must migrate to the new region[2]. In this case, the expected discounted lifetime income becomes

$$\rho \tilde{V}^U = b + \alpha_l \int_{w_l^*}^{\overline{w}} \left(\frac{w}{\rho} - \tilde{V}^U \right) dF(w) + \alpha_n \int_{w_n^*}^{\overline{w}} \left(\frac{w}{\rho} - c - \tilde{V}^U \right) dF(w), \tag{4}$$

where the reservation wage for the local labour market is defined by $w_l^* = \rho \tilde{V}^U$, while the reservation wage for jobs outside the local labour market is defined by $w_n^* = \rho \tilde{V}^U + \rho c$. Thus, the reservation wage for jobs outside the local labour market is larger than the reservation wage for local jobs, since the unemployed person must be compensated for the costs of moving.

To determine the size of w^* relative to w_l^* and w_n^*, equation (4) is rewritten as

$$w_l^* = b + \frac{\alpha_l}{\rho} \int_{w_l^*}^{\overline{w}} (w - w_l^*) dF(w) + \frac{\alpha_n}{\rho} \int_{w_n^*}^{\overline{w}} (w - (w_l^* + \rho c)) dF(w). \tag{5}$$

predictions that the costs of moving are larger for homeowners than for those living in rented housing.

[2]According to Catte et al. (2004), the transaction costs for selling an average-sized house in Denmark are approximately 11% of the sales price. We have no information on the cost of moving out of an apartment. Some contracts state that the rented accommodation should be left in the same condition as it was when it was first occupied. There might therefore be some expenses for painting etc. It is however very unlikely that these expenses amount to the cost of selling a house.

Consider first the sign of $w^* - w_l^*$. After rearranging terms, we obtain

$$w^* - w_l^* = \frac{\alpha_l + \alpha_n}{\rho} \left[\int_{w^*}^{\overline{w}} (w - w^*)dF(w) - \int_{w_l^*}^{\overline{w}} (w - w_l^*)dF(w) \right]$$
$$+ \frac{\alpha_n}{\rho} \int_{w_l^*}^{w_n^*} (w - w_l^*)dF(w) + c\alpha_n \left(1 - F(w_n^*)\right). \tag{6}$$

Now assume $w_l^* \geq w^*$. The term in square brackets is then positive since the option value of search is declining in the reservation wage. The other terms are positive as well, so by contradiction we must have $w_l^* < w^*$.

We can write w_n^* in the following way:

$$w_n^* = \rho c + b + \frac{\alpha_l}{\rho} \int_{w_l^*}^{\overline{w}} (w - (w_n^* - \rho c))dF(w) + \frac{\alpha_n}{\rho} \int_{w_n^*}^{\overline{w}} (w - w_n^*)dF(w). \tag{7}$$

Consider now the differential $w_n^* - w^*$:

$$w_n^* - w^* = \rho c + \frac{\alpha_l + \alpha_n}{\rho} \left[\int_{w_n^*}^{\overline{w}} (w - w_n^*)dF(w) - \int_{w^*}^{\overline{w}} (w - w^*)dF(w) \right]$$
$$+ \frac{\alpha_l}{\rho} \int_{w_l^*}^{w_n^*} (w - w_l^*)dF(w) + c\alpha_l[1 - F(w_n^*)]. \tag{8}$$

Assume that $w_n^* \leq w^*$. Again the term in square brackets is then positive, and the other terms are positive as well, so by contradiction we must have $w_n^* > w^*$. That is, we now have the following result:

Proposition 1 $w_l^* < w^* < w_n^*$.

Homeowners' reservation wage for jobs outside their local labour market is higher than is the reservation wage of renters, because homeowners have to cover their moving costs. Since fewer job offers from outside their local labour markets are acceptable, homeowners try to avoid having to move by reducing their reservation wage for jobs in the local labour market.

To see how moving costs associated with owner-occupied housing affect individual transitions from unemployment, we first state the hazard rate out of unemployment to a job in the local labour market, θ_l, and the hazard rate to jobs involving geographical mobility, θ_n, for renters with no moving costs:

$$\theta_l = \alpha_l(1 - F(w^*)) \qquad \text{and} \qquad \theta_n = \alpha_n(1 - F(w^*)). \tag{9}$$

The exit rate from unemployment is the product of the arrival rate of job offers and the probability that the offer is accepted. For owners, the relevant hazard rates for exit to a new job in the local labour market and the national labour market, respectively, are

$$\tilde{\theta}_l = \alpha_l(1 - F(w_l^*)) \qquad \text{and} \qquad \tilde{\theta}_n = \alpha_n(1 - F(w_n^*)). \tag{10}$$

It follows trivially that $\tilde{\theta}_l > \theta_l$ and $\tilde{\theta}_n < \theta_n$, so unemployed workers in owner-occupied housing have higher transition rates into employment in the local labour market, while they have lower transition rates into jobs in regions outside the local labour market.

Oswald's hypothesis states that homeownership causes the observed positive correlation between homeownership rates and unemployment in aggregate data. In our framework, this implies that the overall hazard rate out of unemployment should be higher for renters than for owners, or $\theta_l + \theta_n > \tilde{\theta}_l + \tilde{\theta}_n$. However, according to the model, it is easy to see that the validity of this claim depends on the relative size of α_l and α_n, and the relative sizes of $F(w_l^*) - F(w^*)$, and $F(w_n^*) - F(w^*)$, which is an empirical question. It is clear that factors such as the geographical layout of a country, the spatial distribution of industries, cultural and linguistic differences between regions etc. are expected to also affect geographical mobility and therefore the offer arrival rate α_n.

A natural extension of the model is to allow for on-the-job search. In the most simple case, where the job offer arrival rates are identical in employment and unemployment we would have that $w^* = w_l^* = b$, and $w_n^* = b + \rho c$.[3] Then, since $\theta_l = \tilde{\theta}_l$ and $\theta_n > \tilde{\theta}_n$, it would always be the case that $\theta_l + \theta_n > \tilde{\theta}_l + \tilde{\theta}_n$ and owners would clearly have longer unemployment spells on average than renters. There is, however, a rather substantial empirical literature that has estimated the job offer arrival rates for unemployed and employed persons. These studies find consistently that the job offer arrival rate for search on-the-job is much lower than the job offer arrival rate of unemployed job searchers, see e.g., Flinn (2002) and Rosholm and Svarer (2004) and the references therein. Extending the model with different arrival rates for employed and unemployed complicates the model, but does not affect the qualitative predictions of the model. The reason why a homeowner has a lower reservation wage locally is that his option value of continued search is lowered by moving costs. Likewise, his reservation wage for non-local jobs is higher due to the direct effect of the realised moving costs if he decides to accept the job offer. This is still the case after introduction of on-the-job search with different arrival rates.

Another extension of the model would be to let b be lower for homeowners than it is for renters, because owning is essentially an investment with high initial costs, such that owners have higher disutility of "losing the home". The implication is that the

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[3]We owe this point to an anonymous referee.

reservation wage for owners in the local labour market will still be lower than that for renters, while the reservation wage for jobs outside the local labour market may now be higher or lower for owners than for renters depending on the relative order of magnitude of moving costs versus the disutility. It would also depend on whether those who move would become owners or renters in their new locations, hence the theoretical model would be more complex. As the theoretical model here is mainly to be viewed as a framework for interpretation of our empirical results, we have not modelled this case. In addition, it could be argued that the more likely response of homeowners to moving costs would be to increase their search intensity locally. However, the implication for the hazard rates would be similar. Moreover, the hazard rates are the focus of the empirical part of this paper, in which we do not investigate wage differences between owners and renters.

Of course there may be other effects of homeownership on the labour market. First, the willingness to commute, and hence realised commuting distance, could be greater for unemployed workers who are homeowners. In a related model, Manning (2003) shows that the reservation wages increase with commuting distance if higher commuting distance is associated with a loss of utility. However, to introduce commuting distance into the model presented here would be beyond the scope of the paper. Nevertheless, it is clear that commuting is another mechanism, that implies that homeowners may have higher job finding rates locally than do renters; if owners face higher costs of mobility, they would be willing to commute longer, giving them a higher local job offer arrival rate (because their local labour market is larger). This would tend to give them a higher job finding rate for local jobs and a lower job finding rate for jobs outside the local labour market (because the non-local labour market has shrunk in size). Hence, commuting would tend to generate the same outcomes as those posited in our model. Since we have no available data on commuting, we are unable to distinguish between the two mechanisms. The potential effect of commuting however should be kept in mind when interpreting the results.

Second, by setting a lower reservation wage for local jobs, unemployed workers accept matches with lower productivity (lower wages). This implies an efficiency loss for the economy as a whole. Moreover, it implies that employed individuals in owner occupied-housing units will conduct more on-the-job search, *ceteris paribus*, because they have more to gain from doing so. However, it is beyond the scope of this paper to analyse these effects in depth.

3 Data and the Danish labour and housing markets

The Danish labour market is characterised by having a high turnover rate, which is due to weak employment protection and high unemployment benefit replacement rates. At the same time, the labour market is highly unionised and the wage structure is very compressed. Also, active labour market measures play an important role, and in a review of active labour market policies in Europe, Kluve and Schmidt (2002) find that the extent of participation in active labour market programmes in Denmark stands out. The geographical mobility of both employed and unemployed workers is modest, and regional migration rates are at the low end compared to other continental European countries, cf. OECD (2002) and Danish Economic Council (2002). For the unemployed, 50 percent of migration costs can be reimbursed if they move to get a job, but the lack of mobility is illustrated by the fact that only 26 applications for reimbursement were accepted in the first quarter of 2002. Furthermore, since 1994, regional migration rates have declined somewhat even though regional unemployment disparities have been constant or rising.

The Danish housing market is comprised of four different main segments. The largest part is owner-occupied housing, including somewhat more than 50% of all housing units. Private rental housing and social housing each constitute almost 20% and cooperative housing accounts for 6 % of the housing market. The alternative to being an owner is to rent, and of particular relevance here is that the markets for private rental housing, social housing and cooperative housing are heavily regulated by rent controls. For the private rental market, Munch and Svarer (2002) show that rent control seriously distorts mobility, as tenancy duration is longer the more regulated the rent of the dwelling is.

To investigate the causes behind mobility of unemployed workers in Denmark, a very rich data set, which is drawn from administrative registers, is employed. The data set is a flow sample of all unemployment spells beginning between 1997-2000 for individuals in a 10% random sample of the Danish population. The sample is restricted to include only the inflow to unemployment of workers in the age group 19-66 years. The duration of each unemployment spell is known in weeks, and the subsequent destination state (new job locally, new job in another geographic area, other states than employment and unemployment) is known as well. In addition, there is access to information on a number of demographic and socio-economic variables for each individual.

The local labour markets between which migration takes place are so-called commuting areas, which are defined such that the internal migration rate is 50% higher than the external migration rate, cf. Andersen (2000). The commuting areas are based on geographically connected municipalities, and the 275 municipalities in Denmark are merged

into 51 such commuting areas. An unemployed worker is then defined to be geographically mobile if he or she gets a job and moves to another commuting area up to 8 weeks before and 52 weeks after the beginning of the job spell[4]. This definition is based on the fact that the majority of all moves take place within this interval, reflecting that workers typically first accept a new job and then search for a permanent new residence. Gregg et al. (2003) find a similar pattern for the UK.

In the data set, there are 75,806 persons with at least one unemployment spell and altogether there are 208,775 unemployment spells. Of these spells, 30% end with employment locally, 1.2% end with employment in a distant labour market, 29% end with a return to latest employer, 25% terminate with nonparticipation, and 15% are uncompleted. Thus among all spells that are completed with employment, 2% end with employment in another local labour market[5]. Table 1 reports descriptive statistics for the individual characteristics behind the spells.

Insert Table 1 about here

The explanatory variables used in the econometric analysis contain first of all an indicator concerning homeownership. This variable is allowed to vary over time according to the present homeowner status of the unemployed. Other variables are the age of the worker, gender, number of dependent children (aged 0-17), whether the person lives in a two-adult household, whether or not the person is an immigrant from a non-OECD country, the size of the municipality, the educational level of the worker, whether or not the person is a member of an unemployment insurance fund, and finally, if so, the UI replacement rate.

3.1 Proportion of homeowners and level of unemployment

The Oswald hypothesis is based on the positive correlation between the proportion of homeowners in a given country or region and the corresponding level of unemployment found in various aggregate data sets. Before we investigate the hypothesis on micro data, we take a look at some aggregate data for Denmark. In Table 2, we show the

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[4]Exact moving dates are known for all individuals.

[5]Calculations based on the European Community Household Panel show that among all unemployment spells in Denmark that end with employment, 4.1% are also associated with a residential move within the next year (thus not requiring it to be a move to another local labour market). This mobility rate is higher only in Luxembourg and Finland, while it is below 2.5% in Ireland, Italy, Greece, Spain, Portugal and Austria. In France and the UK, it is 3.2% and 2.8% respectively. Thus, the mobility rate in Denmark is at the high end among European countries.

Pearson coefficient of correlation between the share of homeowners in each municipality in Denmark (there are 275 different municipalities) and the regional level of unemployment. We do not have access to rates of unemployment on the municipal level. Instead, we use a measure of regional unemployment constructed by the Institute for Local Government Studies in Denmark. The measure gives the unemployment rate in an area around the municipality. The area is defined by how far an individual living in a given municipality can commute without having a daily cost associated with commuting that exceeds DKK 60 (corresponds to approximately Euro 9 in 1987 prices). The data are available in the period between 1987-2000.[6]

Insert Table 2 about here

From 1987 to 1993, our aggregate data support the finding in Oswald (1996) and Nickell and Layard (1999). After 1993, the relationship is not significant. In the observation period of the micro data, 1997-2000, the correlation is either zero or positive, albeit not significantly positive. In 2000, the correlation is positive and significant at the 10% level. Thus, this pattern of correlations is roughly in accordance with analyses of the aggregate data sets that have been used to support the Oswald hypothesis. To investigate whether the pattern reflects causality or is 'spurious', we now turn to an analysis of the patterns actually found in the micro-data.

3.2 Non-parametric hazard functions

A first impression of the association between homeowner status and unemployment duration is obtained by plotting different Kaplan-Meier estimates of the escape rate from unemployment. In Figure 1, we show the non-parametric single risk hazard functions for moving from unemployment to employment. We distinguish between owners and non-owners.

Insert Figure 1 about here

As can be seen owners have a consistently higher escape rate from unemployment than do non-owners. This first picture is at odds with the Oswald hypothesis. The picture is, however, in line with Coulson and Fischer (2002), who show – based on U.S. micro data – that homeowners have better labour market outcomes than do renters. Compared to Brunet and Lesueur (2003), who investigate the same issue on French micro data, the results are not consistent. In the French labour market, owners experience

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[6]We are grateful to Leif Husted at the Institute for Local Government Studies for providing us with these data.

unconditionally longer unemployment periods than do non-owners. We will not discuss the diverging results any further at this stage. Instead, we present Kaplan-Meier estimates of the competing risks hazard functions. Figure 2 shows the hazard functions for moving from unemployment to a job in the local labour market.

Insert Figure 2 about here

Once more, it is clear that owners have a higher escape rate than do non-owners, which is in clear accordance with the theoretical model presented in Section 2. In Figure 3, we show the hazard functions for finding employment in geographically distant labour markets. In this case, the non-owners have a higher escape rate. This picture is in accordance with both the theoretical model and also with the main proposal of the Oswald hypothesis, namely that owners experience higher a degree of unemployment because they are less geographically mobile. The difference between the two hazard functions beyond 12 months is not statistically significant.

Insert Figure 3 about here

In the remainder of this paper, we take a closer look at the relationship between homeownership and unemployment duration. Specifically, we investigate whether homeownership is endogenous with respect to the unemployment process, and if so, if this is the reason behind the observed negative association between homeownership and unemployment duration in the raw data.

4   Econometric model

In order to investigate the effect of homeownership on unemployment duration we apply an empirical model that is quite similar to that used by Van Leuvensteijn and Koning (2004). The part of the model that describes transitions in the labour market is specified as a competing-risks mixed proportional hazard model. Two transition rates out of unemployment are modelled: the unemployed can leave unemployment for a (new) job locally (l) or for a job in another local labour market by being mobile (n). All other destinations (e.g., out of the labour force and recall to last employer) are treated as right censored observations[7]. Each destination specific hazard $j = l, n$ is the product of the baseline hazard, which captures the time dependence in the hazard rate and a function

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[7]This is discussed further in section 5.1.

of observed characteristics, x, a time varying indicator for ownership status, z_t, and unobserved characteristics, v_j

$$\theta_j\left(t|x, z_t, v_j\right) = \lambda_j\left(t\right) \cdot \exp(\beta_j' x + \gamma_j z_t + v_j), \tag{11}$$

where $\lambda_j\left(t\right)$ is the baseline hazard and $\exp(\beta_j' x + \gamma_j z_t + v_j)$ is the systematic part of the hazard. The baseline hazards are specified flexibly, as both $\lambda_l(t)$ and $\lambda_n(t)$ have a piecewise constant specification, such that they are constant within duration intervals.

To account for possible endogeneity of the homeownership variable, z_t, we simultaneously model the probability of being a homeowner and the transition rates out of unemployment. The probability of being a homeowner depends on explanatory variables, x, and an unobserved component, v_h, and is specified as a logit model

$$P(x, v_h) = P(z_t = 1|x, v_h) = \frac{\exp(\beta_h' x + v_h)}{1 + \exp(\beta_h' x + v_h)}. \tag{12}$$

We assume that all sources of correlation between the two processes - beyond those captured by the observed explanatory variables - can be represented by the individual-specific heterogeniety terms. These terms are assumed to be time-invariant and hence constant across replications of the same process for the individual. Due to multiple occurrences of both unemployment spells and ownership status for the individuals, we can exploit the multiple spell feature of our data to identify the effect of homeownership on the exit rate from unemployment, as suggested by identification results for duration models with multiple spells cf. Honoré (1993). This identification approach has been used in a series of papers by Lillard and coauthors (see e.g., Panis and Lillard (1994), Lillard et al. (1995), and Upchurch et al. (2002)). Identification requires that we – for at least a subset of individuals – observe unemployment spells both when the individual is a homeowner and when the individual is a renter. The intuition for identification is spelled out in Panis (2004). In terms of our application, his argument goes as follows: suppose we observe only one respondent over a long period of time during which he switches homeowner status. With a sample of one, there is no heterogeneity and no correlation across equations, such that the equations are independent. The effect of homeowner status on exit rates from unemployment is identified because of repeated observations on unemployment spells and variations in homeowner status. More generally, conditional on heterogeniety, the equations are independent and identification rests on repeated outcomes with intraperson variation in homeowner status[8]. In terms of intraperson variation in homeowner status 16% of the individuals in the sample are observed both as renters and as homeowners.

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[8] Identification of the homeowner effect is further discussed in section 5.1.

The contribution to the likelihood function from an individual in our model is

$$\mathcal{L} = \prod_{m=1}^{M} \left\{ \begin{array}{c} \int \int \int P(x_m, \upsilon_h)^{z_{tm}} (1 - P(x_m, \upsilon_h))^{1-z_{tm}} \\ \theta_l \left(t | x_m, z_{tm}, \upsilon_l\right)^{d_{lm}} \theta_n \left(t | x_m, z_{tm}, \upsilon_n\right)^{d_{nm}} \\ \exp\left(-\int_0^t \theta_l \left(s | x_m, z_{sm}, \upsilon_l\right) ds - \int_0^t \theta_n \left(s | x_m, z_{sm}, \upsilon_n\right) ds\right) \end{array} \right\} dG(\upsilon_l, \upsilon_n, \upsilon_h),$$

(13)

where d_l and d_n are destination indicator variables for the unemployment hazard rates (thus also taking into account censoring of the duration variable), M is the number of unemployment spells the individual experiences in the sample period, and $G(\upsilon_l, \upsilon_n, \upsilon_h)$ is the joint cdf of the unobservables. We use a flexible and widely applied specification of the distribution of the unobservables; it is assumed that υ_l, υ_n and υ_h each can take two values, where one of the support points in each destination specific hazard is normalised to zero (i.e., $\upsilon_{l1} = 0$ and $\upsilon_{n1} = 0$), because the baseline hazard acts as a constant term in the hazard rates. Thus, there are eight possible combinations of this trivariate unobserved heterogeneity distribution, each with an associated probability. For more details on this class of mixture distributions in duration models, see e.g., van den Berg (2001).

5   Results

This section first presents estimation results of a simplified version of the duration model, where no distinction is made between finding employment locally and finding employment by being mobile (i.e., a single risk duration model), but where the selection into homeownership is accounted for. The first two columns in Table 3 show estimated coefficients and their standard errors of the unemployment hazard, while columns three and four contain parameter estimates and standard errors of the selection equation.

Insert Table 3 about here

With respect to explanatory variables in the selection into homeownership, it appears that older workers and households with two adults are more likely to be homeowners, as expected. Also, individuals living outside Copenhagen are more likely to own their homes and individuals with vocational education are more often homeowners than are individuals in other education groups. Uninsured workers are less inclined to own, while UI fund members are less likely to be homeowners the higher the benefit replacement rate they have. Since the UI system has a quite low ceiling, this basically means that the wage is positively correlated with homeownership.

From the first column of Table 3, we conclude that homeowners have a higher transition rate from unemployment to employment than do renters. That is, owners have, *ceteris paribus*, shorter spells of unemployment, and this contradicts the positive correlation observed in Oswald's (1996) aggregate data, and in our own regional data, see Section 3.1 above.

With respect to other covariates, it can be noted that age has a negative effect on the hazard rate and women – particularly those with children – also have a lower hazard rate. Education improves the chances of escaping unemployment and the replacement rate of unemployment benefits has a negative effect, which is a standard result.

The unobserved heterogeneity terms in the selection equation, v_h, and in the hazard rate, v_e, are clearly correlated, so it is of importance to correct for selectivity. However, when the model is estimated without correction for selection into homeownership, the coefficient to homeownership in the hazard is still significantly positive, but somewhat surprisingly it is lower. This means that there is a negative correlation between unobserved components in the two equations, such that unobserved characteristics that make the unemployed more likely to be a homeowner also have a negative effect on the transition rate out of unemployment. This finding is to some extent counterintuitive, since one would expect people with more favourable employment prospects to be more likely to acquire housing. The results indicate, however, that this effect is captured by the observed characteristics that we include in the model. The negative correlation is more likely caused by the composition of the pool of unemployed people. In Munch et al. (2005), the impact of homeownership on job duration in Denmark is investigated. They find that homeowners are less likely to become unemployed, and this could indicate that people with a higher probability of becoming unemployed are less likely to acquire housing than is the population in general. It is presumably this effect that is captured by the negative correlation. In other words, individuals with more unstable career paths are less likely to buy their own homes and are more often found among the unemployed.

The single risk hazard model offered no support for the Oswald hypothesis, but the main proposed mechanism behind the hypothesis is that homeowners' geographical mobility is expected to be reduced. Therefore, the next step is to estimate the competing risks duration model, where a distinction is made between finding a job by being geographically mobile and finding a job in the local labour market. The first two columns of Table 4 show estimated coefficients, β_n, and their standard errors in the hazard rate for finding a job in another region, while columns three and four contain those of the local job hazard

rate, β_l. Columns five and six contain parameter estimates of the selection equation.

Insert Table 4 about here

Before turning to the relationship between homeownership and unemployment duration, we offer some comments on the effects of other covariates. Most variables seem to have a stronger impact on the mobility hazard than on the local job hazard. For example, being 50 or more years of age reduces the local job hazard by 38% $(= exp(-0.48) - 1)$ compared to being between 40-49 years old, but it reduces the mobility hazard by 68%. Interestingly, some variables have opposite effects on the two destination specific hazard rates. Unemployed workers living in households with two adults have a higher local job hazard but a lower mobility hazard than do single workers. Living outside the Copenhagen metropolitan area has a strong positive effect on the mobility hazard, while it has a negative effect on the local job hazard. This is probably because of thin market effects, since the Copenhagen metropolitan area is by far the largest local labour market. It should also be noted that the estimated destination specific hazard rates exhibit negative duration dependence (except for the first couple of months for the mobility hazard), i.e., they decline with unemployment duration, cf. Figure 4. Figure 4 also reveals that the mobility hazard is much lower than is the local job hazard, reflecting that geographical mobility is a rather rare phenomenon.

Insert Figure 4 about here

The findings indicate that homeownership has the expected effect, as it indeed lowers the propensity to move for job-related reasons. Hence, there is weak support for the Oswald-hypothesis in the sense that ownership reduces the chances of escaping unemployment by being geographically mobile. Also in line with the theoretical search model, homeownership has a positive effect on the probability of finding employment in the local labour market. This positive effect on the much higher local job hazard (see Figure 4) overrides the negative effect on the mobility hazard, such that there is a positive overall effect of homeownership on the transition rate from unemployment to employment, cf. Table 3. Put differently, the *reasoning* behind the Oswald hypothesis is empirically supported, since homeownership reduces the propensity to move for job-related reasons, but because so few workers move to get a job, this mechanism is not important enough to be evident in an overall positive correlation between homeownership and unemployment. Hence, the non-negative correlation found in aggregated regional data would have to come from other sources.

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5.1   Robustness of the results

Above, we investigate the association between unemployment and homeownership through mobility. There is also reason to believe that there is a relationship between homeownership and unemployment that has nothing to do with mobility and likewise a relationship between homeownership and mobility that has nothing to do with unemployment. In terms of the first relationship, it could be argued that a higher housing wealth net of the mortgage debt decreases the escape rate out of unemployment (see, e.g., Lentz and Tranæs (2005) for a justification of this relationship in terms of financial wealth), and this relationship is absent for renters. In order to address this issue, we included variables for the market value of the home and the mortgage debt ratio in the home (i.e., they take the value zero for renters). These variables did not have any significant effect on any of the destination specific hazard rates. Neither did the inclusion of these explanatory variables have any effect on the relationship between homeownership and the cause-specific hazard rates.

In terms of investigating the relationship between homeownership and mobility, we also include a range of explanatory variables that has been found to affect individual mobility. The most prominent are age, level of education, marriage market status and the presence of children. Since these explanatory variables at the same time are likely to be associated with homeowner status, they should be included in order to justify the empirical test of our theoretical hypothesis. Younger individuals are more likely to be geographically mobile and at the same time less likely to be homeowners, so it could be argued that the negative effect we find between homeownership and geographical mobility in the hazard rate out of unemployment is due to the behaviour of younger individuals. The inclusion of the age dummies confirms that the reported association between homeownership and mobility when returning to employment is not a spurious effect caused by the behaviour of young individuals. Likewise, Greenwood (1997) and Compton and Pollak (2004) have shown that geographical mobility is more pronounced among higher educated individuals, and the results from the homeowner equation reported in Table 4 show that more educated people are less likely to own homes. By conditioning on level of education, we purge the results from this confounding effect. Related to this point is the behaviour of married and cohabiting couples. Mincer (1978) argues that families are less likely to be geographically mobile compared to single person households. The reason is that the return to mobility, e.g., through a new job offer for one of the spouses, should be weighted against the combined costs of moving for the household; a comparison that is less likely to favour a move if the spouse is working. In terms of housing decisions, families are more likely to

be homeowners. Presumably, they realise they are less likely to move and therefore are more willing to invest in a house, knowing that some of the investment is irreversible as a consequence of the relatively high transaction costs. The latter phenomenon is reinforced by the presence of children. We therefore also condition on marriage status and the presence of children in the empirical model.

To investigate whether the effect of homeownership varies across different types of households, we also included interaction terms between the homeowner variable and a number of other covariates, such as the presence of children and the age group dummies. The interaction term between homeownership and the presence of children only entered the local job hazard significantly with a positive coefficient. The age group terms also only entered the local job hazard significantly (the effect is biggest for the 40-49 year olds and smallest for the 25-29 year olds). However, these household differences are not important enough to change the total effect of homeownership for any of the separate subgroups in any of the hazards.

Another important issue is econometric identification of the homeowner effect. The model could also be identified by including covariates in the homeowner equation that are not included in the unemployment hazard equations. This approach is pursued by Van Leuvensteijn and Koning (2004), who use the regional homeowner rate as an instrumental variable. We also ran regressions using this instrumental variable, but it did not change the results in any significant way.[9]

The robustness of the results was also considered by estimating the model with different specifications of the distribution of unobservables. Specifically, we tried to include more points of support in the destination specific hazard rates, but this did not change the results. Van den Berg (2001) notes that the methodological and empirical literature provides evidence that discrete distributions are sufficiently flexible to capture "random effects" unobserved heterogeneity, and our findings seem to support this finding.

Even if the mobility rate in Denmark lies in the intermediate range compared to other European countries (see section 3), it is of interest to see whether the results still hold in

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[9]We estimated the following four different models: 1) only one spell per person and no instrument, 2) one spell and the instrument, 3) multiple spells and no instrument (see Table 4), and 4) multiple spells and the instrument. In all cases, there was a significant negative impact of homeownership on the mobility hazard and a significant positive effect on the local job hazard. However, the quantitative impact of ownership changed in the single spell models (compared to the results of Table 4, the coefficients to the homeowner variable were 0.1129 and -0.9129 respectively in model 1 and 0.1054 and -1.1656 respectively in model 2). In model 4, the coefficients to the ownership variable were only marginally different from those presented in Table 4. All in all, we take this as evidence for the claim that what matters for identification is information about multiple spells.

sectors of the economy where mobility is higher. To this end, we estimate the model with a different definition of local labour markets. Instead of using the 51 commuting areas we use the 275 municipalities. When these smaller municipalities are used, the mobility rate roughly doubles. In addition, we estimate the model for unemployed people below the age of 40, unemployed people with further education and a combination of both (here the mobility rate more than doubles). In all cases, the qualitative results were unchanged; the effect of homeownership is positive on the local job hazard and negative on the mobility hazard.

Finally, the right censoring of transitions from unemployment to states other than employment locally or in a distant labour market could produce biased results if they are endogenous. However, adding extra risks (for nonparticipation and recall from the last employer) leaves the effects of homeownership almost unchanged.[10]

5.2   Discussion

The main result that homeownership overall is negatively associated with the duration of unemployment contrasts the findings for the U.S. by Green and Hendershott (2001b) and for France by Brunet and Lesueur (2003). Apart from different econometric approaches, one particular issue might play an important role in explaining the diverging results. Regional mobility is more important for the functioning of the U.S. labour market, so homeownership has greater potential to do some damage there, cf. the discussion in the introduction and the theoretical section.[11]   In Denmark and in many other European countries, regional mobility is lower than in the U.S. This is also consistent with the model in the sense that transaction costs for sales of houses is typically lower in the U.S. than it is in Europe. According to Catte et al. (2004), the transaction costs for sales of medium-sized houses in the U.S. is around 9% of the sales price, whereas in the European countries (for which they have data), the transaction costs are in all cases above 10% of the sales price (11% in Denmark).

Our theoretical model can thus explain these apparent contradictory results; in countries where culture (linguistic and cultural differences between regions etc.), geography (landscape size, distance between regions, population spread etc.) or the spatial distribution of economic activity lead to higher geographical mobility for reasons unrelated to homeownership, it is possible that the effect on the mobility hazard dominates in the

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[10]The full set of results reported in this subsection are available upon request.

[11]With respect to the study by Brunet and Lesueur (2003), regional mobility is also relatively important for the French labour market as regional migration rates are among the highest in continental Europe, cf. OECD (2000).

overall effect of homeownership on unemployment duration, whereas the opposite may be the case in countries with low 'natural' geographical mobility. That is, the sign of the correlation (in aggregated regional data) between unemployment duration and homeownership depends on the size of the mobility offer arrival rate, α_n, relative to the local job offer arrival rate, α_l.

This line of reasoning illustrates how the macro data correlations found in some of the above-mentioned studies may reflect spurious correlations rather than causal relationships: if 'natural' geographical mobility is high, the proportion of homeowners will be low. At the same time, when mobility is high, geographical mismatches in labour demand and supply are more easily accommodated, and hence unemployment may be low. Conversely, if natural geographical mobility is low, people are more inclined to buy their homes and structural unemployment may be higher. Thus, cross-country/region regressions of the aggregate unemployment rate on the homeownership rate that do not control for the level of natural geographical mobility may erroneously reach the conclusion that homeownership increases unemployment.

Another channel through which the macro data correlations may become spurious is if the causal relationship does not arise through unemployment duration, but rather through job duration. homeowners may be more likely to become unemployed possibly because they find themselves in 'bad' matches because of their relative reluctance to move for better job opportunities. The latter explanation, however, is rejected by Van Leuvensteijn and Koning (2004) on Dutch data and by Munch et al. (2005) on Danish data, since homeowners in these studies have a lower probability of becoming unemployed.

In addition to the geographical or cultural country characteristics discussed above, homeownership also competes with a number of other candidate variables to explain both mobility and unemployment. One candidate variable is relatively easy access to early retirement schemes and disability pensions. In a comparison between Europe and the U.S., Decressin and Fatas (1995) find that, in Europe, region-specific shocks are absorbed by adjustments in the participation rate, whereas in the U.S., workers move. For both areas, the unemployment rate plays a minor role as an adjustment mechanism. Also, generous unemployment benefits are available without being conditional on job search in other regions, i.e., monitoring and sanctions in the search process are typically not implemented. The implication is that, first, if an individual becomes unemployed, it may not be necessary to move, even if a job cannot be found in the local labour market. Moreover, reservation wages will be fairly high, and hence, unemployment duration could potentially be quite long. Second, given the relatively generous levels of unemployment benefits, income uncertainty is lowered, and hence, the risk that an individual who loses a job will

not be able to pay the mortgage is lower. Therefore, in countries with generous benefit schemes, homeownership may be associated with lower risk than in countries without such a social security net. This would tend to give positive correlations in aggregated regional data between unemployment rates and homeownership, while at the macro level the causal relation would be the opposite. Hence, the apparent conflicting signs of the correlations can easily be explained.

Finally, it should also be mentioned that the markets for rented housing in Denmark are regulated by rent controls, which prolong tenancy durations (although average tenancy duration in the rental sector is still much lower than it is in owner-occupied housing units). We show in a companion paper (see Svarer et al. (2005)) that this also distorts labour mobility. Thus, the alternative to being a homeowner is being a renter in a regulated market with relatively low mobility.

6   Conclusion

This paper has examined the micro data foundation for the positive correlation between homeownership and unemployment as observed by Oswald (1996) and others. Based on a theoretical search model, we first showed that homeowners should have a reduced propensity to move for job reasons, which is the main mechanism proposed behind the hypothesis in the literature. However, in addition, homeowners should also have a lower reservation wage for local jobs because of costs associated with the selling and buying of their homes. The net effect of homeownership on unemployment duration is ambiguous, but if the observed pattern in aggregate data is to be believed, the negative mobility effect should dominate.

Our results support the first two predictions, as owners are less likely to find employment in another region and more likely to find employment locally than are renters, but the net effect of homeownership on unemployment duration is negative, thus contrasting the Oswald hypothesis. Hence, our results do not infirm the theoretical prediction stating that homeowners reduce their reservation wage for local jobs, and this effect is quantitatively more important than is the negative mobility effect. This result is found even though the correlation between the unemployment rate and homeownership is positive at the regional level.

We conclude that in a labour market with a low level of mobility, which along with a high homeownership rate can be attributed to other characteristics, such as incentives to leave the labour force, active labour market policies etc., homeownership does not lead to longer unemployment spells on average. It is possible that in countries where geographical

mobility is a more important element of the functioning of the labour market (such as in the U.S.), homeownership might have an overall detrimental effect on unemployment. However, this is not likely to be the case in many European countries.

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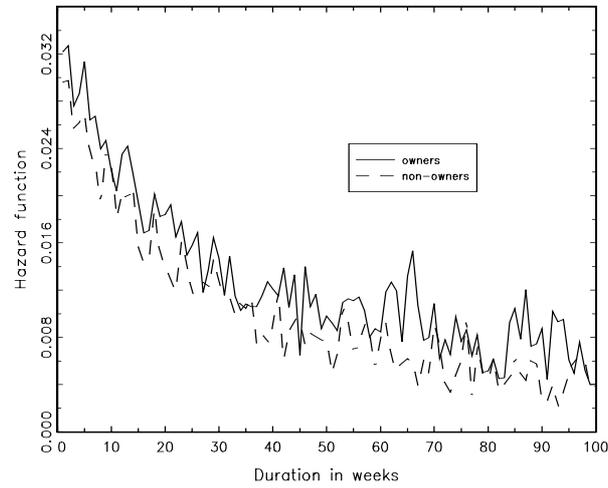# A   Appendix: Tables and figures

Figure 1: Kaplan-Meier hazard functions.
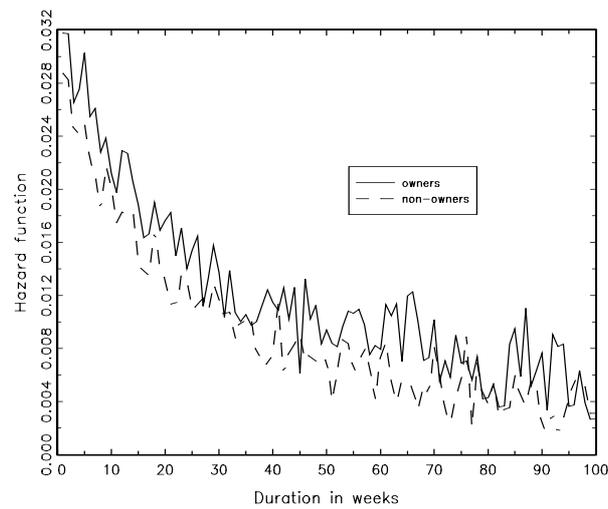
Figure 2: Kaplan-Meier hazard function for unemployed who find job locally.
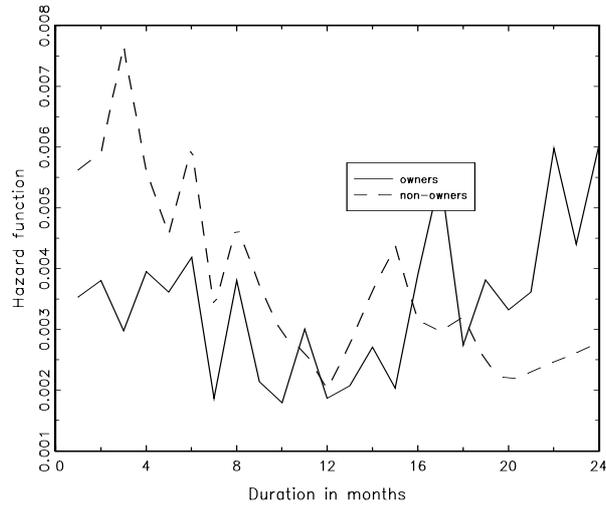
Figure 3: Kaplan-Meier hazard functions for individuals who find a job nationally. Due to few exits the hazard functions are presented in monthly intervals.

TABLE 1

DESCRIPTIVE STATISTICS

Variables	Mean	Stdv.
Home ownership	0.5708	0.4950
Age 19-24	0.1436	0.3507
Age 25-29	0.1550	0.3619
Age 30-39	0.2790	0.4485
Age 40-49	0.2100	0.4073
Age 50 +	0.2124	0.4090
Female	0.5618	0.4962
Children 0-17 years	0.3642	0.4812
Two adults	0.6172	0.4861
Non OECD country	0.0260	0.1590
Copenhagen	0.2829	0.4504
Large city	0.2845	0.4512
Small city	0.4326	0.4954
Basic schooling	0.4084	0.4915
Vocational education	0.3721	0.4834
High school	0.0803	0.2718
Higher education	0.1392	0.3461
Non insured	0.1403	0.3473
UI replacement rate	0.7043	0.2907
# observations	208,775	

Note: Means are averages over spells. The mean

UI replacement rate is reported for members of

UI funds

TABLE 2

COEFFICIENT OF CORRELATION: HOME OWNER AND UNEMPLOYMENT

Year	Correlation	P-value
1987	**0.1437**	0.0171
1988	**0.1854**	0.0020
1989	**0.1840**	0.0022
1990	**0.1915**	0.0014
1991	**0.1815**	0.0025
1992	**0.1239**	0.0400
1993	**0.1423**	0.0182
1994	0.0620	0.3052
1995	-0.0153	0.7998
1996	-0.0096	0.8740
1997	-0.0064	0.9157
1998	0.0406	0.5016
1999	0.0838	0.1655
2000	0.1083	0.0729

Note: Bold numbers indicate a significant parameter estimate (5 % level).

TABLE 3

ESTIMATION RESULTS: SINGLE RISK MODEL

Variables	Unemployment hazard		Selection equation	
	Coeff.	Std. err.	Coeff.	Std. err.
Home ownership	**0.3478**	0.0150		
Age 19-24	**0.4754**	0.0164	**-0.9132**	0.0277
Age 25-29	**0.3628**	0.0154	**-1.3679**	0.0260
Age 30-39	**0.1523**	0.0137	**-0.8130**	0.0242
Age 50 +	**-0.4961**	0.0149	**0.3122**	0.0280
Female	**-0.1101**	0.0117	0.0347	0.0183
Children 0-17 years	**0.0630**	0.0163	-0.0215	0.0320
Female × children	**-0.2993**	0.0199	**1.1576**	0.0184
Two adults	**0.0327**	0.0108	**0.2814**	0.0360
Non OECD country	**-0.8106**	0.0314	**-2.4962**	0.0339
Large city	**-0.0374**	0.0119	**0.6691**	0.0192
Small city	0.0089	0.0113	**1.0426**	0.0184
Basic schooling	**-0.2677**	0.0108	**-0.3143**	0.0171
High school	**0.1249**	0.0173	**-0.2645**	0.0274
Higher education	**0.1093**	0.0148	**-0.3820**	0.0243
Non insured	**-0.8212**	0.0250	**-2.2142**	0.0439
UI replacement rate	**-0.3330**	0.0285	**-0.9939**	0.0514
$\upsilon_{e,2}$	**1.2816**	0.0139		
$\upsilon_{h,1}$	**-2.9748**	0.0443		
$\upsilon_{h,2}$	**2.5764**	0.0444		
$P(\upsilon_{e,1}, \upsilon_{h,1})$	**0.1901**	0.0046		
$P(\upsilon_{e,2}, \upsilon_{h,1})$	**0.1738**	0.0045		
$P(\upsilon_{e,1}, \upsilon_{h,2})$	**0.4440**	0.0058		
$P(\upsilon_{e,2}, \upsilon_{h,2})$	**0.1921**	0.0056		
$Corr(\upsilon_e, \upsilon_h)$	**-0.1754**	0.0128		

Note: The estimated coefficients of the first column correspond to the parameter vector, β, of the single risk duration model for transitions from unemployment to employment. The estimated coefficients of the third column correspond to the parameter vector, β_h, of the probit model for homeownership status. The standard error for the correlation coefficient has been calculated based on 1,000 drawings from the multivariate normal distribution with mean and covariance matrix set equal to the estimated parameter vector and covariance matrix. Bold numbers indicate a significant parameter estimate (5 % level).

TABLE 4

Estimation results: Competing risks model

Variables	Mobility hazard		Local job hazard		Selection equation	
	Coeff.	Std. err.	Coeff.	Std. err.	Coeff.	Std. err.
Home ownership	**-0.2159**	0.0575	**0.3753**	0.0156		
Age 19-24	**1.7661**	0.0910	**0.4306**	0.0167	**-0.9127**	0.0277
Age 25-29	**1.7013**	0.0914	**0.3210**	0.0157	**-1.3925**	0.0260
Age 30-39	**0.8920**	0.0904	**0.1390**	0.0138	**-0.8333**	0.0243
Age 50 +	**-1.1524**	0.1452	**-0.4831**	0.0150	**0.3253**	0.0281
Female	**-0.1341**	0.0528	**-0.1170**	0.0119	**0.0414**	0.0182
Children 0-17 years	**-0.5277**	0.0965	**0.0739**	0.0165	-0.0025	0.0321
Female × children	**-0.5401**	0.1151	**-0.2744**	0.0201	**1.1550**	0.0184
Two adults	**-0.2538**	0.0542	**0.0476**	0.0110	**0.2610**	0.0361
Non OECD country	**-1.6691**	0.1975	**-0.7751**	0.0320	**-2.4643**	0.0340
Large city	**1.2285**	0.0696	**-0.0801**	0.0121	**0.6654**	0.0192
Small city	**1.5747**	0.0662	**-0.0435**	0.0115	**1.0285**	0.0183
Basic schooling	**-0.5342**	0.0587	**-0.2562**	0.0109	**-0.3157**	0.0170
High school	**0.7122**	0.0725	**0.0749**	0.0179	**-0.2684**	0.0273
Higher education	**0.7414**	0.0723	**0.0844**	0.0150	**-0.3995**	0.0243
Non insured	0.0588	0.1402	**-0.8651**	0.0254	**-2.2243**	0.0438
UI replacement rate	0.0493	0.1714	**-0.3377**	0.0287	**-0.9969**	0.0514
$v_{h,1}$	**-2.9766**	0.0444				
$v_{h,2}$	**2.5892**	0.0445				
$v_{l,2}$	**-1.2876**	0.0140				
$v_{m,2}$	**3.0594**	0.3161				
$P(v_{m,1}, v_{l,1}, v_{h,1})$	**0.1184**	0.0107				
$P(v_{m,2}, v_{l,1}, v_{h,1})$	**0.0509**	0.0104				
$P(v_{m,1}, v_{l,2}, v_{h,1})$	**0.1585**	0.0101				
$P(v_{m,2}, v_{l,2}, v_{h,1})$	**0.0353**	0.0096				
$P(v_{m,1}, v_{l,1}, v_{h,2})$	**0.0822**	0.0166				
$P(v_{m,2}, v_{l,1}, v_{h,2})$	**0.0985**	0.0165				
$P(v_{m,1}, v_{l,2}, v_{h,2})$	**0.3823**	0.0206				
$P(v_{m,2}, v_{l,2}, v_{h,2})$	**0.0739**	0.0204				
$Corr(v_h, v_l)$	**-0.1840**	0.0145				
$Corr(v_h, v_m)$	0.0365	0.0232				
$Corr(v_h, v_l)$	**0.2820**	0.0428				

Note: The estimated coefficients of the first and third columns correspond to the parameter vectors, β_n and β_l, of the competing risks duration model for transitions from unemployment into employment in another region or locally. The estimated coefficients of the fifth column correspond to the parameter vector, β_h, of the probit model for homeownership status. The standard errors for the correlation coefficients have been calculated based on 1,000 drawings from the multivariate normal distribution with mean and covariance matrix set equal to the estimated parameter vector and covariance matrix. Bold numbers indicate a significant parameter estimate (5 % level).
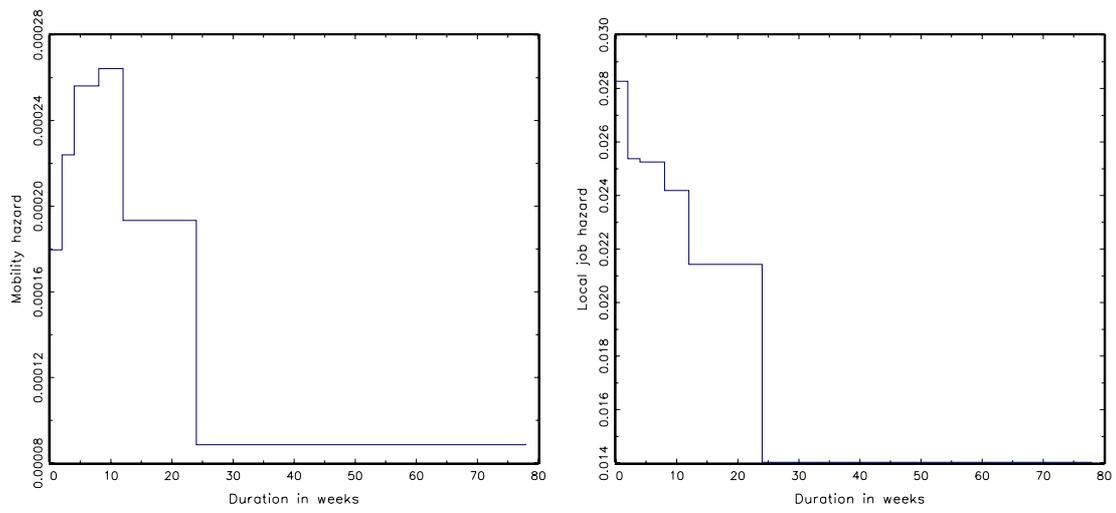
Figure 4: Estimated destination specific hazard rates