

## Interrelationships between Life Course Events in the United States

Bohyun Joy Jang<sup>1</sup>, John B. Casterline<sup>2</sup>, Anastasia R. Snyder<sup>1</sup>

1 Institute for Population Research, Department of Human Sciences, The Ohio State University

2 Institute for Population Research, Department of Sociology, The Ohio State University

Partnership transitions are closely related to other critical life changes (Steele, Kallis, Goldstein, & Joshi 2005). Residential or housing changes are an example; marriage or cohabitation requires at least one partner's moving and the union formation is followed by obtaining a home ownership in some cases. These concurrent life course transitions suggest that both processes are determined by the same set of unmeasured and measured components (Steel et al. 2005; Kulu and Steele 2013). In other words, the decisions of marriage or cohabitation will be dependent of determinants of residential changes. One methodological solution for this interdependency in life course events is to use a multi-process model which allows for correlations of unobserved factors affecting two different transitions. The multi-process model has been used in research on interrelated life events such as marriage and childbearing (Steele et al. 2005; Steele et al. 2006), union dissolution and residential changes (Boyle et el. 2008), and family events and housing careers (Kulu and Steele 2013). Surprisingly, however, little research has investigated the interdependency between union transitions and residential changes.

As more longitudinal data become available, a large body of research is able to examine interrelationships between family events and mobility in the long haul. The studies suggest that individuals change their residence to adjust to anticipated changes in family size (Kulu and Steele 2013; Clark and Withers 2007). Marriage and cohabitation, therefore, may trigger mobility among single individuals (Clark and Withers 2009). However, the opposite is also possible; moving may result in union status changes from single to married or from single to cohabited. For example, researchers have found that individuals postpone family formation until obtaining homeownership (Murphy and Sullivan 1985) and the housing career (which mostly requires residential changes) is served as a resource to accomplish or hinder family plans (Mulder and Billari 2010). In summary, these results reveal that union formation and residential transitions are closely linked to each other. However, studies in the past have paid relatively little attention to dynamics between the two transitions. A few studies have demonstrated the association between housing and family events (Clark 2012) but they are also limited to fertility behaviors.

In the current study, we use the National Longitudinal Survey of Youth 1997 which is a nationally representative sample of individuals from a recent cohort in the United States. The NLSY provides large amount of information on individual life course transitions such as family transitions and residential changes. Using the data, we test the adjustment and triggering effects of mobility on union formation, and *vice versa*. Since individuals experience several episodes of different types of moving (i.e., a short distance move and a long distance move) and union

formation (i.e., cohabitation and marriage) over lifetime, a multi-level competing risks model is performed in the current study. In addition, since unobserved individual characteristics influence both processes, we estimate a multi-process model which allows for correlations between heterogeneity from both models.

### Data and Measures

This study uses the public and geocode data from both the National Longitudinal Survey of Youth 1997 (NLSY97). The NLSY97 includes panel data from 8,984 individuals who were born between 1980 and 1984. Respondents have been interviewed annually from 1997 when they were ages 12 to 18 to 2011 when they became ages 25 to 31. Using the information, we are able to create monthly life course experiences of the entire sample over 15 years.

*Union formation:* Union formation is measured by the month that either cohabitation or marriage occurs throughout the survey years. During the survey period of 1997 to 2011, about 14% have experienced marriage (without cohabitation) and 57% have cohabited. The average age at first marriage and cohabitation is 22.8 and 21.8, respectively.

*Geographic mobility:* The NLSY97 has asked respondents about detailed migration history every survey year. Using this information, we categorize moving types by distance moved. The mobility within the same county is defined as a short-distance move and called residential mobility while the moving across the jurisdictional boundary is referred to as migration which is a long-distance move (Schachter, Franklin, & Perry, 2003). Since international migration has different implications and impacts on life courses than internal migration (Molloy, Smith, & Wozniak, 2011), we exclude migration to or from a foreign country from data analysis. In our sample, about 18% have moved within the same county (i.e., residential mobility) and 59% has changed their residence to different county (i.e., migration) until 2011. The month and year of every move are utilized to create an event history file of mobility for analysis.

### Methods

We estimate equations for the discrete-time hazards of mobility and union formation (Allison 1984). Since the NLSY respondents experience more than one episode of mobility and union formation, we include a person-specific random effect into our models. The equations for each process can be specified as:

$$(1) \log \left[ \frac{h^{m(r)}(t)}{h^{m(0)}(t)} \right] = \alpha_0^m D(t) + \alpha_1^m F(t) + \alpha_2 X^m + \alpha_3 cohabit_{(t)} + \alpha_3 marry_{(t)} + u^{m(r)}, \quad r = 1, 2$$

Equation (1) is for the hazard of mobility at time t ( $\log \left[ \frac{h^{m(r)}(t)}{h^{m(0)}(t)} \right]$ ). It implies the hazard of transition of type  $r$  mobility from the onset of risk (age 16) where  $r = 0$  (no transition),  $r=1$

(residential mobility, a short distance move), or  $r=2$  (migration, a long distance move).  $D(t)$  represents the duration of migration since age 16. Once individuals move, they are at risk of a next move.  $F(t)$  denotes covariates that changes over time: educational attainment, employment status, and living in metro areas included in the current study.  $X$  denotes covariates that are constant across time such as demographic, household, and county characteristics at the first interview. The equation also includes selected facets of the union formation history, whether an individual married or cohabited in month  $t$ ; both are time-varying. A person-specific residual,  $u^{m(r)}$ , is included to represent the person-specific propensity to move that is not captured by measured explanatory variables (Allison 1984; Rabe-Hesketh and Skrondal 2012).

$$(2) \log \left[ \frac{h^{u(r)}(t)}{h^{u(0)}(t)} \right] = \beta_0^u D(t) + \beta_1^u F(t) + \beta_2 X^u + \beta_3 \text{short move}_{(t)} + \beta_3 \text{long move}_{(t)} + u^{u(r)}, \quad r = 1, 2$$

With regard to the hazard of union formation, equation (2) denotes  $\log \left[ \frac{h^{u(r)}(t)}{h^{u(0)}(t)} \right]$  the hazard of a transition of type  $r$  from age 16 ( $r=0$  (no transition),  $r=1$  (cohabitation),  $r=2$  (marriage)). The equation consists of a set of terms  $D$  capturing the duration-pattern and a large set of time-varying ( $F(t)$ ) and time-constant ( $X$ ) covariates. We also include selected facets of the mobility history, whether a move (either short distance residential mobility or long distance migration) occurred in month  $t$ . The question includes a person-specific random effect,  $u^{u(r)}$  controlling for any unobserved heterogeneity for the same individual, affecting union formation and being constant over time.

The random effects from both equations are assumed to follow the normal distribution, with a variance specific to each effect to be estimated from the data:

$$u = (u^{m(1)}, u^{m(2)}, u^{u(1)}, u^{u(2)}) \sim N_4(0, \Omega_u)$$

The four person-specific random effects are first assumed independent of each other. If the four possible histories of mobility and union formation are explained by all covariates considered in the models, the independent specification will be correct. However, it is less likely to be satisfied, therefore, we posit correlations between these random effects (Steele et al. 2005; Upchurch et al. 2002).

$$\begin{pmatrix} u^{m(1)} \\ u^{m(2)} \\ u^{u(1)} \\ u^{u(2)} \end{pmatrix} \sim \left( \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_{m(1)}^2 & & & \\ \sigma_{m(12)} & \sigma_{m(2)}^2 & & \\ \sigma_{m(1)u(1)} & \sigma_{m(2)u(1)} & \sigma_{u(1)}^2 & \\ \sigma_{m(1)u(2)} & \sigma_{m(2)u(2)} & \sigma_{u(1)u(2)} & \sigma_{u(2)}^2 \end{pmatrix} \right)$$

### Preliminary Results

Table 1 reveals preliminary results from models estimating each life event separately (i.e., migration, residential mobility, marriage, and cohabitation). The findings suggest that mobility and union formation are closely related to each other. In fact, marriage and cohabitation are the most critical determinant for migration and residential mobility and *vice versa*. Moreover, we found that significant random effects in each equation, suggesting that person specific characteristics which are not included in the models affect the mobility and union formation transitions. From these initial models, we will include county characteristics and estimate the models simultaneously using ‘cmp’ command in Stata.

**Table1. Estimates from models for mobility and union formation**

Variable	Mobility		Union Formation	
	Migration	Residential mobility	Marriage	Cohabitation
<b>Union Formation</b>				
Married	2.32 (.07)***	2.48 (.13)***	-	-
Cohabited	2.37 (.04)***	2.58(.06)***	-	-
<b>Mobility</b>				
Migration	-	-	2.23 (.07)***	2.39 (.03)***
Residential mobility	-	-	2.37 (.12)***	2.61 (.06)***
<b>Individual characteristics</b>				
Female	.00 (.04) <sup>ns</sup>	.18 (.09)†	.48 (.06)***	.36 (.03)***
Black	-.34 (.05)***	-.98 (.12)***	-.62 (.08)***	-.30 (.03)***
Hispanic	-.49 (.05)***	-.20 (.12) <sup>ns</sup>	.08 (.08) <sup>ns</sup>	-.21 (.04)***
High school or equivalent	-1.34 (.03)***	-.60 (.07)***	-1.32 (.10)***	-.83 (.04)***
College or more	.52 (.04)***	-.55 (.11)***	-.23 (.07)**	-.55 (.03)***
Employed part-time	-.27 (.03)***	-.12 (.05)*	-.30 (.07)***	.07 (.03)*
Employed full-time	-.22 (.02)***	.04 (.04) <sup>ns</sup>	.17 (.05)***	.42 (.03)***
<b>Household characteristics</b>				
Living in an intact family	-.07 (.04)†	-.61 (.10)***	-.02 (.06) <sup>ns</sup>	-.35 (.03)***
Mother’s educational attainment	.07 (.01)***	-.03 (.02)†	-.04 (.01)***	-.01 (.01)**
Intercept	-4.37 (.04)***	-7.24 (.26)***	-7.06 (.23)***	-4.46 (.04)***
<b>Random Effects</b>	.32 (.31, .34)	.67 (.65, .69)	.34 (.32, .37)	.14 (.13, .15)

Notes: Numbers in parentheses are standard errors. Duration effects are controlled for.  
ns: not significant, †≤.10, \* p≤.05, \*\* p≤.01, \*\*\* p≤.001

## References

- Allison, P. D. (1984). *Event history Analysis: Regression for longitudinal event data*. Sage University Paper.
- Boyle, P. J., Kulu, H., Cooke, T., Gayle, V., & Mulder, C. H. (2008). Moving and union dissolution. *Demography*, 45(1), 209-222.

- Clark, W. A. V., & Withers, S. D. (2007). Family migration and mobility sequences in the United States: Spatial mobility in the context of the life course. *Demographic Research*, 17, 591-622.
- Clark, W. A.V., & Withers, S. D. (2009). Fertility, mobility and labour-force participation: A study of synchronicity. *Population, Space and Place*, 15, 305-321.
- Clark, W. A. V. (2012). Do women delay family formation in expensive housing markets? *Demographic Research*, 27, 1-24.
- Kulu, H., & Steele, F. (2013). Interrelationships between childbearing and housing transitions in the family life course. *Demography*, 50, 1687-1714.
- Molloy, R., Smith, C. L., & Wozniak, A. (2011). Internal migration in the United States. *Journal of Economic Perspectives*, 25 (3), 173-196.
- Mulder, C. H., & Billari, F. C. (2010). Homeownership regimes and low fertility. *Housing Studies*, 25, 527-541.
- Murphy, M. J. & Sullivan, O. (1985). Housing tenure and family formation in contemporary Britain. *European Journal of Population*, 1, 230-243.
- Rabe-Hesketh, S., & Skrondal, A. (2012). *Multilevel and longitudinal modeling using Stata. Volume II: Categorical responses, counts, and survival*, Third Edition. Stata Press.
- Schachter, J., Franklin, R. S., & Ferry, M. J. (2003). *Migration and Geographic Mobility in Metropolitan and Nonmetropolitan America: 1995 to 2000*. Census 2000 Special Report. CENSR-9. U.S. Census Bureau, Washington, DC.
- Steele, F., Kallis, C., Goldstein, H., & Joshi, H. (2005). The relationship between childbearing and transitions from marriage and cohabitation in Britain. *Demography*, 42 (4), 647-673.
- Steele, F., Joshi, H., Kallis, C., & Goldstein, H. (2006). Changing compatibility of cohabitation and childbearing between young British women born in 1958 and 1970. *Population Studies*, 60(2), 137-152.
- Upchurch, D. M., Lillard, L. A., & Panis, C.W.A. (2002). Nonmarital Childbearing: influence of education, marriage, and fertility. *Demography*, 39 (2), 311-329.