

# Patterns and Determinants of Stretch Commuting Across the Rural-Urban Continuum

Matt Kures

Center for Community and Economic Development  
University of Wisconsin-Extension

Steven Deller

Tessa Conroy

Department of Agricultural and Applied Economics  
Center for Community and Economic Development  
University of Wisconsin-Madison/Extension

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# Introduction

- We explore the concept of *stretch commuting*, or long distance commuters traveling 50 or more miles each way.
- Locally (i.e. in Wisconsin) regions are interested in retaining out-commuters due to labor supply constraints (nearing full employment and declining labor force partly due to an aging population).
- Economic upheavals stemming from the Great Recession create opportunities for exploring how commuters may have responded to these shifts.
- Declining mobility rates raise the question of whether workers are substituting commuting for migration.

# Joint Residential-Employment Location Decisions

Commuters are assumed to jointly select their residential locations and workplaces in a manner that maximizes the positive benefits to his or her household (Renkow and Hoover, 2000; Cho, Rodriguez and Song, 2008; So, Orazem and Otto, 2001; Partridge, Ali and Olfert, 2010)

Utility function that can include:

- Housing/Costs Characteristics;
- Quality of Life (Natural or cultural amenities, school quality, social connections, etc.);
- Probability of finding employment;
- Wage differentials;
- Demographics;
- Travel costs (time and direct costs).

# Commuting Patterns are Influenced by Many Factors

The exact influence of commuting length/time on locational decisions is neither definitive nor consistent (Cho, Rodriguez and Song, 2008):

- Workplace accessibility is either significant or a critical determinant for individuals who are deciding where to live (Abraham and Hunt, 1997; Levinson, 1998; Bhat and Guo, 2004).
- Demographic composition, housing characteristics and neighborhood attributes may play a greater role in residential selection (Molin and Timmermans, 2003; Zondag and Pieters, 2005).
- Commuting patterns are influenced by occupation, gender, income, and household structure (Kim, Sang, Chun and Lee, 2012; Wyly, 1998; Rapino and Fields, 2012).
- Spatial structure and distribution of labor markets influence commuting flows from both inter and intra-regional perspectives (Mitchelson and Fisher, 1987; Renkow and Hoover, 2000; Boschmann and Kwan, 2010; Partridge, Ali and Olfert, 2010; Chen, Zhan and Wu, 2012).

# Is there a Reasonable Threshold for Commuting Distances?

- If shorter commuting times or distances are to be viewed as amenities to individuals, the values of these amenities must diminish as commuting times or distances increase. Several distance thresholds have been suggested where the returns associated with commuting become negligible:
  - 50 to 60 miles between a community of residence and the community of employment (Mitchelson and Fisher, 1987)
  - Distance of 118 kilometers (~73 miles) as a critical threshold where rural areas become less likely to benefit from rural-urban integration through commuting (Partridge, Ali and Olfert, 2010).
- The number of individuals willing to commute more than 50 miles each way is notable. These so-called “stretch commuters”, totaled more than 3.3 million individuals between 2001 and 2002 (Bureau of Transportation Statistics, 2004).
- Rapino and Fields (2012) find that five percent of all full-time workers traveled 50 miles or more from their place of residence to place of employment during the 2006-2010 period.

# Motivation

- Snapshots of long distance commuters confirm that some segment of the U.S. population is willing to travel distances either at or beyond the thresholds where many individuals or regions likely experience minimal returns.
- However, we do not necessarily know how place-based factors or individual motivations influence an individual's decision to commute long distances (Rapino and Fields, 2012).
- Do patterns of stretch commuters vary across time and space similar to other socio-economic categories of commuters (past studies have been somewhat restricted by enumeration units and/or time periods).

**Can we create and ultimately use a data set to answer these (and other) questions about long distance commuting?**

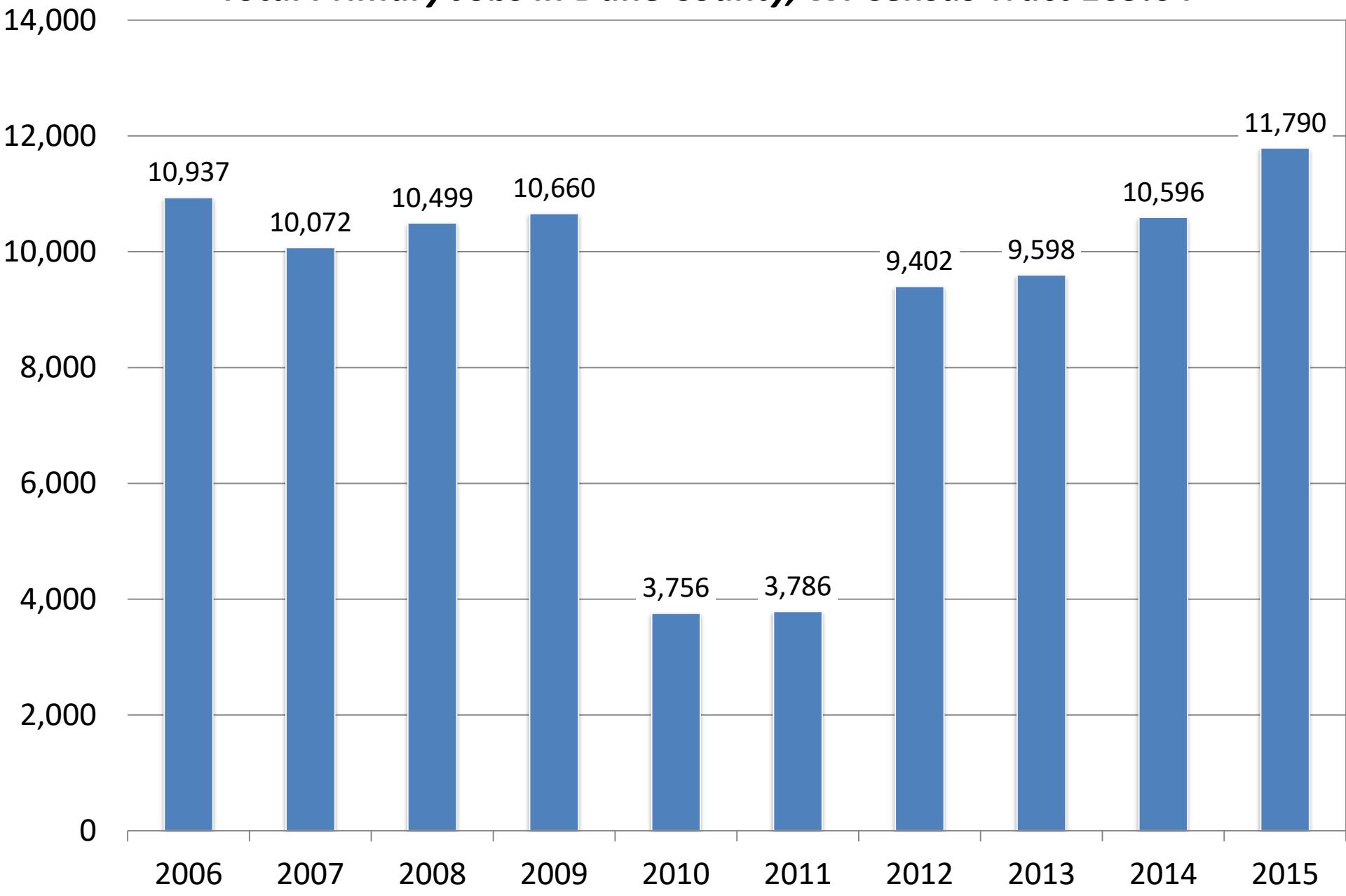
**Our analysis is largely exploratory**

# Data Source - Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES)

- *Synthetic* journey-to-work dataset produced annually (currently 2002 to 2015). Based on Q2 employment;
- State unemployment insurance reporting and account information and federal worker earnings records provide information on employment location for covered jobs and residential information for workers;
- Tabulated by residence area characteristics, workplace area characteristics and origin-destination characteristics. O-D subset includes more limited information on individuals by their earnings, age group and industry of employment;
- Enumeration units start with census blocks, which can be further aggregated to other geographic areas;
- For more information on LODES see Graham, Kutzbach, and McKenzie, 2014.

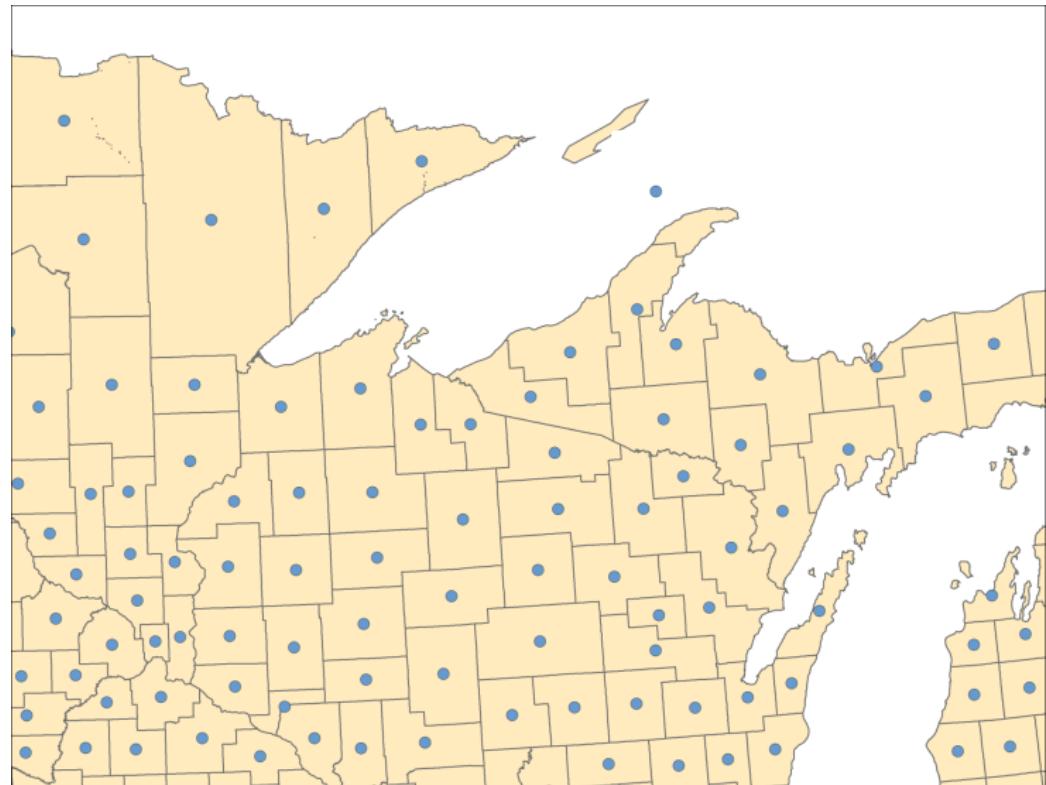
## Example of Potential Noise in the Data

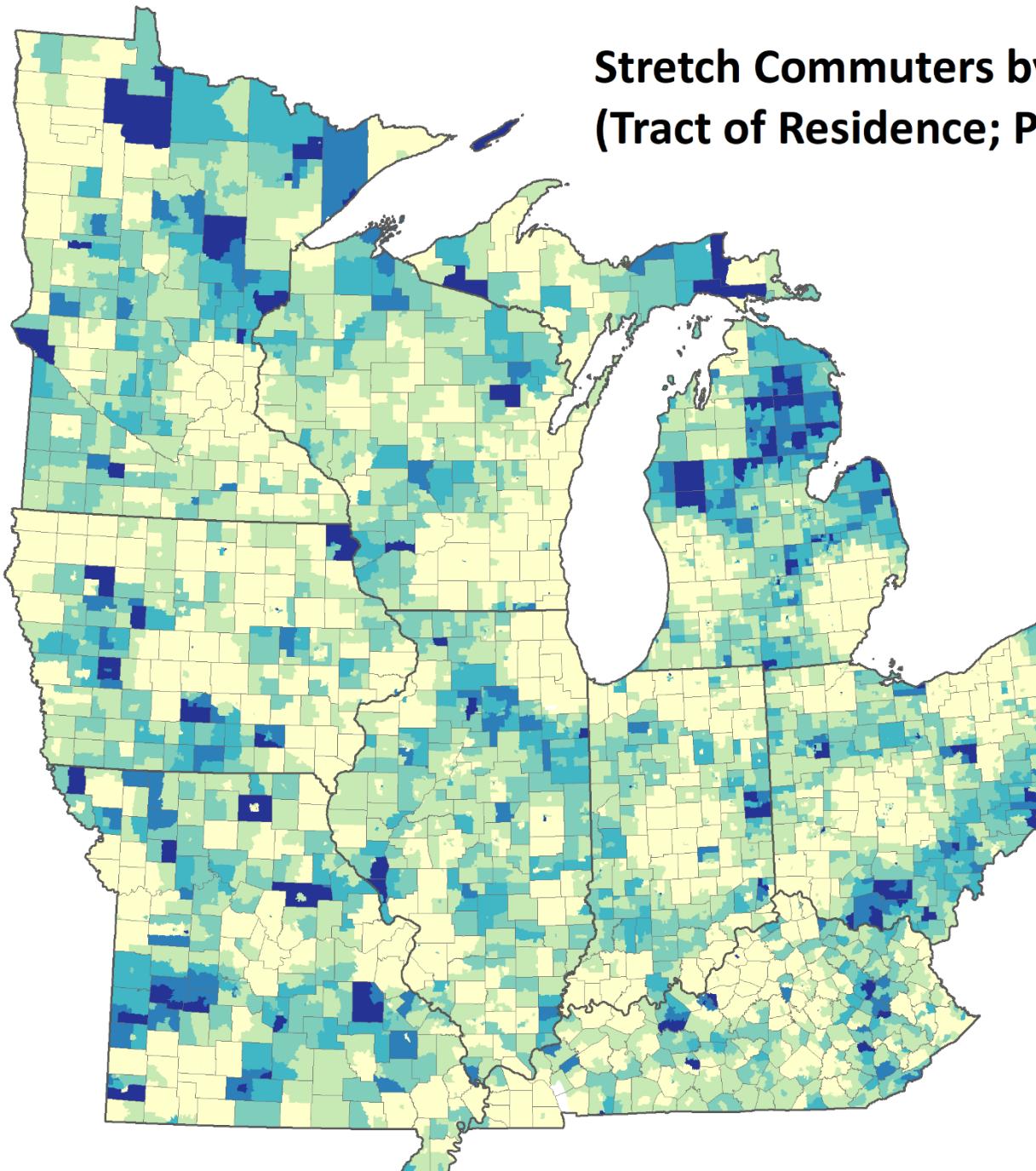
### *Total Primary Jobs in Dane County, WI Census Tract 109.04*



# Methodology

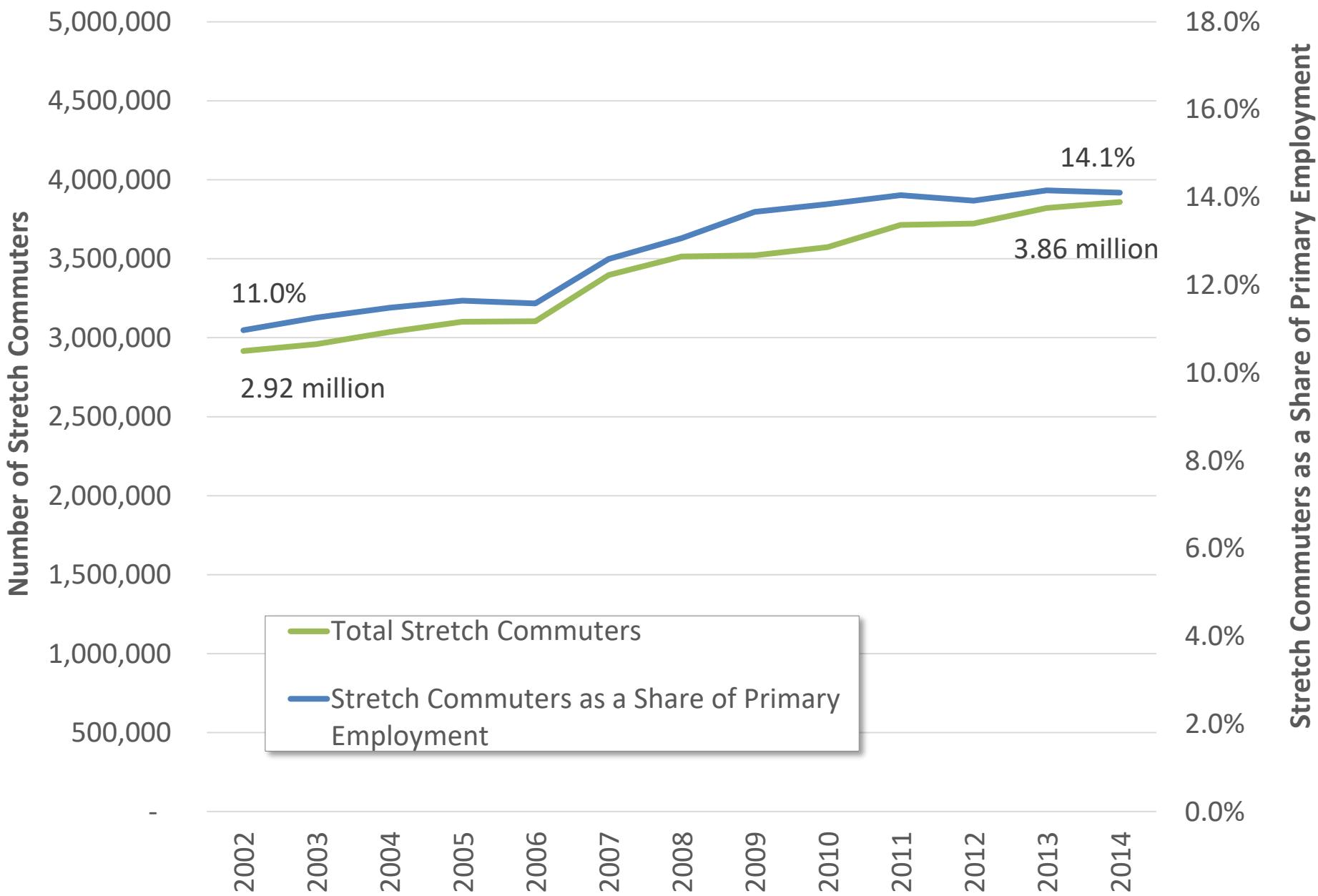
- Census tract-to-census tract centroid measurements with a travel friction adjustment using GDAL/OGR scripted with Python (significantly faster than running through ArcGIS, but not necessarily fast).
- Tract to tract measurements reduce problems associated with large geographic areas, but do not necessarily eliminate problems associated with the MAUP.
- Nine state study area (IL, IN, IA, KY, MI, MN, MO, OH and WI). Also include surrounding state census tract centroids to consider out-of-state study area commuters.
- Only consider primary jobs.
- Repeated the calculations for each year between 2002 and 2014.



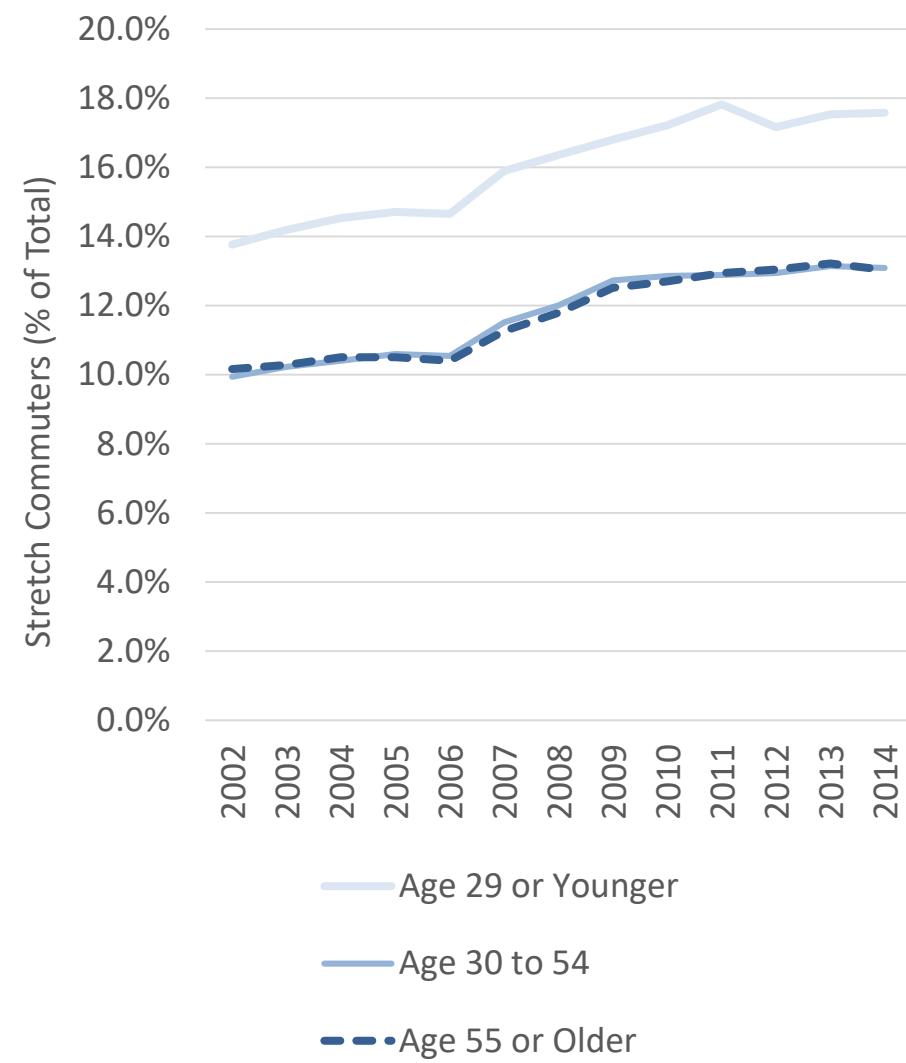


## Stretch Commuters by Census Tract in 2002 (Tract of Residence; Percent of All Workers)

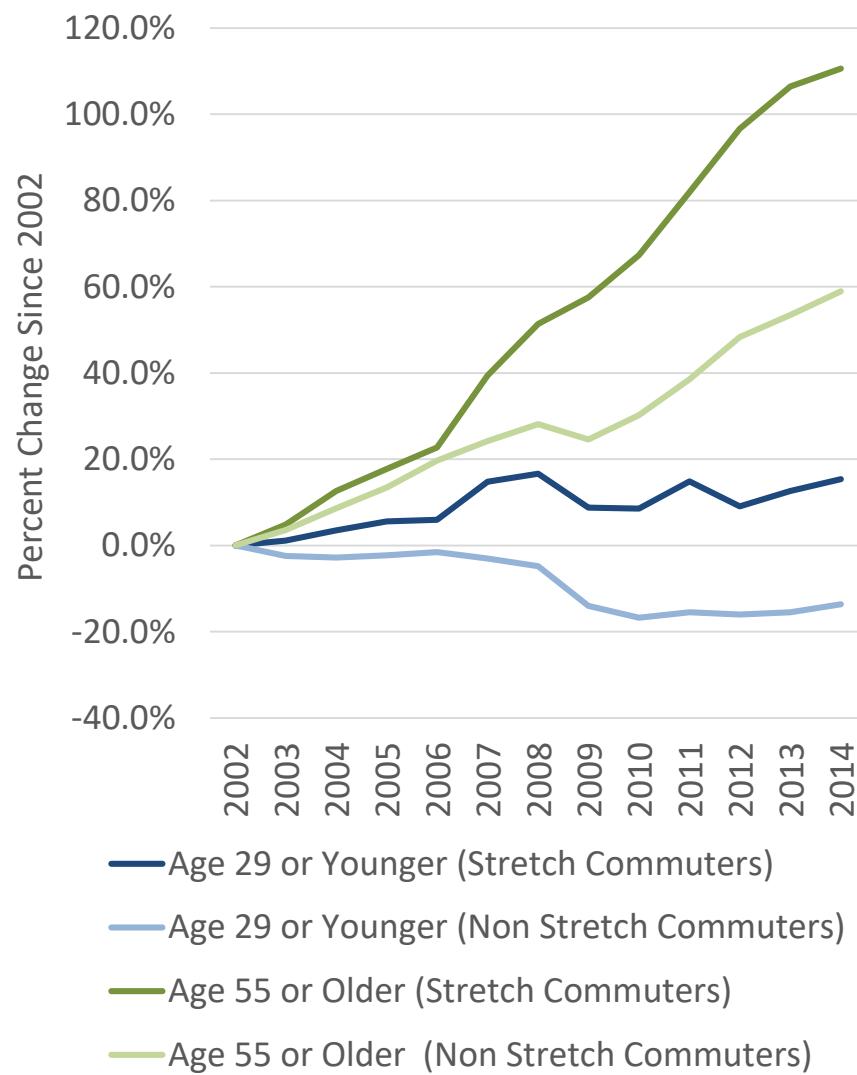
## Change in Study Area Stretch Commuting – 2002 to 2014



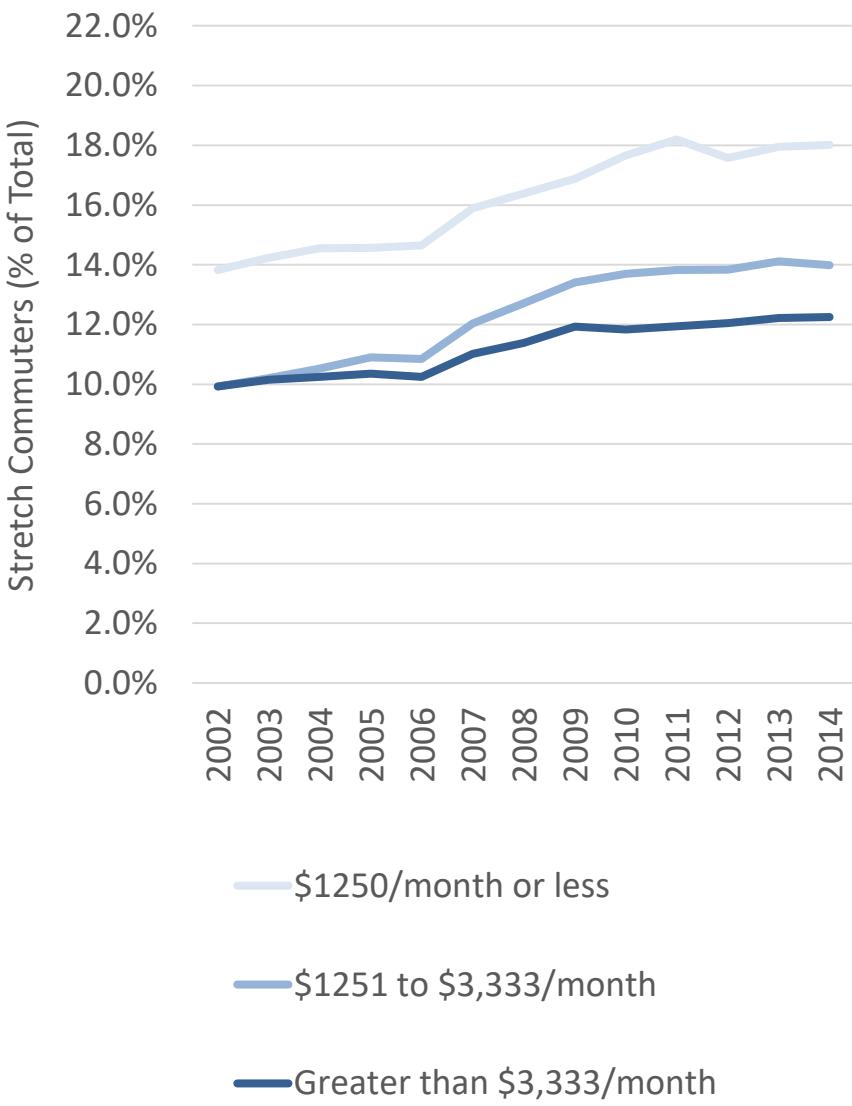
## Stretch Commuters as a Share of All Workers by Age Group



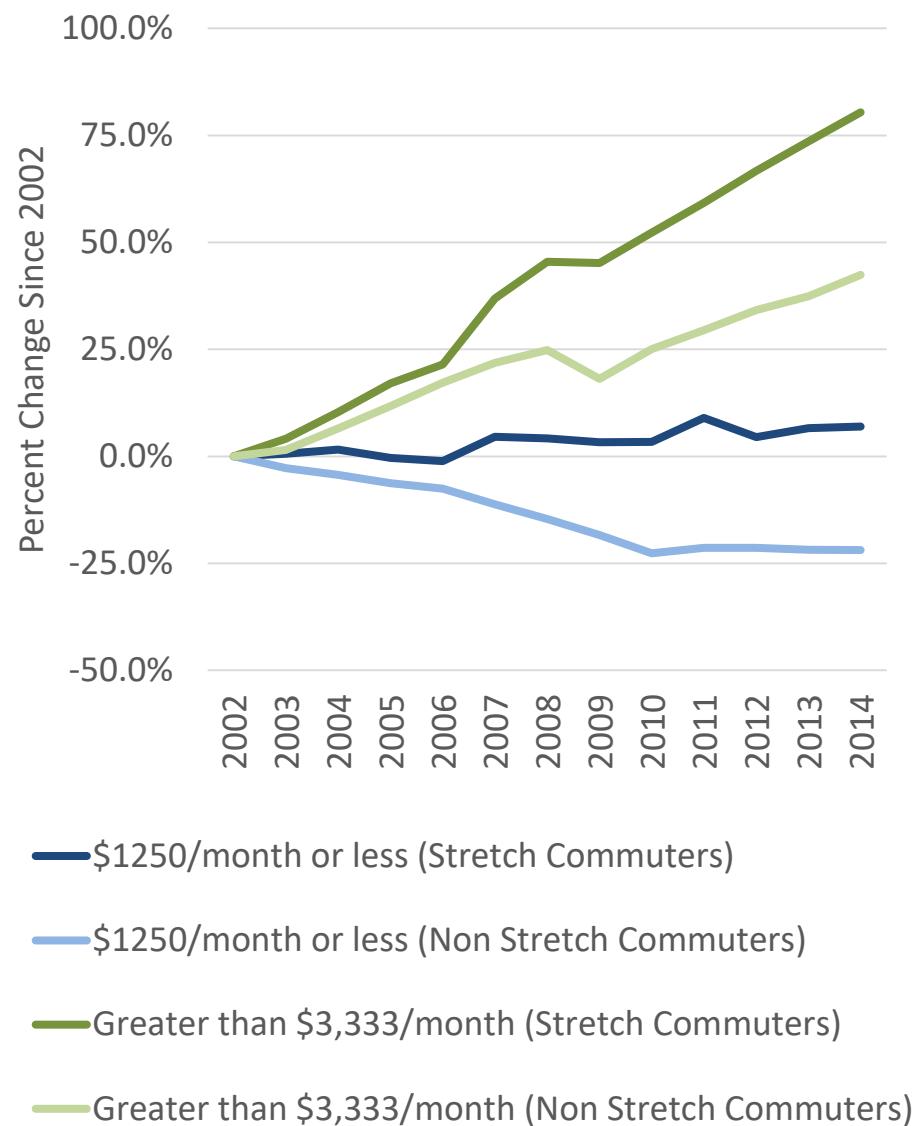
## Percent Change in Workers by Age Group Since 2002 - Stretch vs. Non-Stretch Commuters

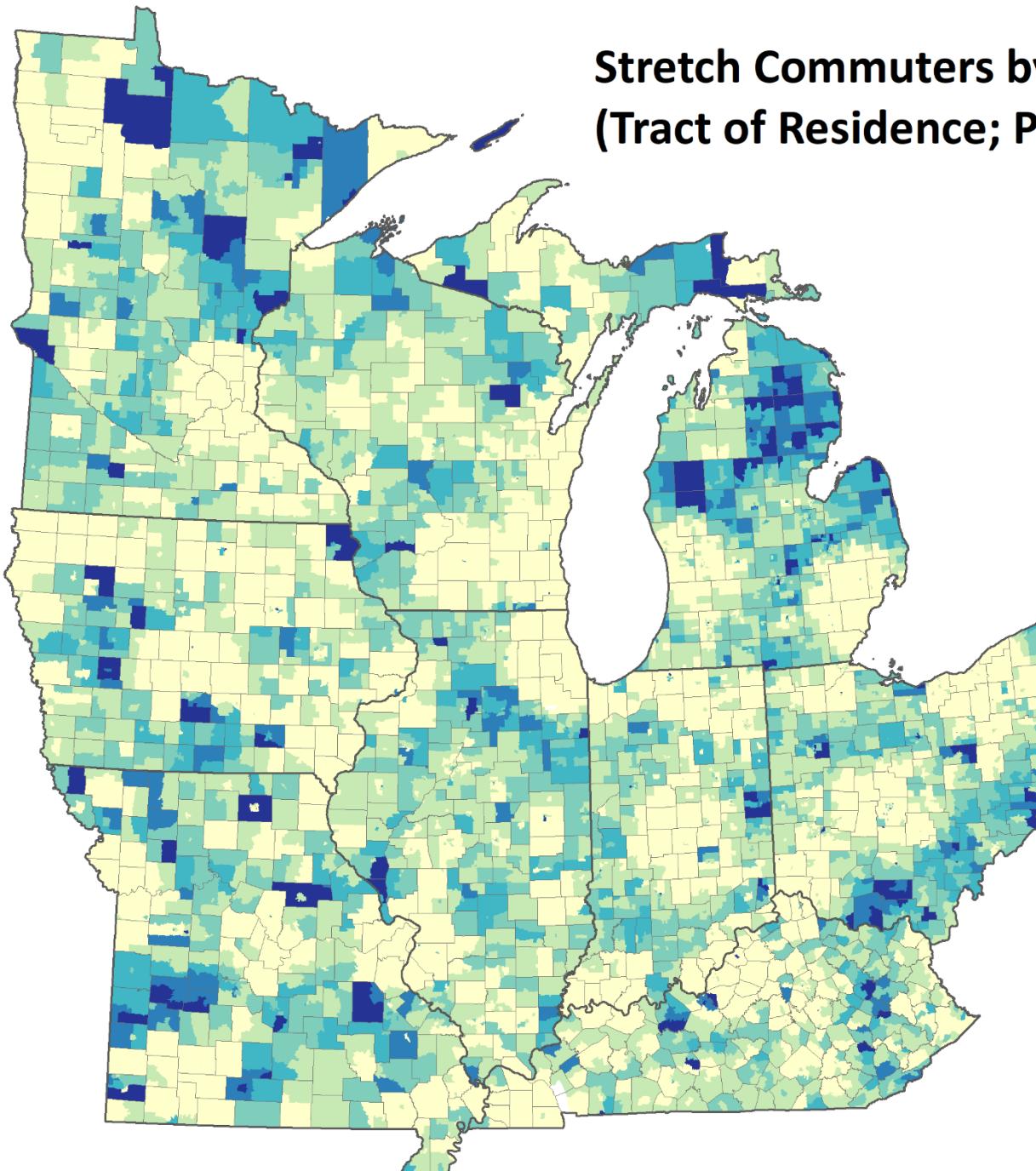


## Stretch Commuters as a Share of All Workers by Monthly Earnings



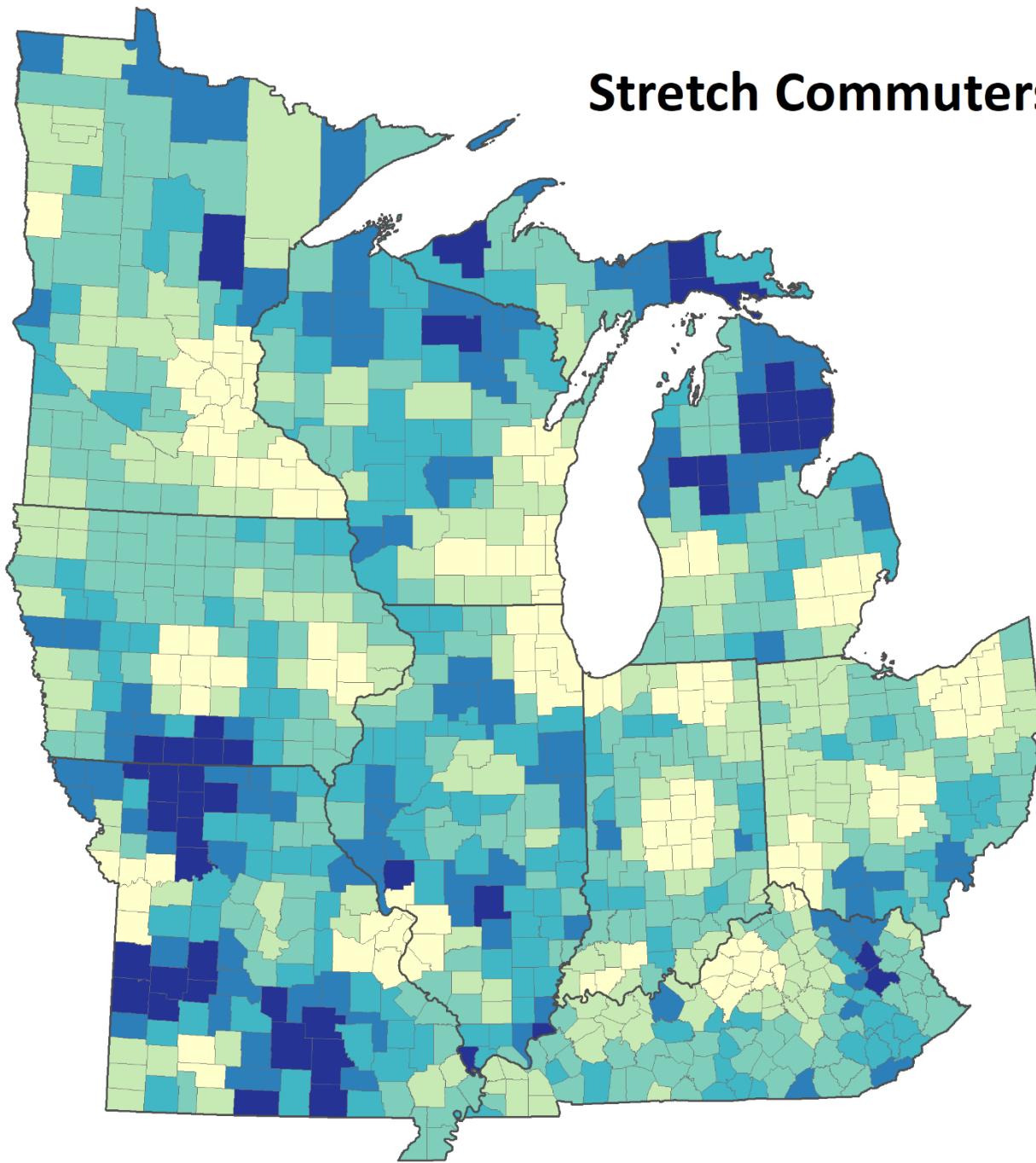
## Percent Change in Workers by Earnings Since 2002 - Stretch vs. Non Stretch Commuters





## Stretch Commuters by Census Tract in 2002 (Tract of Residence; Percent of All Workers)

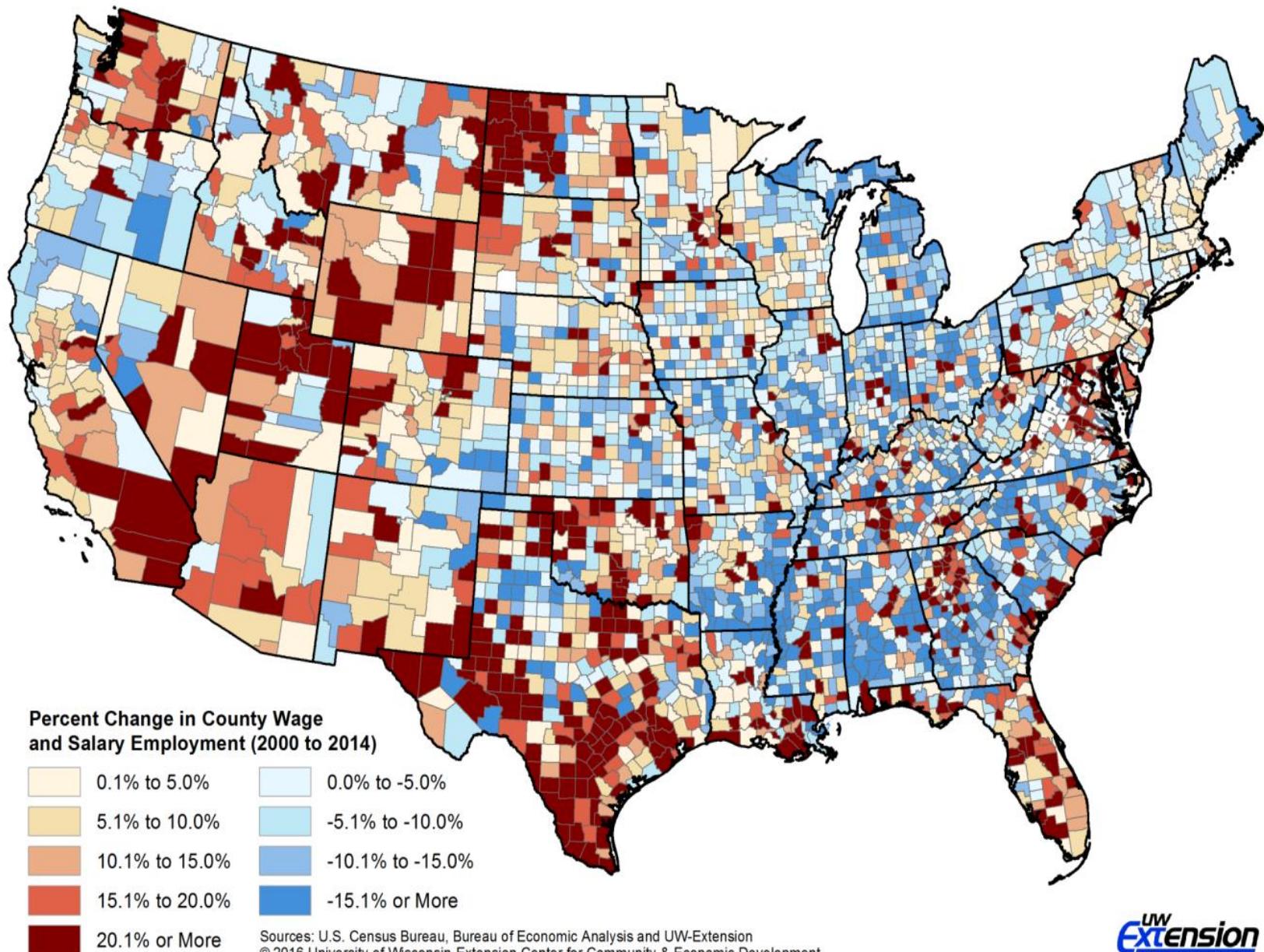
# Stretch Commuters by County - 2014



**County of Residence  
(Percent of All Workers)**

- 15.0% or Less
- 15.1% to 20.0%
- 20.1% to 25.0%
- 25.1% to 30.0%
- 30.1% to 35.0%
- 35.1% or More

# Percent Change in Wage and Salary Employment by County - 2000 to 2014

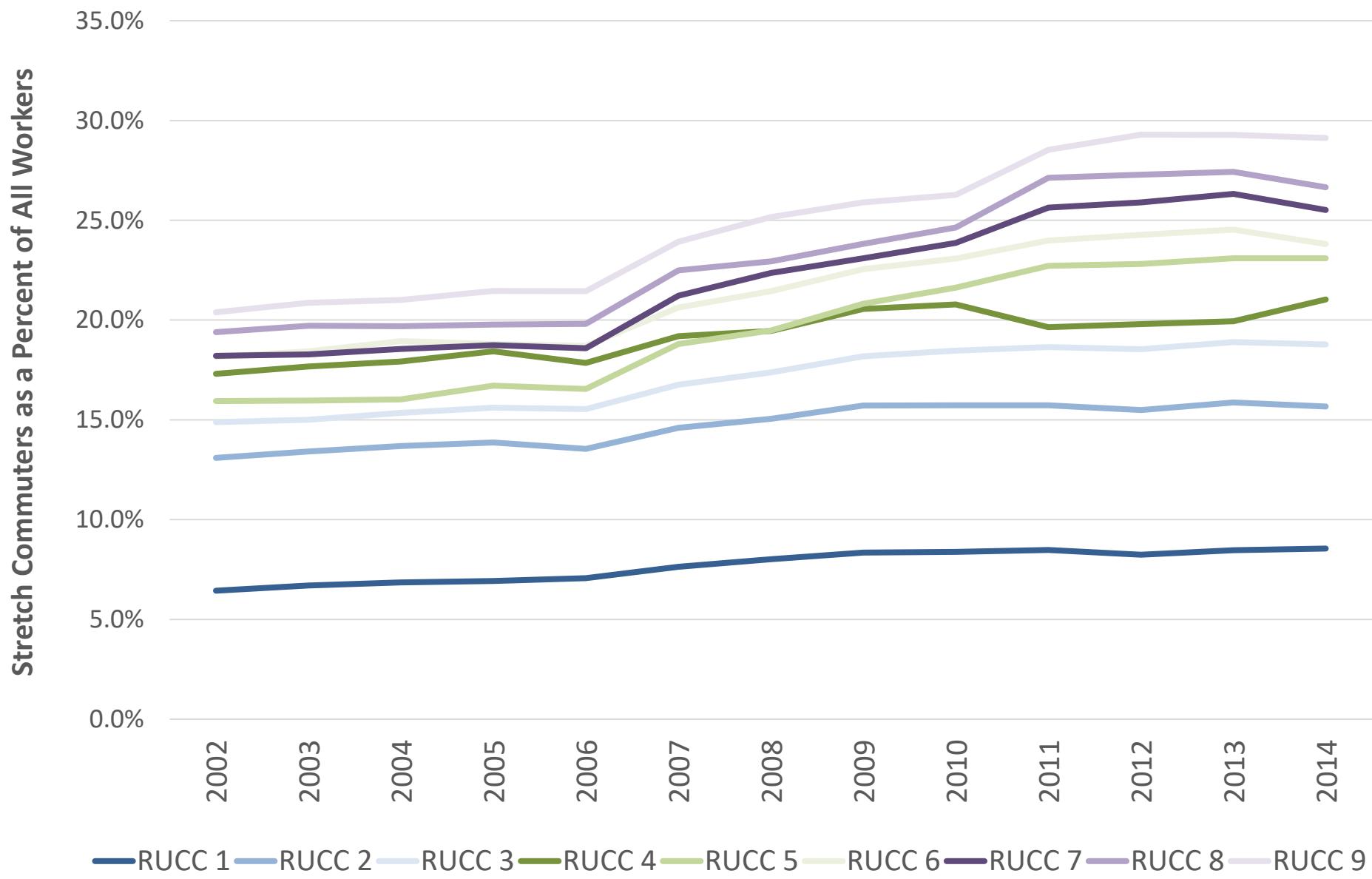


# Rural-Urban Continuum Codes

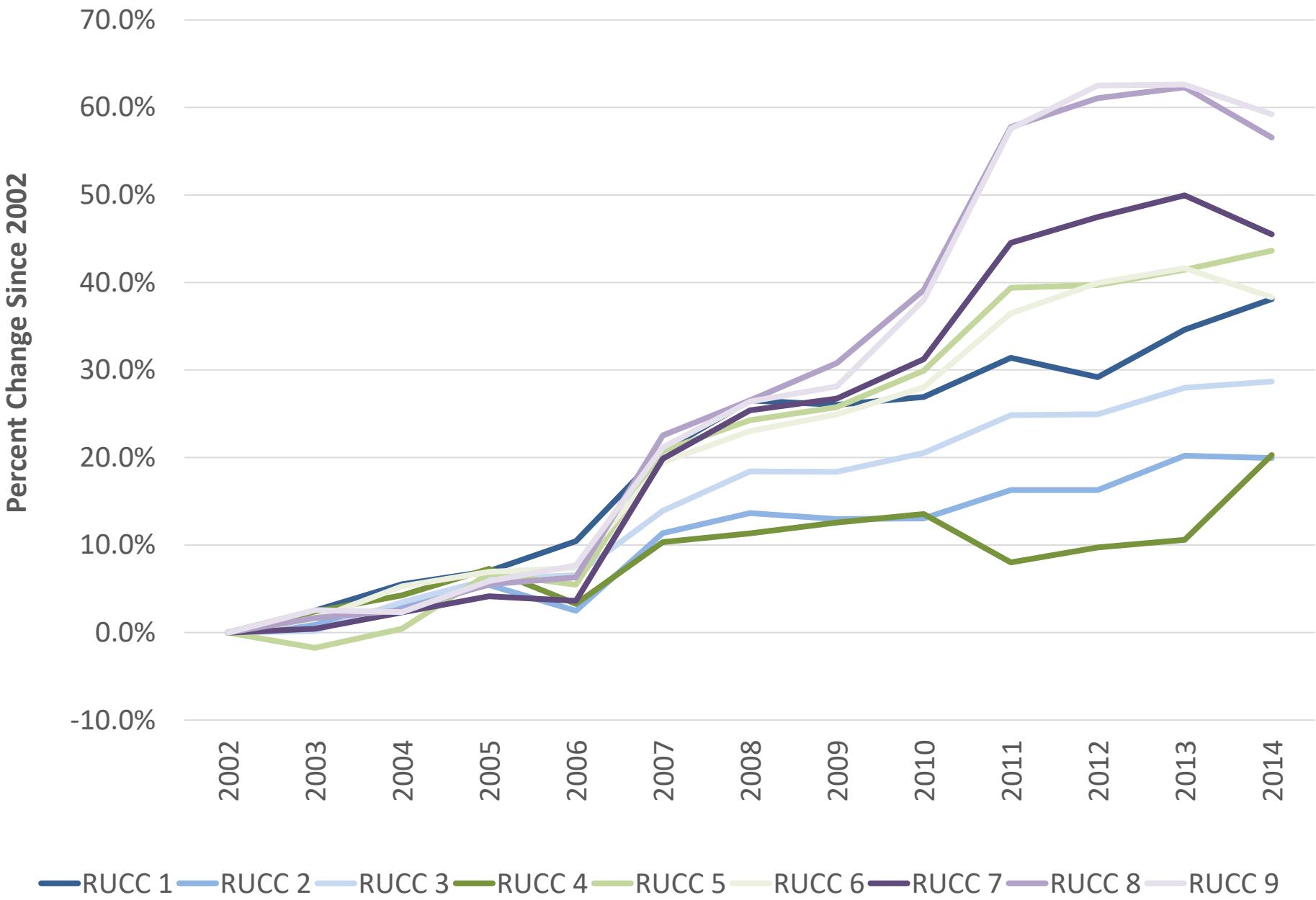
## *Another Method for Making Comparisons*

Code	Description
Metro Counties	
1	Counties in metro areas of 1 million population or more
2	Counties in metro areas of 250,000 to 1 million population
3	Counties in metro areas of fewer than 250,000 population
Non-Metro Counties	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
7	Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban pop., adjacent to a metro area
9	Completely rural or less than 2,500 urban pop., not adjacent to a metro area

# Stretch Commuters as a Percent of All Workers by RUCC (Primary Jobs)



# Percent Change in Stretch Commuting Since 2002 by Rural-Urban Continuum Code



# Exploratory Modeling

Working hypothesis: Stretch commuting has been expanding over time; people are willing to commute greater distances in order to live in one place and work in another.

Simple panel model:  $\Delta SC_{t \rightarrow t+1} = f(SE_t, D_t)$

Where:

- $SC_{t \rightarrow t+1}$  - Change in the number of workers that are stretch commuters from time  $t$  to time  $t+1$
- $SE_t$  - Set of simple socioeconomic variables
- $D_t$  - Set of time dummies. Assuming a simple linear function, we would expect the coefficients on the time dummies to be increasing over time:  $\beta_{Dt} > \beta_{Dt-1} > \beta_{Dt-2} > \dots$

# Exploratory Modeling

- Two measures of stretch commuting: (1) the change in total number of stretch commuters, and (2) the change in the percent of workers that are stretch commuters.
- We use both measures as more of a simple robustness check. We also use an aspatial fixed effects estimator along with a crude spatial error model with fixed effects.
- We explored two way fixed effects along with time fixed effects. F tests for fixed effects rejected the two way fixed effects in favor of the time fixed effects model. This latter result lends some credence to the basic hypothesis that stretch commuting is shifting over time, or at least during the study period explored here.

# Exploratory Modeling

Table 1: Exploratory Analysis of Stretch Commuting

	Number of Commuters		Share Commuters	
	Aspatial	SEM	Aspatial	SEM
% Pop Over Age 65	-0.2367 (0.5555)	-0.1124 (0.7327)	-0.2323 (0.5507)	-0.1072 (0.7353)
Population/Employment Ratio	0.0631 * (0.0529)	0.0791 ** (0.0020)	0.0512 (0.1052)	0.0686 ** (0.0056)
Share of Employment in Manufacturing	-0.2982 * (0.0795)	-0.2046 (0.1512)	-0.2483 (0.1320)	-0.1491 (0.2783)
Share of Employment in Farming	0.9876 ** (0.0012)	1.0715 *** (0.0001)	0.8699 ** (0.0033)	0.9410 ** (0.0003)
Unemployment Rate	-0.7118 (0.3934)	-0.4627 (0.5047)	-0.4851 (0.5486)	-0.2634 (0.6936)
Per Capita Income	-0.0199 (0.4590)	0.0033 (0.7787)	-0.0204 (0.4331)	0.0021 (0.8494)
Time Fixed Effect 2004	-0.3176 *** (0.0001)	-0.2897 *** (0.0001)	-0.3280 *** (0.0001)	-0.3011 *** (0.0001)
Time Fixed Effect 2006	0.3928 *** (0.0001)	0.4191 *** (0.0001)	0.3844 *** (0.0001)	0.4097 *** (0.0001)
Time Fixed Effect 2008	-0.1656 *** (0.0001)	-0.1505 *** (0.0001)	-0.1377 ** (0.0006)	-0.1229 *** (0.0001)
Time Fixed Effect 2010	-0.0322 (0.4262)	-0.0260 (0.4972)	-0.0762 * (0.0520)	-0.0694 * (0.0615)
Spatial Parameter $\rho$	---	-0.2700 *** (0.0001)	---	-0.2820 *** (0.0001)
R <sup>2</sup>	0.1453	0.1777	0.1476	0.1824

Marginal significance (p-value) in parentheses.

\*\*\*: Significant at 99.9% level.

\*\*: Significant at 95.0% level.

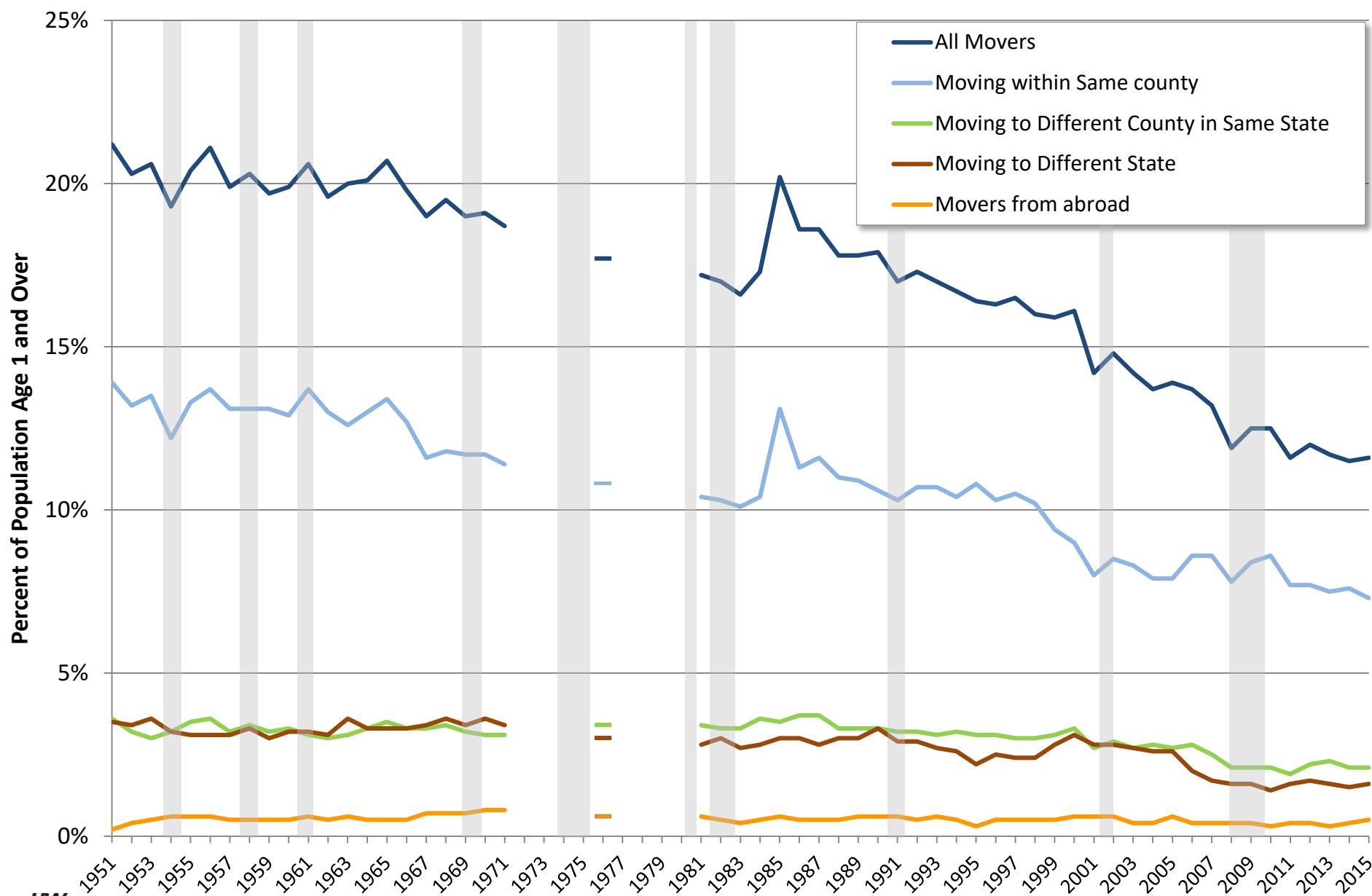
\*: Significant at 90.0% level.

# Summary and Future Research

- We find that stretch commuters have increased between 2002 and 2014 across the rural-urban continuum and among different age groups and earnings categories.
- We will greatly expand the analysis of determinants by evaluating a greater number of control variables.
- Explore additional lines of inquiry (Housing implications, child care, changes in travel costs, community economic development initiatives, etc.)
- Further examine whether long distance commuters are trading commuting for migration.

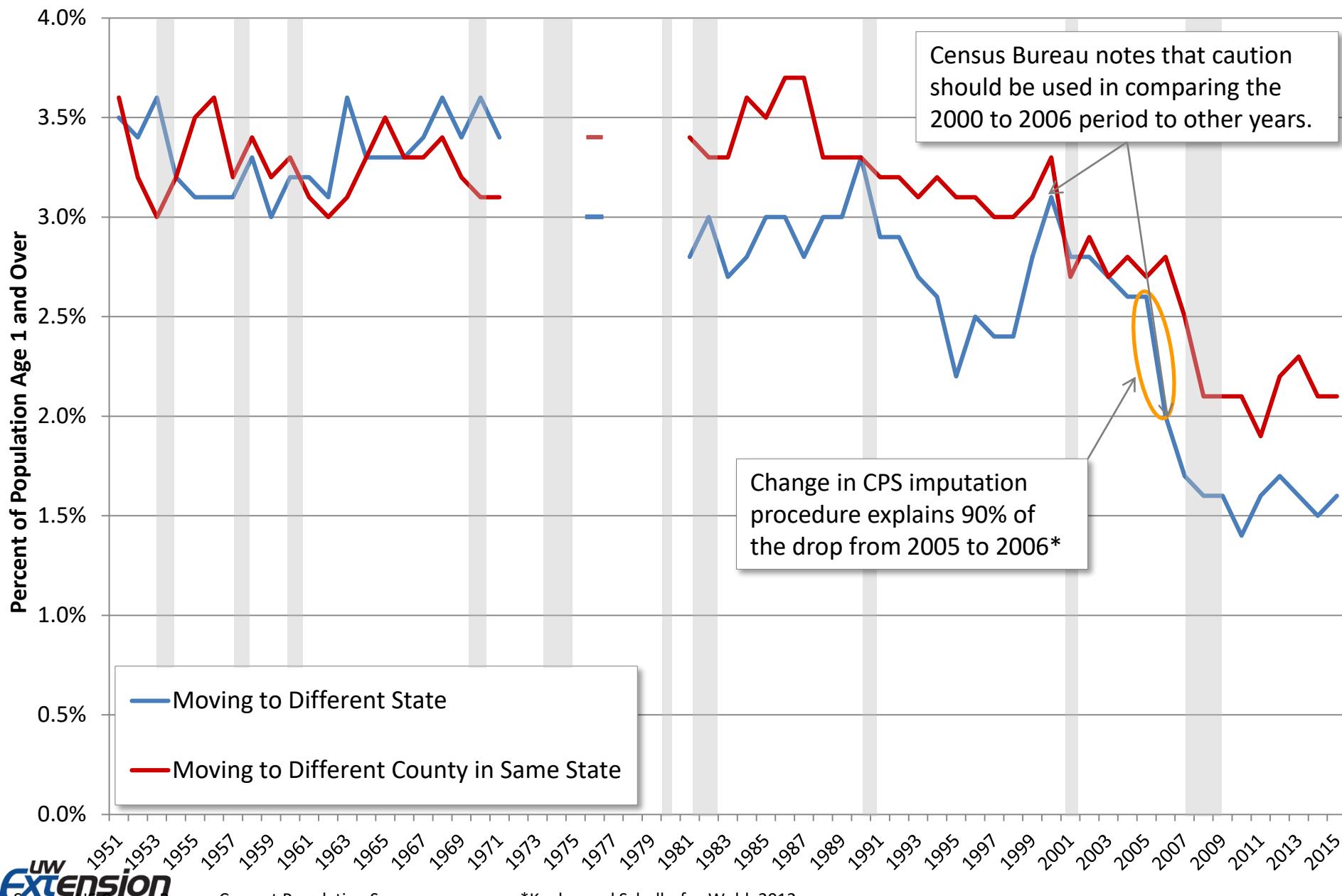
# Mobility Rates 1950 to 2015

## *Percent of United States Population Moving (Age 1 and Over)*



# Inter-State and Inter-County Mobility 1950 to 2015

## Percent of United States Population Moving Across State Lines (Age 1 and Over)



# Contact Information

Matt Kures

University of Wisconsin-Extension  
Center for Community & Economic Development

[www.uwex.edu/ces/cced](http://www.uwex.edu/ces/cced)

@uwexcced

610 Langdon Street, Room 328, Madison, WI 53703  
Phone 608-265-8258    [matthew.kures@uwex.edu](mailto:matthew.kures@uwex.edu)