Rural Homeownership and Labour Mobility in the U.S.

DANIEL C. MONCHUK[*], MAUREEN KILKENNY[#] AND EUAN PHIMISTER[@]

[*] The World Bank, 1818 H Street, NW. Washington DC 20433, USA. Email: dmonchuk@gmail.com

[#] 2915 Susileen Dr., Reno, NV 89509, USA. Email: maureekkilkenny@gmail.com

[@] Department of Economics, Business School, University of Aberdeen, Aberdeen, AB24 3FX, United Kingdom. Email: e.phimister@abdn.ac.uk

(Received February 2010: in final form January 2012)

ABSTRACT

Are rural homeowners in the workforce as mobile as urban? This paper focuses on whether rural unemployed homeowners end their unemployment spells more or less often without moving than urban homeowners. A competing hazard model is estimated using a five year panel that controls for the demographics of the individuals and the economic characteristics of their workplaces. We find evidence that unemployed rural homeowners appear to be less mobile than unemployed urban homeowners, which may suggest the presence of a lock-in effect similar to those identified by other researchers associated with subsidized housing, homeownership compared to renting, and mortgage illiquidity.

Keywords: lock-in effects, geographic labour mobility, rural housing policy, rural unemployment, duration model

JEL Classifications: J6, R23

INTRODUCTION

Although widespread homeownership has long been a policy goal in the U.S. (MARTINEZ, 2000), home owners have higher mobility costs than non-owners, such that in countries and states where homeownership rates are higher, labour market mobility has been found to be lower, and aggregate unemployment higher (OSWALD, 1999; PARTRIDGE and RICKMAN, 1997). Within countries or states, rural homeowners arguably face not only higher mobility costs than renters but also higher mobility costs than urban homeowners. Rural housing markets in vast countries like the United States are less liquid, as evidenced by the higher home vacancy rates (Figure 1). Rural remoteness also likely delays seller-buyer matches, leading to lower prices

paid for rural homes (see also KRAINER and LEROY, 2002). Rural homeowners may not be able to sell their home for a price that would enable them to buy a comparable home elsewhere. Prohibitive down-payment effects combined with differential spatial house price inflation (QUIGLEY, 1987; FERREIRA et al., 2008), may add further transaction costs to rural homeowner mobility. If rural homeowners looking for work face higher mobility costs, they require more of a wage premium to accept non-local re-employment (meaning they are less likely to move to an urban or metro county for a new job, all else equal). By the same token, rural homeowners in the workforce may be more likely to accept local employment for a lower wage than either renters or urban homeowners in the workforce.

[insert Figure 1]

If rural homeownership reduces spatial labour mobility, this has important implications for the largest federal rural development programme in the United States. The USDA Rural Housing Program's provision of low-interest loans to encourage rural homeownership accounts for almost half of USDA Rural Development Agency's total programme level (KILKENNY and JOHNSON, 2007). If rural wages and the participation of rural people in the labour force (wherever they may work) are undermined by rural homeownership, subsidizing the supply and ownership of rural homes may not be an ideal rural development policy. Other federal programs in the United States subsidize urban homeownership as well, but because of spatial heterogeneity, the same type of policy can have different effects. If rural homeownership has more deleterious effects on rural residents' labour market outcomes than urban, subsidizing rural homeownership may be more problematic than subsidizing urban homeownership.

Recent micro econometric evidence (BATTU et al., 2008, MUNCH et al., 2008) has shown that homeownership affects labour market behavior and mobility among metropolitan

residents, comparing renters to home owners. Our paper focuses on the labour market behaviour and mobility among homeowners, comparing rural to urban home owners. We estimate the contributions of rurality and homeownership to geographic mobility and job search duration. A strong preference for their rural residential location, relatively higher rural moving costs, or a relatively narrower array of re-employment opportunities in rural areas (meaning there is a lower marginal return to an extended job search from the rural residence) are three plausible reasons for closer-to-home and/or shorter search durations by rural unemployed homeowners compared to urban homeowners.

Stronger attachment to a rural residence may also underlie a greater willingness among the rural unemployed to commute longer distances. KHAN et al. (2001) emphasized that commuting is an alternative to rural out-migration. RENKOW (2003) found that rural labour demand growth is met by reduced rural out-commuting rather than in-migration. By inference, rural out-commuting rises when rural labour demand falls. Indeed, census data documents that in the U.S., there are more long commutes among the residents of the largest metro counties and small rural counties adjacent to metro counties than among residents of all other counties. However, these data also show that residents of the smallest and most remote rural counties display the fewest long commutes, a finding consistent with SO et al. (2001), who note that commuting costs from remote counties can be prohibitively high. In that case, there are just two ways for the rural unemployed to become re-employed: accept local re-employment or move. In this paper, like MUNCH et al. (2008) we postulate that if the costs of residential mobility from rural areas are higher, rural homeowners would have higher real reservation wages with respect to employment that necessitates a move and lower reservation wages for local employment, compared to the reservation wages of rural renters and urban homeowners for those

options, all else equal. Alternatively, we postulate that if the benefits of rural residential persistence are higher-- for example, if rural residents are willing to commute farther or have a stronger attachment to their residential locations-- or, if rural labour is better matched to the local job offerings where they become unemployed, both rural renters and rural homeowners would have higher reservation wages with respect to employment that necessitates a move, and lower reservation wages for local re-employment than their urban counterparts.

In exploring the impact of homeownership in rural versus urban areas, two empirically testable hypotheses are: (i) unemployed rural and urban homeowners are equally likely to stay in the labour force and accept a local job, and just as likely to take a job that necessitates a move or to drop out of the labour force altogether; and (ii) that there is no comparable differential mobility of unemployed rural compared to urban renters. Rejecting the first hypothesis while failing to reject the second supports there may be a rural 'lock-in effect' traceable to higher rural homeowner mobility costs.

Cross-sectional data from the 2000 U.S. census documents a number of relevant facts. Rural housing vacancy rates much higher (Figure 1) than urban – approximately three times that in metro areas. Rural net out-migration is much higher (Figure 2), and rural housing prices are much lower (Figure 3). These facts are, of course, related. Rural outmigration fuels excess housing supply, exacerbates vacancy rates, and contributes to even lower rural housing values than can be explained by remoteness alone. In sum, because a rural homeowner enjoys more real housing at a lower cost than they can liquidate if they sell, all else equal, relatively thin rural housing markets and low rural housing values may underlie a housing-tenure related 'lock-in' effect that relatively immobilizes rural homeowners in the labour force.

[insert Figure 2]

[insert Figure 3]

Micro-level preliminary evidence of a rural homeownership 'lock-in' effect comes from the United States' Panel Study of Income Dynamics (PSID) data. According to this survey data, a larger proportion of unemployed homeowners in the most rural counties ended their unemployment spells by taking a job that did not require them to move (19%) compared to the national average (13%). And a lower percentage (1%) of rural unemployed homeowners simply quit the labour force, compared to the 4% national average (Figure 4).

[insert Figure 4]

To test if these outcomes are due to rural homeownership-related mobility costs, while controlling for other plausible explanations, we use the PSID data to prepare a panel dataset that distinguishes rural from urban homeowners and renters in the labour force to measure their unemployment spells. We then estimate a competing risk model of the duration and nature of their exits from unemployment and find evidence that rural homeowners exiting an unemployment spell are more likely to accept employment locally. Although a lack of information on the quality of job following unemployment prevents us from reaching a more definitive conclusion, taken together with the failure to find a similar result for rural renters, the empirical results provide evidence consistent with that of a potential 'lock-in' effect for rural homeowners even after controlling for demographics of the individuals and the economic characteristics of their jobs.

In the next section we review the related literature followed by a description of our empirical approach, and the data and methods used to construct the dataset. The results are then presented and we conclude with a summary of findings, implications for policy, limitations of the data and analysis, and recommendations for further study.

RESIDENTIAL MOBILITY AND UNEMPLOYMENT

Because rural housing is cheaper than urban housing, our question about the relative mobility of the rural labour force is related to the claim that arose in the 1980s in the UK that unemployed persons living in public housing were less likely to accept employment if it necessitated moving from subsidized lower-cost housing (HUGHES and MCCORMICK, 1987; MCCORMICK, 2000). Their research indicated that Britons renting public housing at below-market rates, given the benefits of tenure, the limited transferability of access rights, and the long waiting lists for subsidized housing elsewhere, were "locked in" to their current locales. Recent research by BATTU et al. (2008) continues to find that relatively low-cost public renting appears to constrain the geographic mobility into employment of unemployed persons in the U.K.

The possibility that home ownership-- as opposed to renting-- discourages labour force participation is often referred to as the "Oswald Hypothesis." Using macroeconomic time series and cross section data about OECD countries, Oswald found that unemployment rates were higher in countries with higher rates of homeownership, consistent with his claim that the higher transaction costs of selling and buying homes rendered homeowners less mobile than renters (OSWALD, 1999). Using U.S. state-level panel data, PARTRIDGE and RICKMAN (1997) also found a positive relationship between aggregate statewide unemployment rates and aggregate statewide homeownership rates.

While there is little dispute that homeownership is related to labour force participation and geographic immobility, there remains considerable controversy about the direction of the effects on labour force participation and unemployment duration. In contrast with the Oswald Hypothesis that unemployment rates are positively correlated with homeownership rates, many analysts argue that unemployment rates may be negatively correlated with homeownership rates,

because homeowners are more likely to be employed and less likely to become unemployed in the first place, i.e., homeownership is endogenous to employment.

Indeed, with respect to Dutch data, LEUVENSTEJIN and KONING (2004) found that homeowners are less likely to become unemployed than renters of private housing, accounting for unobserved heterogeneity as well as the endogeneity of homeownership. Looking at U.S. data, COULSON and FISHER (2002) found that unemployment duration is shorter for homeowners relative to renters, also contrary to the Oswald Hypothesis. Controlling for the endogeneity of homeownership, MUNCH et al. (2006) found that Danish homeowners were more likely to find a job in a local labour market (i.e., were less geographically mobile) and that homeowners were less likely to change jobs than renters (consistent with the Oswald hypothesis), but that homeowners had shorter unemployment spells compared to private renters (in contrast with the Oswald hypotheses).

Using the 1990 public use microdata (IPUMS) 5% sample, COULSON and FISHER (2009) subsequently tested four alternative hypotheses relating homeownership to inferior labour market outcomes, controlling for the potential endogeneity of homeownership via an instrumental variable approach. As in their earlier work, they found that homeowners are less likely than renters to be unemployed. But in contrast with their earlier research, they found that homeowners also tended to earn lower wages than renters, all else equal. Similarly, we expect to find lower rates of geographic mobility and lower rates of unemployment (shorter unemployment duration) associated with rural homeownership than urban homeownership.

Adding reduced geographic mobility (on the rural labour supply side) to the effects of remoteness and the lack of agglomeration externalities on the wages rural firms can afford to pay

(on the rural labour demand side) leaves rural wages even lower than urban wages (or wages for more mobile persons) of the same productivity.

Finally, in a set of papers that abstract entirely from homeownership status, MILLS (2000, 2001) reported that the nonmetropolitan unemployed have slightly higher rates of exit from unemployment than metro unemployed. The present paper investigates if that is because unemployed rural people are more likely to become re-employed (locally or by commuting) without moving, more likely to migrate for a new job, or, to exit the labour force all together. The data we use does not allow us to distinguish an exit which involves commuting from an exit to a local job, nor does it allow us to distinguish a move within the same county from not moving. These ambiguities would have interfered with the interpretability of our investigation if we did not also compare the workplace and workforce mobility of rural to urban renters. As noted above, if we find a significant difference in rural compared to urban homeowner re-employment dynamics but no significant difference in the re-employment dynamics of rural compared to urban renters, we can infer that the differences in labour force outcomes are due to differences in homeowner mobility costs of moving from rural to urban.

HOMEOWNERSHIP 'LOCK-IN' EFFECTS

Focusing on household geographic mobility rather than labour force participation, QUIGLEY (1987) first documented the occurrence of a housing illiquidity 'lock in' effect during the 1979-1981 period when mortgage interest rates rose dramatically. He observed that homeowners who had mortgages with relatively favorable financial terms, especially in states that did not allow home buyers to assume those mortgages, were significantly less geographically mobile.

Recently FERREIRA et al. (2008) have highlighted significant evidence of homeownership-related financial lock-in effects constraining geographic mobility. Using two decades of American Housing Survey data, 1985-2005, they estimated the impact of rising interest rates and negative housing equity on household geographic mobility. They found that both rising interest rates and falling housing equity led to lower mobility rates. They estimated that the mobility of homeowners with negative equity is almost 50 percent lower than the mobility of homeowners not 'under water.' This effect is of considerable current interest, given the fact that geographic mobility in the United States fell to 12% in 2007-2008, the lowest level since it was first recorded in 1948 (U.S. CENSUS BUREAU, 2009).

While QUIGLEY (1987), FERREIRA et al. (2008) and the others who have studied lock-in effects have identified an immobilizing effect of rising moving costs *over time* on homeowner mobility, this paper looks at the possibility that rising moving costs *over space* can impact rural homeowner mobility as well. We postulate that rural-urban differences in housing market liquidity (Figures 1 and 3) underlies rural-urban differences in homeowner geographic mobility and re-employment hazard rates.

In sum, we postulate that unemployed rural homeowners are more likely to stay in the labour force and accept a local job, and less likely to take a job that necessitates a move or to drop out of the labour force altogether, compared to unemployed urban homeowners. Furthermore, assuming that these outcomes are due mainly to the relatively low resale value and illiquidity of rural owner-occupied homes, we postulate that there is no comparable differential mobility of unemployed rural compared to urban renters.

ECONOMETRIC MODEL

This paper distinguishes between four types of unemployment transitions: (1) exit unemployment by taking a new job with a residential move to another county, (2) exit unemployment by taking a new job and not moving out of the county (which may allow for a within-county move), (3) exiting the labour force; and (4) remaining unemployed (a truncated or censored exit from unemployment). An 'exit from unemployment' is when a person's unemployment spell ends in one of the first three states *r=1,..,3.* As opposed to the probability (or 'risk') of a single type of 'exit from unemployment,' these alternatives are 'competing' risks.

Three latent variables T_r, *r=1,..,3* represent the potential time a person remains unemployed before exiting as type *r.* Unemployment duration is then the random variable *T* where $T = \min(T_1,..,T_3)$. (Censored exits are treated in a symmetric manner.) The influence of covariates on each exit type are modeled via their effect on the hazard for each exit type:

$$\theta_r(t \mid \mathbf{x}') = \theta_{r0}(t)\exp(\mathbf{x}'\boldsymbol{\beta}_r) \quad (1)$$

where $\theta_{r0}(t)$ is the baseline hazard for the exit type, and **x** is the vector of covariates that explain the hazard rate.

The vector of covariates includes the categorical county classifications to isolate the otherwise unmeasured effect of rurality (metro, urban adjacent to metro, urban/non-adjacent, and rural; see Appendix A.1). Also included are the human capital characteristics of the observed individuals (age, education, gender, ethnicity), their household demographic characteristics (married, change in marital status, number of children, change in number of children); and controls for period-specific macroeconomic effects (year), the unemployment rate in the county, if the individual was working in a seasonal industry before becoming unemployed, and a seasonal dummy variable representing months with high changes in net employment.

Although the underlying processes are assumed to be continuous, the data is interval-censored: only the unemployment exits during a specific period are observed $[j-1, j)$. Hence, for any period *j*, the interval or discrete hazard to state *r*, denoted h_{rj}, is defined as the probability of an exit to state *r* during period *j* given that the unemployment spell lasted to *j-1*. The underlying relationship between the discrete and continuous exit hazards can be shown to be (JENKINS, 2005):

$$h_{rj} = 1 - \exp\left(-\exp\left[\mathbf{x}_i'\boldsymbol{\beta} + \gamma_j\right]\right), \text{ where } \gamma_j = \log\left(\int_{j-1}^{j} \theta_{r0}(t)dt\right) \quad (2)$$

Because of the relatively small number of observations, this paper fits a parsimonious parametric baseline hazard, consistent with the Weibull distribution. From estimates of alternative semi-parametric models, the assumptions do not unduly restrict the baseline hazard. The small number of observations also meant that it was not possible to model housing tenure choice simultaneously with unemployment exits (as in MUNCH et al., 2006, 2008). Hence the results obtained are therefore conditional on housing tenure status. Recent research on unemployment durations also emphasizes the role of unobserved heterogeneity and the possible correlations between competing risks (MUNCH et al., 2006). But because the available data provided us with a small number of observed unemployment exits for each type, a more restricted approach had to be followed.

Furthermore, this paper treats the data as if it were intrinsically discrete, which is a reasonable approximation when the time intervals are relatively short and/or the hazards are small (JENKINS, 2005). This allows the use of standard software to estimate the competing risk models, allowing us to fit a multinomial logit model to suitably reorganized data (ALLISON, 1982).

DATA

Five samples of monthly observations on individuals were extracted from the public use 1988-1993 Panel Study of Income Dynamics (PSID). The PSID has been collected by the Survey Research Center of the University of Michigan since 1968. Since 1997, however, the data are available only every 2 years (i.e., 1999, 2001, …2005). Also, for four years after 1993, the county type in which the respondent is observed was not provided. Therefore, the five years 1988-1993 is the only period for which both county type and annual observations are available.

From this data a complete sequence of labour market spells recorded to the nearest calendar month is constructed, and an inflow sample of unemployment spells starting after 1 January 1988 is extracted. Specifically, for every unemployment spell, an observation is generated for each month, where the indicator variable y_{ij} equals one if an exit of the type under consideration occurs during the month, and zero otherwise.

Inconsistencies in the underlying data arose from recall problems and variable relabeling over time. Interviewees were asked about their employment status at both the current and previous interview. As a result there were some differences between what individuals recalled about their employment status at the previous interview and what was recorded at that time. For this paper we reconciled recall inconsistencies following UPWARD (1999), by applying the principle that information recorded closest to any particular event is the most reliable. Variable names also changed over the years, necessitating matching of variables across years as well. The result is effectively monthly panel data where the unit of observation is an unemployment spell experienced by individuals who lived in counties of known types who were surveyed for the PSID each month of 1988 through the end of 1992.

[insert Table 1]

Table 1 presents the summary statistics for the sample consisting of 1,664 observations and classified as metro, urban adjacent, urban non-adjacent, and rural according to United States Department of Agriculture "Beale" or Rural-Urban continuum code designations (Appendix Table A.1). Metro counties (Beale codes 1-3) account for 61% of the sample observations, 32% are initially resident in urban counties (Beale codes 4&6, and 5&7), and completely rural counties, those that do not contain any urbanized areas of more than 2,500 people, account for 7% of the sample (Beale codes 8 & 9). Monthly observations from the start of the unemployment spell to just prior to the month before an exit represent approximately 81% of the data while the remaining 19% are observations in the final month of the spell after which the spell ends in either a job change with a residential move, a job change with no residential move, or an exit from the labour force. The three types of (non-censored) exits from unemployed, by county type, are illustrated in Figure 4.

[insert Table 2]

Table 2 shows the summary statistics for individuals in the final month of the spell just prior to exiting unemployment. In total there are 315 unemployment spells ending with an exit to one of the three alternatives. As noted, relatively more rural exits involve staying, and there are relatively fewer rural exits from the labour force. Of the 315 spells, the average unemployment spell duration is 4.8 months. It is slightly shorter in rural counties (4.5 months) as shown in Table 2. Sixty-nine percent are white, 4.4% are Hispanic, and 16% are female. The average age is 43 years, older in the rural counties (44.7 years). The average number of children is 1.3. A sample average of 76% were married, with fewer (64%) married in the urban non-adjacent counties and more (82%) were married in rural counties. To control for the impact of life-changing events that may also impact mobility, also included are the change in the number of

children and change in marital status (-1 if no longer married, 0 if no change, and 1 if became married). The metro households generally experienced shrinking family sizes while the urban households generally grew. On average, the change in marital status from the previous year is positive indicating a net increase in married households with the exception of the urban non-adjacent subsample in which the labour force participant changed out of marriage. About one fifth of the whole sample held college degrees; four-fifths held high school degrees. Notably, half of the rurals with unemployment spells had high school degrees and none held college a degree.

[Insert Figure 5]

The raw data, as well as previous research (MILLS, 2000), suggests that there is more labour market churning in rural counties. This might be due, for example, to a preponderance of seasonal employment such as farming, forestry, mining, and recreation in rural areas. Therefore, this paper adopts two controls for seasonality, one associated with the industry prior to unemployment and the other with the month. Tabulation of monthly data on job openings and labour turnover ("JOLTS") been collected by the U.S. Bureau of Labour Statistics since the year 2000 is presented in Figure 5. These data indicate that the arts, entertainment, and recreation sector, construction, and mining and logging; in addition to agriculture), are the most seasonal industries. The data also indicate a clear cyclical pattern, with hires exceeding terminations for half the year (February-July) and terminations exceeding hires the other half the year. The average unemployment rate in all the counties was just over 6%, with the rural unemployment rate (in the sample) at roughly 4%.

RESULTS

Table 3 reports the calculated average marginal effects and the p-values of the significance of the marginal effects (in parentheses) from the multinomial logit model of competing hazard rates, estimated by maximum likelihood. The fit of the model is substantial, with well over half of the variation in exits from unemployment (57%) being explained by the variables in the model. Rurality for homeowners, as hypothesized, has a significantly positive immobilizing effect (exit from unemployment to a job without a move). It is also by far the largest measured effect, raising the hazard of an exit to a job without a move by 0.094 or that rurality increases the likelihood of staying by 9%.

[insert Table 3]

The significantly negative marginal effects of additional time unemployed indicates that the hazard of finding a new job diminishes the longer one has been unemployed, consistent with the literature on the persistence of unemployment (e.g. ARULAMPALAM et al., 2000). Both exiting without moving and exiting the labour force all together are non-linearly related to age: falling as one matures then rising as one becomes elderly; as expected. The hazard of exiting to a new job with a move falls significantly with a marginal change in the number of children. The hazard of exiting without a move rises significantly positively with having a college degree. The seasonality controls explain exits with moves and exits from the labour force. And as expected, the exit hazard from the labour force rises significantly positively with increases in the county unemployment rate.

As discussed earlier, if the 'rural effect' is related mainly to rural homeowner mobility costs then we do not expect to find similar rural effects in the model of unemployment exits for renters. The relative thinness of a rural housing market should not affect the labour force participation or geographic mobility of non-homeowners. A systematic rural effect for renters

may be attributable to a longer time needed to find a replacement tenant, while all other types of renter mobility costs are expected to be similar. It could also follow from a strong preference for their rural location, or, a better matching of the resident rural workforce to rural employment opportunities.

[insert Table 4]

Table 4 reports the results for renters. There is no "rural effect" distinguishing rural from urban or metro renters. This evidence is consistent with the hypothesis that lower geographic mobility among the rural unemployed is associated mainly with ownership of a rural home.

SUMMARY AND CONCLUSIONS

This paper investigated if unemployed rural homeowners (and unemployed rural renters) end their unemployment spells more or less often without moving than the urban unemployed. Using a five year panel set of observations on individuals from the PSID and estimating a parametric competing hazard model, this study finds empirical evidence of rural differences in unemployment dynamics even after controlling for demographics of the individuals and the economic characteristics of their jobs. In particular, our empirical evidence indicates that rural unemployed homeowners don't end unemployment spells by moving as often as unemployed homeowners in other types of counties. One interpretation of this evidence is that of a rural 'lock-in' effect for homeowners similar to the lock-in effects associated with subsidized housing, homeownership, or mortgage illiquidity that have been identified by other researchers. Although information on quality of the job following an unemployment spell would be needed to make a more concrete assessment, having found no such relationship for renters in rural versus urban areas supports the notion that rural homeowners are less mobile.

A ‘lock-in’ effect for rural homeowners could have important policy implications. According to a recent article in *The Economist* about the Oswald Hypothesis, immobilized workers:

> “…become stuck in jobs for which they are ill-suited, which is inefficient: it raises prices, reduces incomes and makes some jobs uneconomic. Areas with high home-ownership often have a strong “not-in-my-backyard” ethos, with residents objecting to new development. Homeowners commute farther than renters, which causes congestion and makes getting to work more time-consuming and costly for everyone. Mr. Oswald urged governments to stop subsidising home-ownership. Few listened. America subsidises more than most. Owner-occupiers typically pay no tax on capital gains and can deduct mortgage interest from their income-tax bills. Fannie Mae and Freddie Mac, two government-backed mortgage firms, have squandered a fortune promoting home-ownership among the uncreditworthy.” (THE ECONOMIST, 2009)

In calendar year 2006, for example, the USDA provided $7.4 billion worth of low-interest loans to encourage rural homeownership. That amounted to 46% of the USDA Rural Development Agency’s program outlays that year (KILKENNY and JOHNSON, 2007). But if rural homeownership is particularly immobilizing, participating in a *rural* home ownership programme potentially locks one into the local labour market reducing lifetime income restraining economic growth.

However, there are a number of reasons why any conclusion that the observed difference in the mobility of rural unemployed homeowners is due to a rural homeownership lock-in effect is premature. First and most obviously, the sample is old and small. The rural observations are

few and not necessarily representative of current conditions. The highest priority for future research is to update and expand the sample. With a larger sample one could simultaneously model the labour market dynamics of both renters and homeowners, control for the endogeneity of homeownership and earned income, and control for unobserved heterogeneity, as discussed in the literature review. Second, we have not directly measured how moving and transaction costs might vary across counties by type. Thus a second priority for future research is to obtain a larger panel of relevant geo-referenced data that can be merged with panel data about the local housing markets, for example. Third, it would be useful to have information on job quality before and after an unemployment spell, such as the difference between wages before and after an unemployment spell, another thing that our data did not allow us to do. With more complete and geo-referenced data, one could also take distances to other labour markets into account, and explicitly consider the fourth competing risk type of exiting to a new job without a move but with a longer commute.

REFERENCES

ARULAMPALAM W., BOOTH, A.L. and TAYLOR, M.P. (2000) Unemployment persistence, *Oxford Economic Papers-New Series* **52**(1), 24-50.

BATTU, H., MA A. and PHIMISTER E. (2008) Housing Tenure, Job Mobility and Unemployment in the UK, *The Economic Journal* **118**, 311-328.

COULSON, N.E. and FISHER L.M. (2002) Labor Market Outcomes of Homeownership, *Housing Studies* **17**, 35-50.

COULSON, N.E. and FISHER L.M. (2009) Housing Tenure and Labor Market Impacts: The Search Goes On, *Journal of Urban Economics* **65**, 252-264.

DIETZ, R. D. and HAURIN, D. R. (2003). The social and private micro-level consequences of Homeownership, *Journal of Urban Economics* **54**(3), 401-450.

FERREIRA, F., GYOURKO J. and TRACY J. (2008) Housing Busts And Household Mobility, *National Bureau of Economic Research* (NBER) Working Paper 14310, http://www.nber.org/papers/w14310 (accessed 4/4/2009).

JENKINS, S. P. (2005) Survival Analysis, Institute for Social and Economic Research, University of Essex. Unpublished manuscript available at http://www.iser.essex.ac.uk/iser/teaching/module-ec968 (accessed 2/16/2010).

KHAN, R., ORAZEM P. and OTTO D. (2001) Deriving Empirical Definitions of Spatial Labor Markets: The Roles of Competing versus Complementary Growth, *Journal of Regional Science* **41**(4), 735-56.

KRAINER, J. and LEROY S. F. (2002) Equilibrium valuation of illiquid assets, *Economic Theory* **19**(2), 223-242.

MARTINEZ, S. C. (2000). The Housing Act of 1949: Its place in the realization of the American dream of homeownership, *Housing Policy Debate* **11**(2), 467-488.

MILLS, B. (2000) Are Spells of Unemployment Longer in Nonmetropolitan Areas? Nonparametric and Semiparametric Evidence, *Journal of Regional Science* **40**(4), 697-718.

MILLS, B. (2001) Unemployment Duration in Non-Metropolitan Labor Markets, *Growth and Change* **32**, 174-192.

MUNCH, J., ROSHOLM M. and SVARER M. (2006) Are Home Owners Really More Unemployed? *Economic Journal* **116**, 911-1013.

MUNCH, J., ROSHOLM M. and SVARER M. (2008) Home Ownership, Job Duration, and Wages, *Journal of Urban Economics* **63**(1), 130-45.

OSWALD, A. (1999) The Housing Market and Europe's Unemployment: A Non-Technical Paper, May 1999 http://www2.warwick.ac.uk/fac/soc/economics/staff/faculty/oswald/homesnt.pdf (accessed 2/16/2010).

PARTRIDGE, M. and RICKMAN D. (1997) The Dispersion of US State Unemployment Rates: The Role of Market and Non-market Equilibrium, Factors *Regional Studies* **31**(6) 593-606

QUIGLEY, J. (1987) Interest Rate Variations, Mortgage Prepayments and Household Mobility, *Review of Economics and Statistics* **69**, 636-643.

RENKOW, M. (2003) Employment Growth, Worker Mobility, and Rural Economic Development, *American Journal of Agricultural Economics* **85**(2), 503-13.

SO, K.S., ORAZEM P. and OTTO D. (2001) The Effects of Housing Prices, Wages, and Commuting Time on Joint Residential and Job Location Choices, *American Journal of Agricultural Economics* **83**(4), 1036-48.

THE ECONOMIST (2009) "The road not taken," Anonymous correspondent(s), Mar 19th 2009 http://www.economist.com/world/unitedstates/displaystory.cfm?story_id=13331109 (accessed 4/4/09).

UPWARD, R. (1999) Constructing data on unemployment spells from the PSID and the BHPS, Centre for Research on Globalisation and Labour Markets, School of Economic Studies, Nottingham (available at http://www.nottingham.ac.uk/gep/documents/papers/1999/99-07-appendix.pdf).

U.S. CENSUS BUREAU (2009) Annual Geographical Mobility Rates, By Type of Movement: 1947-2008, http://www.census.gov/population/socdemo/migration/tab-a-1.xls (accessed 4/18/09).

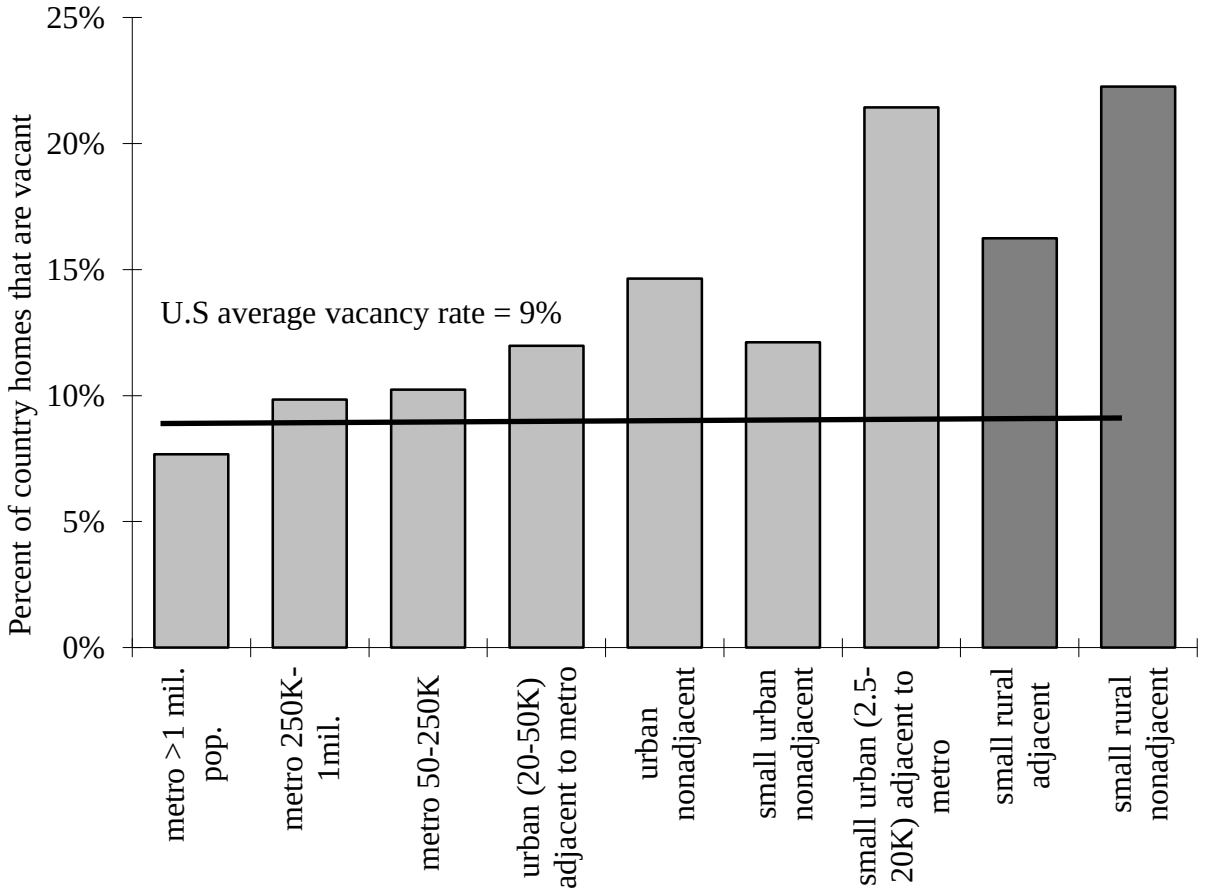

Figure 1. Average home vacancy rate by county type, 2000
Source: 2000 Decennial Census STF 3, U.S. Census; tabulation by authors
(see Appendix Table A.1 for county type definitions)

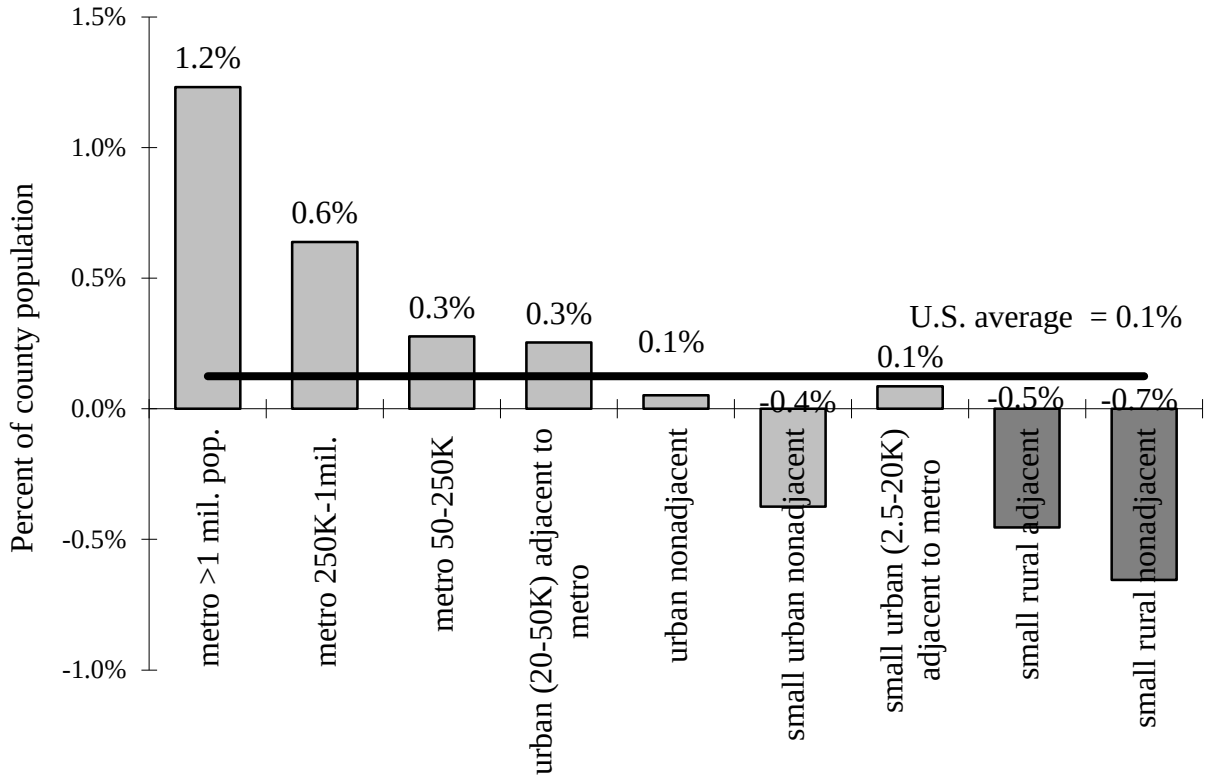

Figure 2. Average net migration rate by county type, 2000-2005
Source: Bureau of the Census CO-EST Estimates (annual); tabulation by authors
(see Appendix Table A.1 for county type definitions)

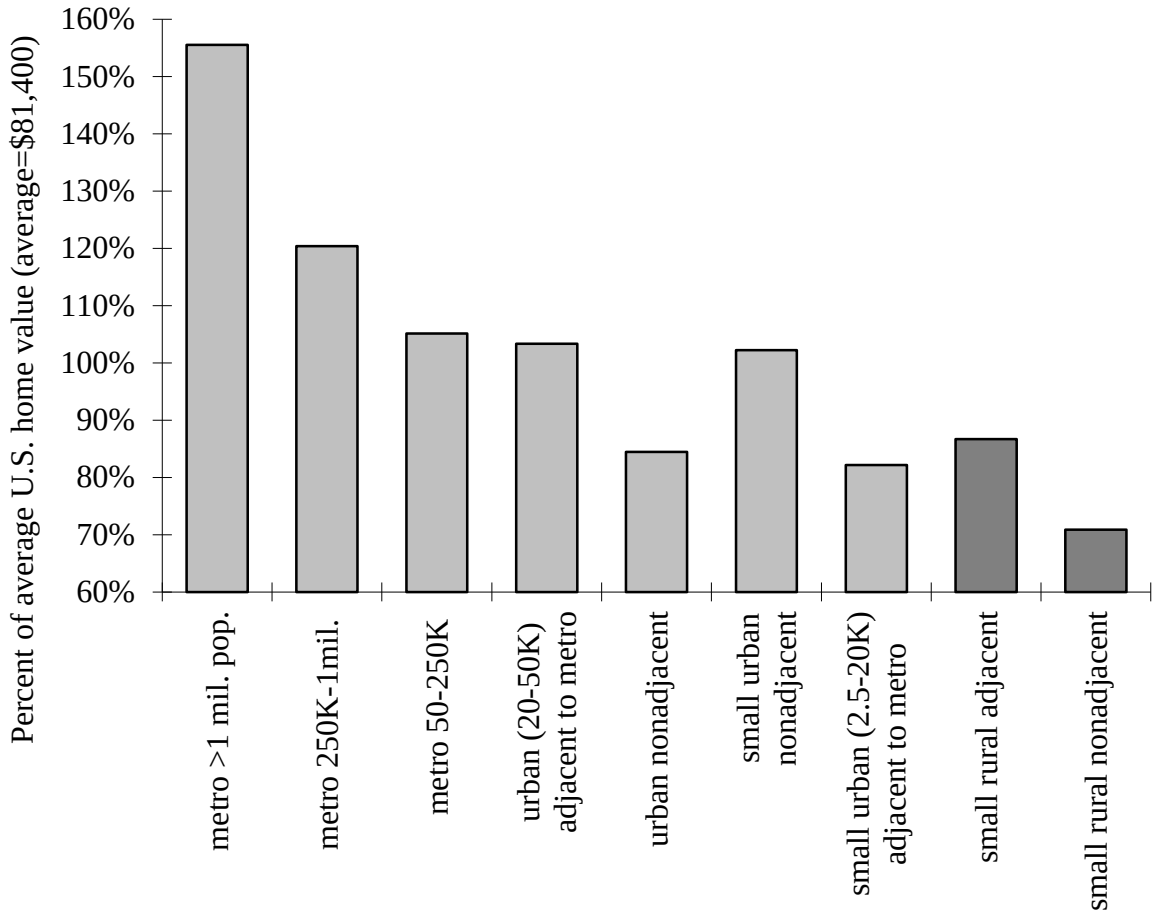

Figure 3. Average median home value relative to U.S. average by county type, 2000
Source: 2000 Decennial Census STF 3; U.S. Census; tabulation by authors
(see Appendix Table A.1 for county type definitions)

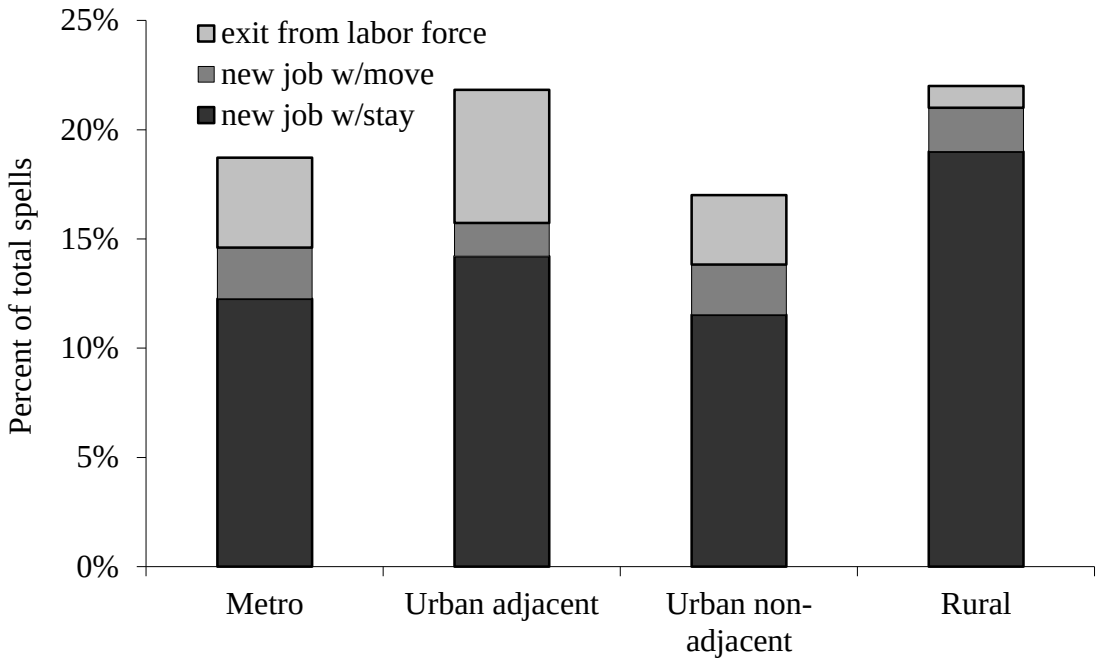

Figure 4. Non-censored exits from unemployment by county type
Source: PSID sample, described in text.

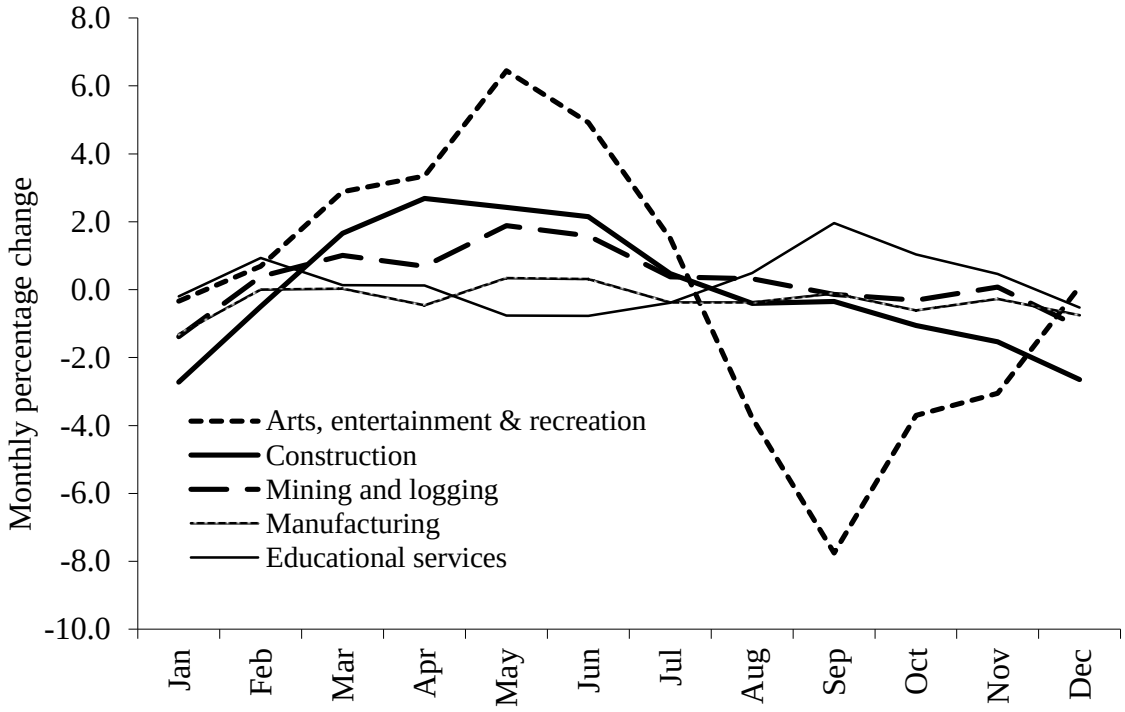

Figure 5. Monthly average net additions to employment by sector, 2001-2008
Source: Bureau of Labor Statistics "Job Openings and Labor Turnover Survey" (http://data.bls.gov/PDQ/servlet/SurveyOutputServlet); tabulations by the authors.

Table 1. Summary statistics by county type

	Total		Metro		Urban Adjacent to Metro		Urban Non-Adjacent to Metro		Rural	
	Mean	(St. Dev)	Mean	(St. Dev)	Mean	(St. Dev)	Mean	(St. Dev)	Mean	(St. Dev)
Unemployed, no exit from unemployment	0.811	(0.39)	0.813	(0.39)	0.782	(0.41)	0.830	(0.38)	0.780	(0.42)
Type of Exit from Unemployment										
Job with a move	0.022	(0.15)	0.024	(0.15)	0.015	(0.12)	0.023	(0.15)	0.020	(0.14)
Job with no move	0.127	(0.33)	0.123	(0.33)	0.142	(0.35)	0.115	(0.32)	0.190	(0.39)
Out of the labour force	0.040	(0.20)	0.041	(0.20)	0.061	(0.24)	0.032	(0.18)	0.010	(0.10)
Time Unemployed (months)	6.639	(8.29)	5.455	(5.70)	5.711	(5.85)	8.807	(11.50)	13.020	(14.75)
White	0.730	(0.44)	0.766	(0.42)	0.812	(0.39)	0.536	(0.50)	0.880	(0.33)
Spanish	0.055	(0.23)	0.084	(0.28)	0.000	(0.00)	0.017	(0.13)	0.000	(0.00)
Female	0.147	(0.35)	0.145	(0.35)	0.102	(0.30)	0.187	(0.39)	0.110	(0.31)
Age (years)	43.000	(11.33)	43.753	(10.40)	41.619	(12.04)	40.689	(13.27)	46.060	(10.15)
Number of Children Previous Year	1.188	(1.20)	1.273	(1.20)	0.919	(0.88)	1.213	(1.35)	0.760	(1.15)
Change in number of children from previous year	-0.010	(0.44)	-0.039	(0.46)	-0.046	(0.46)	0.086	(0.41)	0.020	(0.20)
Married in previous year	0.732	(0.44)	0.747	(0.43)	0.853	(0.36)	0.573	(0.50)	0.890	(0.31)
Change in Marital Status from Previous Year	0.022	(0.17)	0.016	(0.12)	0.041	(0.20)	0.037	(0.26)	0.000	(0.00)
Graduated High School	0.802	(0.40)	0.894	(0.31)	0.528	(0.50)	0.844	(0.36)	0.250	(0.44)
Graduated College	0.191	(0.39)	0.266	(0.44)	0.066	(0.25)	0.098	(0.30)	0.000	(0.00)
Seasonal Dummy	0.582	(0.49)	0.594	(0.49)	0.614	(0.49)	0.539	(0.50)	0.540	(0.50)
Seasonal Industry Dummy	0.174	(0.38)	0.178	(0.38)	0.228	(0.42)	0.159	(0.37)	0.070	(0.26)
County Unemployment rate	6.055	(2.38)	5.904	(2.04)	6.005	(1.85)	7.421	(2.51)	2.950	(2.54)
No. Observations	1664		1020		197		347		100	

Note: Only includes individuals who owned their home or had a mortgage at the end of the spell. Source: PSID sample (described in text).
Marital status

Table 2. Summary statistics in final month of unemployment spell by county type

	Total		Metro		Urban Adjacent to Metro		Urban Non-Adjacent to Metro		Rural	
	Mean	(St. Dev)	Mean	(St. Dev)	Mean	(St. Dev)	Mean	(St. Dev)	Mean	(St. Dev)
Type of Exit from Unemployment										
Job with a move	0.117	(0.32)	0.126	(0.33)	0.070	(0.26)	0.136	(0.35)	0.091	(0.29)
Job with no move	0.673	(0.47)	0.654	(0.48)	0.651	(0.48)	0.678	(0.47)	0.864	(0.35)
Exit labour force	0.210	(0.41)	0.220	(0.42)	0.279	(0.45)	0.186	(0.39)	0.045	(0.21)
Time Unemployed (months)	4.778	(5.42)	4.796	(5.01)	4.744	(5.20)	4.831	(4.68)	4.545	(9.88)
White	0.689	(0.46)	0.712	(0.45)	0.744	(0.44)	0.559	(0.50)	0.727	(0.46)
Spanish	0.044	(0.21)	0.058	(0.23)	0.000	(0.00)	0.051	(0.22)	0.000	(0.00)
Female	0.159	(0.37)	0.126	(0.33)	0.140	(0.35)	0.271	(0.45)	0.182	(0.39)
Age (years)	43.241	(11.11)	43.571	(10.00)	45.093	(12.16)	40.288	(12.52)	44.682	(13.35)
Number of Children Previous Year	1.308	(1.28)	1.377	(1.30)	0.744	(0.93)	1.407	(1.35)	1.545	(1.30)
Change in number of children from previous year	-0.019	(0.43)	-0.058	(0.45)	0.070	(0.34)	0.034	(0.45)	0.000	(0.31)
Married in previous year	0.756	(0.43)	0.770	(0.42)	0.814	(0.39)	0.644	(0.48)	0.818	(0.39)
Change in Marital Status from Previous Year	0.016	(0.17)	0.026	(0.16)	0.023	(0.15)	-0.017	(0.23)	0.000	(0.00)
Graduated High School	0.787	(0.41)	0.838	(0.37)	0.651	(0.48)	0.831	(0.38)	0.500	(0.51)
Graduated College	0.181	(0.39)	0.246	(0.43)	0.116	(0.32)	0.085	(0.28)	0.000	(0.00)
Seasonal Dummy	0.667	(0.47)	0.681	(0.47)	0.698	(0.46)	0.576	(0.50)	0.727	(0.46)
Seasonal Industry Dummy	0.197	(0.40)	0.225	(0.42)	0.163	(0.37)	0.169	(0.38)	0.091	(0.29)
County Unemployment rate	6.105	(2.33)	6.042	(2.19)	5.535	(1.65)	7.525	(2.30)	3.955	(2.65)
No. Observations	315		191		43		59		22	

Note: Only includes individuals who owned their home or had a mortgage at the end of the spell. Source: PSID sample (described in text).

Table 3. Competing hazard model of exits from unemployment - homeowners

	Exit to Employment				Exit Labour Force	
	Move		Stay			
	Marginal Effect[#]	P-value[@]	Marginal Effect	P-value	Marginal Effect	P-value
Urban Adjacent to Metro	-0.003	(0.60)	0.001	(0.97)	0.006	(0.63)
Urban Non-Adjacent	0.007	(0.30)	-0.028	(0.19)	-0.018***	(0.01)
Rural	-0.001	(0.87)	0.094*	(0.07)	-0.021**	(0.03)
(log) months unemployed	-0.006***	(0.00)	-0.027***	(0.00)	-0.001	(0.89)
White	-0.002	(0.59)	-0.036	(0.11)	-0.009	(0.44)
Spanish	0.002	(0.80)	-0.041	(0.16)	-0.011	(0.38)
Female	-0.002	(0.76)	0.057	(0.28)	-0.009	(0.46)
Age	0.000	(0.76)	-0.012***	(0.00)	-0.005***	(0.00)
Age squared	0.000	(0.14)	0.000***	(0.00)	0.000**	(0.00)
# Children Previous Year	0.000	(0.94)	0.013	(0.13)	-0.002	(0.60)
Change in #of Children	-0.012***	(0.01)	0.005	(0.83)	0.004	(0.69)
Marital Status previous year	-0.002	(0.72)	0.041	(0.21)	0.001	(0.92)
Change in Marital Status	0.008	(0.33)	0.011	(0.86)	-0.021	(0.50)
Graduated High School	0.000	(0.92)	-0.030	(0.25)	0.000	(0.96)
Graduated College	0.001	(0.88)	0.053*	(0.06)	-0.015**	(0.04)
Seasonal Dummy	0.009**	(0.02)	0.025	(0.12)	0.019**	(0.01)
Seasonal Industry Dummy	0.010	(0.20)	0.033	(0.21)	-0.011	(0.16)
County Unemployment rate	-0.003***	(0.01)	0.006	(0.14)	0.004**	(0.05)
Number of observations	1664					
Pseudo R^2	0.57					

Notes:
Also included in the estimation, but not reported here, are four dummy variables for the years.
[#] For 0/1 variables, the marginal effects reflect a change from 0 to 1
[@] P-values correspond to the estimated significance of the marginal effects, computed at the mean.
Significance at the 10, 5, and 1% levels are denoted by *, **, and *** respectively.

Table 4. Competing hazard model of exits from unemployment - renters

	Exit to Employment				Exit Labour Force	
	Move		Stay			
	Marginal Effect[#]	P-value[@]	Marginal Effect	P-value	Marginal Effect	P-value
Urban Adjacent to Metro	0.017	(0.27)	0.009	(0.54)	0.016	(0.32)
Urban Non-Adjacent	-0.001	(0.94)	-0.006	(0.64)	0.003	(0.80)
Rural	0.016	(0.58)	-0.011	(0.69)	-0.010	(0.62)
(log) months unemployed	-0.009***	(0.00)	-0.021***	(0.00)	0.000	(0.91)
White	0.011	(0.19)	-0.002	(0.86)	0.003	(0.70)
Spanish	0.027	(0.45)	0.013	(0.65)	0.055	(0.19)
Female	0.006	(0.55)	0.001	(0.93)	0.017*	(0.09)
Age	-0.006***	(0.00)	-0.004***	(0.00)	-0.005***	(0.00)
Age squared	0.000***	(0.00)	0.000***	(0.00)	0.000***	(0.00)
# Children Previous Year	-0.003	(0.28)	-0.003	(0.36)	0.001	(0.79)
Change in #of Children	0.006	(0.28)	0.002	(0.80)	0.010	(0.08)
Marital Status previous year	0.008	(0.38)	0.043***	(0.00)	-0.010	(0.28)
Change in Marital Status	-0.036***	(0.01)	0.042**	(0.02)	0.005	(0.78)
Graduated High School	0.019***	(0.01)	0.001	(0.89)	-0.005	(0.47)
Graduated College	0.025*	(0.07)	-0.014	(0.19)	0.009	(0.53)
Seasonal Dummy	0.009	(0.13)	0.023***	(0.00)	0.014***	(0.01)
Seasonal Industry Dummy	0.003	(0.74)	0.043***	(0.01)	-0.014*	(0.08)
County Unemployment rate	-0.001	(0.38)	-0.001	(0.50)	-0.002	(0.25)
Number of observations	3292					
Pseudo R^2	0.62					

Notes:
Also included in the estimation, but not reported here, are four dummy variables for the years.
[#] For 0/1 variables, the marginal effects reflect a change from 0 to 1
[@] P-values correspond to the estimated significance of the marginal effects, computed at the mean.
Significance at the 10, 5, and 1% levels are denoted by *, **, and *** respectively.

Appendix Table A.1. County type classifications

Beale Code and figure label		Description
metro counties:		
1	metro >1 mil. pop.	contains metro area of 1 million population or more
2	metro 250K-1mil.	contains metro area of 250,000 to 1 million population
3	metro 50-250K	contains metro area of 50,00 to 249,999 population
urban adjacent counties:		
4	urban (20-50K) adjacent to metro	contains urban area of 20,000-49,999 population
6	small urban (2.5-20K) adjacent to metro	urban area of 2,500-19,999 population
urban nonadjacent counties:		
5	urban nonadjacent	contains urban area of 20,000-49,999 population
7	small urban nonadjacent	contains urban area of 2,500-19,999 population
rural counties:		
8	small rural adjacent	contains urban area of <2,500 population
9	small rural nonadjacent	contains urban area of <2,500 population

Beale Code Source: United States Department of Agriculture
http://www.ers.usda.gov/Briefing/Rurality/RuralUrbCon/