

Residential Gridlock: Ranking the Growing Gridlock in Residential Mobility

A Supplement to Accompany

Public Release of the June 2021 journal article

“Housing Shortages and the New Downturn of Residential Mobility in the U.S.”

Geographic mobility, as reported by the U.S. Census Bureau, has been reaching record lows in 2019 (9.8%) and 2020 (9.3%). This decline is a continuation of a 4-decade trend. What has **not** been recognized is that **all of the decline in the last decade** was among local area movers, whereas in the preceding decade of the 2000s almost all of the decline was among long-distance movers (Exhibit 1). This local-area mobility declined by approximately one-third in the U.S. as a whole, but analysis to be described shows the decline is largely among renters and much greater in urban areas with certain housing, economic, and demographic conditions.

MEASURING THE DOWNTURN IN MOBILITY

In these national data including both urban and rural population, based on the long-running Current Population Survey, “local-area” is defined as within **the same county**, but in our housing market analysis of the 100 largest metro areas local is within **the same metro**. The housing analysis to be described is conducted with a newer, large-scale survey by the Census Bureau (the American Community Survey) that has only been fully running since 2006.

The decline in local-level mobility is alarming because it **indicates deteriorating housing well-being** due to residents’ inability to adjust their housing to meet changing needs and aspirations. And when one household is discouraged from moving out of their housing unit, that means another household loses the opportunity to move in. Thus, the decline in mobility snowballs toward a collective, **residential gridlock** where few people can find an opening to move. Our analysis indicates that the shortage of vacant openings, not simply the prices brought by scarcity, is slowing the rate at which people can move.

In fact, people’s stated reasons for making local moves emphasize housing motivations much more than in long-distance moves (Exhibit 2). Given the protracted housing crisis of the post-recession decade, our analysis has sought to document specific housing explanations for the contraction of mobility. For the purpose of estimating linkages to housing, we switched our frame for analysis from the percent of population that changed residence to the **share of households** that have recently occupied a different unit, focusing particularly on renters’ behavior, but also including owners. In fact, the trends for population and households are very similar (Exhibit 3), while those for owner and renter subsets of households are very different (Exhibit 4). The decline in household mobility is clearly concentrated among renter households and in the failure of more renters to buy homes and move to owner status.

The unexpected, post-2010 plunge in local residential movers is statistically investigated in the June 2021 *Housing Studies* research article.¹ Exploiting the variation in declining mobility in the 100 largest metropolitan areas in the U.S., we statistically estimated (using ordinary least squares (OLS) regression) the associations of multiple factors that may shape the local trend in mobility among renter households. We found the degree of declining mobility was closely associated with slower housing construction than employment growth in the recovery years following the Great Recession. Additional major factors included the heightened rental demand created by the fall in homeownership and also the entry of the large Millennial generation into the housing market (mostly as renters).

EXPLANATIONS FOR THE DOWNTURN

The statistical models provide insights on reasons for the downturn in mobility by comparing the variations across then 100 metro areas. Relative to the mean metropolitan decline of rental mobility between 2012 and 2018, and relative to the means for each of the other variables, the following strong, significant associations are estimated (from Model 4 in the published paper):

1--Balance of new construction and employment: a one percentage point increase in building permits for the local number of new apartment units equates to a 1.38 percentage point increase in the renter mobility trend; but that construction boost is offset by a -0.19 percentage point decline for every 1.0 percentage point increase in employment growth. (Employment growth signals the economic vitality of a metro, but added growth increases congestion in the housing stock and slows mobility; hence, the importance of new construction. Thus, the balance of construction and employment growth is an essential control for evaluating the additional factors that follow.)

2--Home buying effect on rental opportunities: a one percentage point increase in annual home buying by locally-initiated movers is associated with a 1.72 percentage point increase in the local renter mobility trend. (More local movers into homeownership means more rentals are freed up for renter movers, thus elevating the rental mobility trend. Unfortunately, home buying was greatly depressed following the Great Recession, and some metros, Los Angeles and others, have experienced very weak homeownership recoveries, which depresses their rental mobility.)

3--Discouraging effect of Affordability (excessive cost burden): a one percentage point increase in the prevalence of excessive rent burden in a metro is associated with a -0.26 percentage point decrease in the renter mobility trend. (Interpretation given in the article is that a high prevalence of excessive cost burden discourages renters from moving out of their current unit and also, therefore, reduces chances of other renters moving in.)

¹ Myers, D., Park, JH, and Cho, S (2021) "Housing Shortages and the New Downturn of Residential Mobility in the U.S." *Housing Studies*.
<https://doi.org/10.1080/02673037.2021.1929860>

4--**Depressant effect of Millennial competition:** a one percentage increase in the share of adults concentrated in age 25 to 39 is associated with a -0.67 percentage point decrease in the renter mobility trend. (A counter-intuitive finding is that a larger concentration of young adults, who are prone to be high mobility renters, leads to a reduced mobility trend. Interpretation given is that this high mobility propensity has a strong effect on competition and congestion in rental markets, unless it is offset by much greater housing construction. The article offers the following concrete example of trends from 2012 to 2018:

"The metros with the highest young adult share declined the most in their renter mobility. For example, the youth magnet of Austin, Texas, has a 2012 young adult share of 34.5% and renter mobility decline of -7.85 , while an older metro, Pittsburgh, Pennsylvania, has a share of 23.4% and mobility decline of -2.26 ."

Data and Methods

We adopt the American Community Survey (ACS) as our principal data source. This is the Census Bureau's largest survey, providing data on population and housing collected annually from 3 million addresses, but only since 2005. The ACS provides a very large sample size in the 100 largest metros in the nation (unlike the Current Population Survey that is traditionally used to study geographic mobility). We augmented this with data on housing construction (Census Bureau) and employment growth (Bureau of Labor Statistics) to better measure the adequate provision of new supply. We used statistical analysis to dig deeper into how the housing opportunities in the 100 largest metro areas may have depressed the mobility trend for renters in particular. Five key hypotheses were specified and tested in an OLS regression format (Table 2 of [the paper](#)).

About the Authors

A two-year study was conducted by Professor Dowell Myers, Dr. JungHo Park, postdoctoral scholar, and Seongmoon Cho, Ph.D. student, working in the [Population Dynamics Research Group](#) of the Price School of Public Policy at the University of Southern California. *Support for the empirical research and theory development was generously supported by the Randall W. Lewis Foundation.*

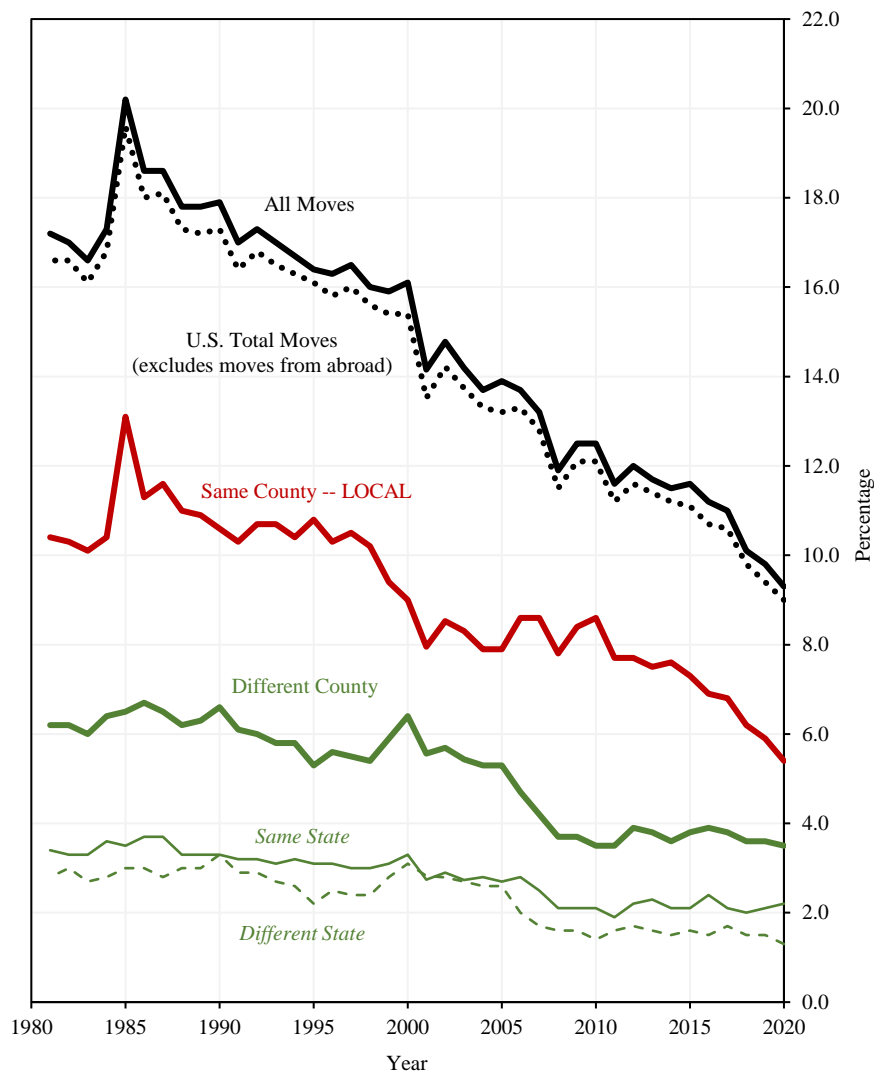
DESCRIPTIVE FINDINGS

In this supplementary brief, we provide descriptive evidence, focusing on the 30 largest metro areas, and including both renters and owners. This brief extends the new insight by ranking the 30 largest metropolitan areas for their degree of greatest decline in local mobility among renters, or alternatively, among homeowners, the weakest recovery in local mobility among homeowners. Also presented are some simplified bivariate scatterplots showing relationships that are consistent with those estimated in regressions with controls for multiple factors.

Definitions of mobility rates differ somewhat between sources and for use in different analyses, as noted below exhibits and explicitly specified in parentheses at the end of each exhibit title.

Appendix B reports different definitions of mobility rates and their comparisons. Appendix C summarizes which data sources, and denominator and numerator, were used in each exhibit.

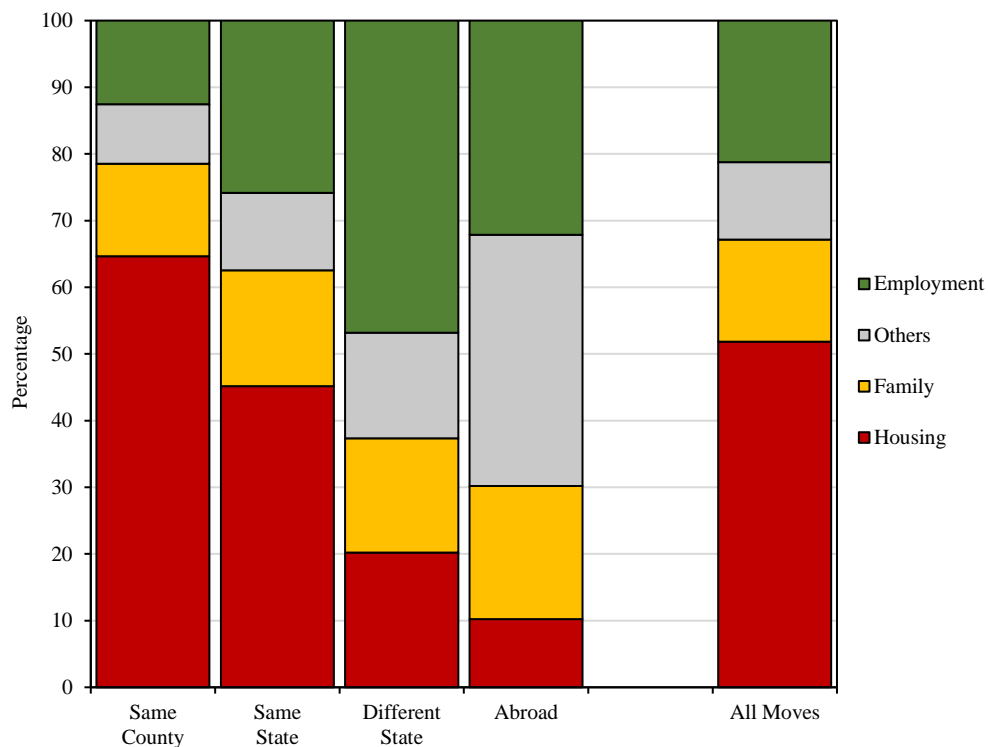
Exhibit 1. Four Decade Trend in the Percent Moving to a Different Residence in the Last Year, United States, 1980 to 2020 (Percent of Total Population (Age 1+) that Changed Residence in Moves of Varying Distances in the Last Year)



Notes: Mobility is defined in this exhibit as the share of total population that has changed residence in the last year by traveling a given distance. The sum of “same county” and “different county,” i.e., local and non-local movers, equals the total mobility rate for “all moves.”

Source: Census Bureau’s CPS Historical Migration/Geographic Mobility Table A-1, titled *Annual Geographic Mobility Rates, By Type of Movement: 1948-2020*, which is publicly accessible at <https://www.census.gov/data/tables/time-series/demo/geographic-mobility/historic.html>

Exhibit 2. Reasons for Moves, By Type of Movement, United States, 2019 (Percent of Total Population (Age 1+) that Changed Residence in Varying Distances in Last Year)

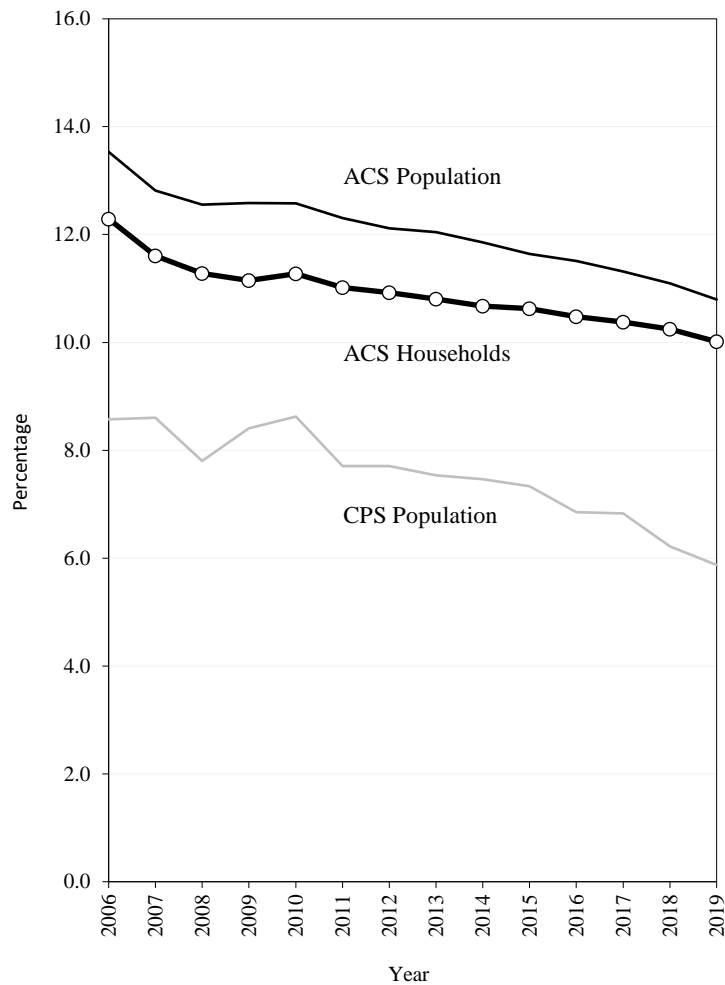


Notes: One of the reasons for move, labeled as “To establish own household,” accounting for 11.4% of all moves in 2019, is often termed a family reason, even when a majority of these movers are living alone or apart from any family members. Household formation is also considered the most elemental factor in housing demand, so it is grouped here with other Housing reasons.

Sources: U.S. Census Bureau’s CPS Historical Migration/Geographic Mobility Table A-5, titled *Reason for Move (Specific Categories): 1999-2020*, which is publicly accessible at <https://www.census.gov/data/tables/time-series/demo/geographic-mobility/historic.html>; 2019 Current Population Survey, Integrated Public Use Microdata (IPUMS) Series, Microdata files (Ruggles et al., 2020).

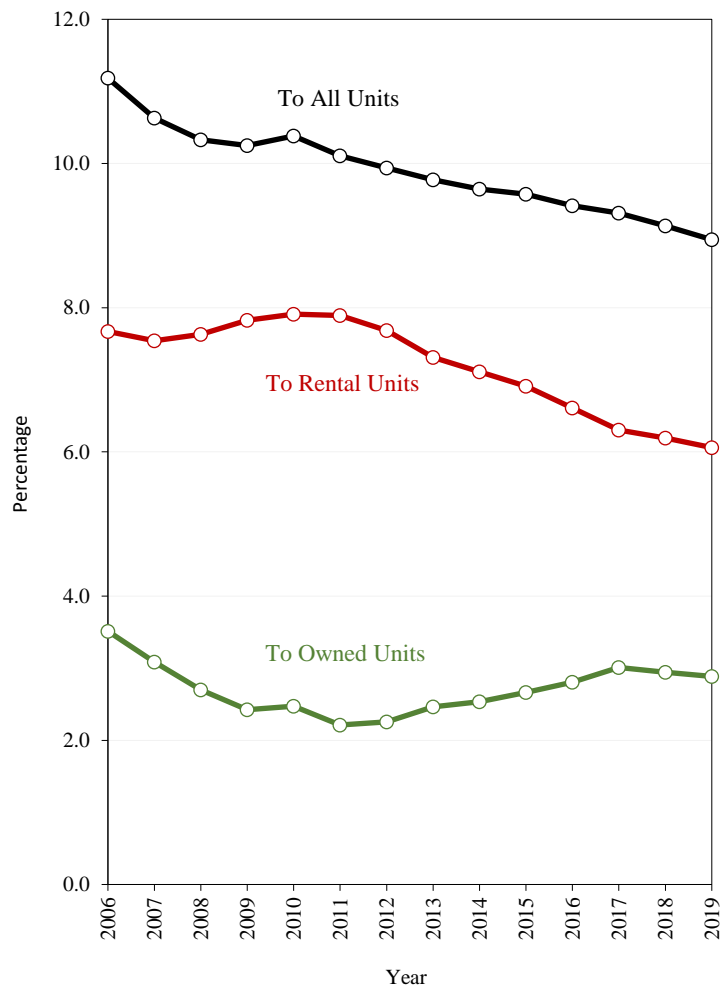
Exhibit 3. Comparison of U.S. Trends in County Level Mobility for Total Population and Total Households, Based on Current Population Survey (CPS) and American Community Survey (ACS), 2006 to 2019

(Percent of Total Population (Age 1+) or All Households that Changed Residence within the Same County in Last Year)



Sources: 2006 through 2019 CPS and ACS IPUMS microdata files (Ruggles et al., 2020).

Exhibit 4. Trend in Metro Level Mobility to Rented or Owned Units, United States, 2006 to 2019 (Percent of Locally-resident Households that Changed Residence within the Same Metro Area in Last Year)



Sources: 2006 through 2019 ACS IPUMS microdata files (Ruggles et al., 2020).

Statistical regression analysis of the trend in rental mobility across the 100 largest metropolitan areas found close relationships between the degree of declining mobility and supply and demand factors. Carefully constructed in successive layers, the multivariate models first test how a weaker housing construction than employment growth during the recovery from the Great Recession was related to a greater decline in residential mobility. These findings were also summarized above under Explanations for Downturn (page 2 of the Supplement), but the examples here are simplified estimates from the same data..

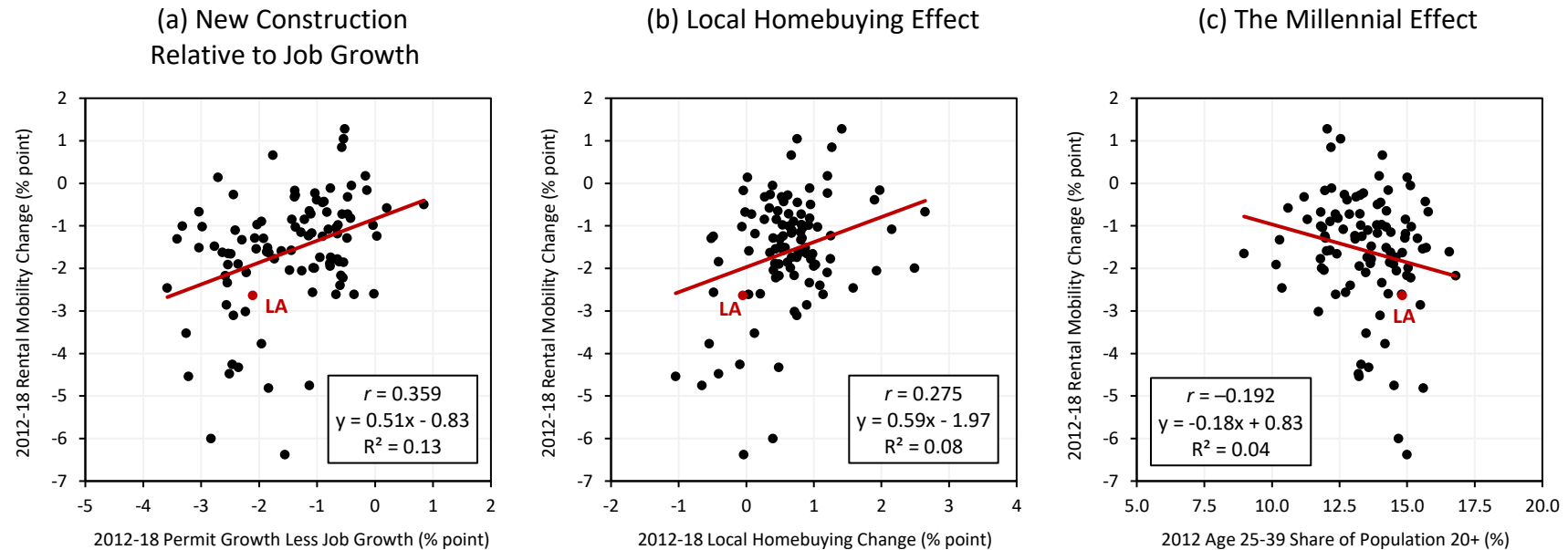
A simplified, bivariate view is offered in Exhibit 5, showing one dot for each metro area in the sample. Panel (a) summarizes the ***construction shortage effect***. Every unit built has amplified importance because it launches a vacancy chain within a metro as successive waves of movers replace each other as units turnover. Reduced construction thus has a multiplier effect on reduced mobility overall, due to fewer chains of moves.

Panel (b) of Exhibit 5 shows the ***homebuying effect on renter mobility***. A rise in homebuying in a metro is linked to rising renter mobility, which is an important finding. The scatterplot presented is a simplified, bivariate relationship. In the full statistical analysis, with construction shortages controlled, the homebuyer effect grows even stronger. The Interpretation given is that homebuying takes households out of rental competition and releases their former rentals for chains of successive renters, which multiplies rental opportunities and enhances renter mobility.

An additional finding that was most surprising is a ***Millennial effect***. The concentration of young adults ages 25 to 39 in a metro in 2012 correlates strongly with the share in 2018 ($r=0.95$) and metros with higher concentrations of Millennials experienced much greater decline in renters' mobility, either when controlled for all other factors or in the simplified, bivariate view presented in panel (c) of Exhibit 5. Ordinarily, one would assume that more young people would raise mobility rates, because young people move more frequently, but this potential also increases greater stress on the available housing stock and the "friction of competition" slows the rate of mobility unless construction increases at an even greater rate, which it generally hasn't.

Exhibit 6 shows a best-to-worst breakdown of residential mobility rates by metropolitan housing market. The metros with a concentration of young Millennial adults in their late 20s and 30s showed greater renter mobility declines in the study. This was true in Los Angeles (-3.6% point), Austin (-5.0% point), Boston (-3.0% point), and San Francisco-Oakland (-2.9% point) from 2010 to 2019. These metros failed to recover owner mobility rates up to the extent of 2010 or the national average experience of 0.4%-point increase. On the other hand, the older metros such as Pittsburgh and Philadelphia show the opposite patterns during the same period (Exhibit 7). Appendix A reports the annual changes in residential mobility rates by tenure status for top 50 metros.

Exhibit 5. Bivariate Relationships Between Rental Mobility Downturns (Y-axis) and Key Supply and Demand Factors (X-axis), 100 Largest Metropolitan Areas, 2012 to 2018 (A Simplified View that is Consistent with Multivariate Controls, Percent of Locally-resident Renter Households that Changed Residence within the Same Metro Area in Last Year)



Notes: Change from 2012 to 2018 in local renter household mobility rate equals the percentage point change from 2012 to 2018 in local renter household mobility rate as % of locally-resident all households in a metro area. 2012 age 25-39 share of population 20+ equals age 25-39 population as % of the age 20+ population in a metro area in 2012. 2012-18 local homebuying change equals percentage point change from 2012 to 2018 in local owner household mobility rate as % of all households in a metro area. 2012-18 permit growth less job growth equals total permit growth minus job growth – i) total permit growth equals summed annual building permits from 2010 through 2015 (2-year lag applied) in a metro area as % of base year 2012 households (not annualized) and ii) job growth equals growth rate of number of jobs between 2012 and 2018 in a metro area as % of number in 2012 (not annualized).

Sources: 2012 and 2018 ACS IPUMS microdata files (Ruggles et al., 2020); U.S. Census Bureau's Building Permits Survey (BPS); Bureau of Labor Statistics (BLS)'s Employment Database.

Exhibit 6. Ranking Table of Greatest Decline in Renter Mobility and Least Recovery in Owner Mobility, 30 Largest Metropolitan Areas, 2010 to 2019 (Percent of Locally-resident Households that Changed Residence within the Same Metro Area in Last Year)

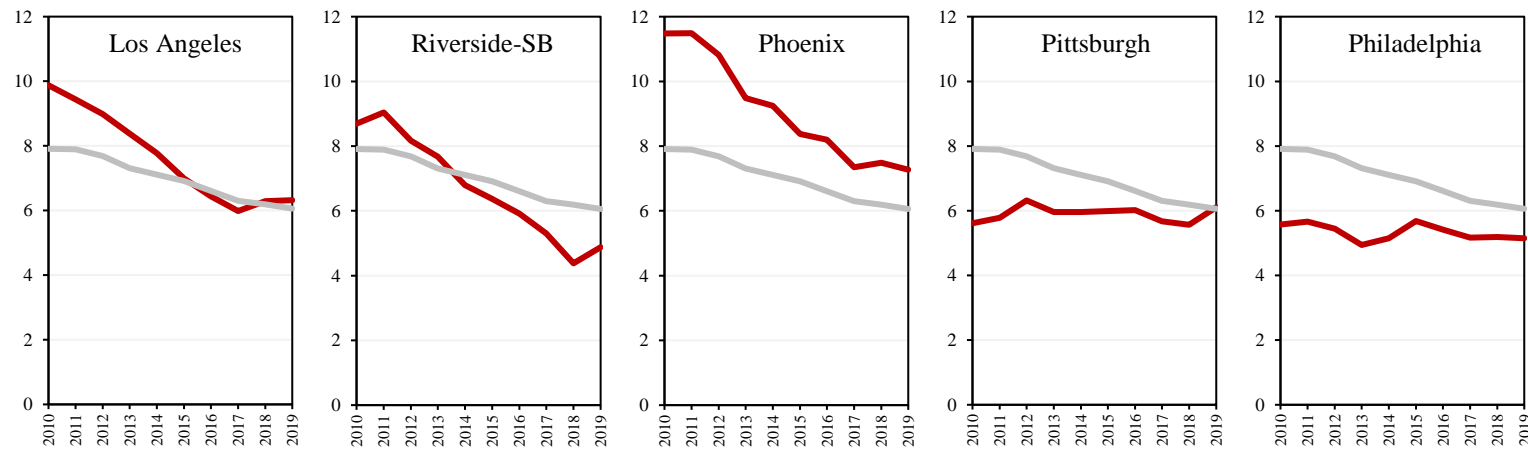
GREATEST DECLINE IN RENTER MOBILITY (IN ORDER OF CHANGE)						LEAST RECOVERY IN OWNER MOBILITY (IN ORDER OF CHANGE)						GREATEST DECLINE IN TOTAL MOBILITY (IN ORDER OF CHANGE)					
Greatest Decline	Pop Size Rank	Metro Name	2010	2019	Change 2010 to 2019	Least Recovery	Pop Size Rank	Metro Name	2010	2019	Change 2010 to 2019	Greatest Decline	Pop Size Rank	Metro Name	2010	2019	Change 2010 to 2019
1	29	Las Vegas	14.9	9.1	-5.8	1	30	Kansas City	3.3	2.9	-0.4	1	29	Las Vegas	18.4	12.2	-6.1
2	28	Austin	14.1	9.1	-5.0	2	26	Sacramento	3.0	2.6	-0.4	2	28	Austin	16.9	12.1	-4.9
3	26	Sacramento	10.5	6.1	-4.4	3	22	Charlotte	2.6	2.2	-0.4	3	26	Sacramento	13.6	8.8	-4.8
4	10	Phoenix	11.5	7.3	-4.2	4	2	Los Angeles	2.1	1.8	-0.3	4	10	Phoenix	15.1	11.0	-4.1
5	13	Riverside-SB	8.7	4.9	-3.8	5	29	Las Vegas	3.5	3.2	-0.3	5	13	Riverside-SB	11.3	7.3	-4.0
6	2	Los Angeles	9.9	6.3	-3.6	6	13	Riverside-SB	2.6	2.4	-0.2	6	2	Los Angeles	12.0	8.1	-3.9
7	4	Dallas	11.2	7.8	-3.5	7	25	San Antonio	2.8	2.7	-0.2	7	4	Dallas	14.3	10.8	-3.5
8	11	Boston	8.1	5.1	-3.0	8	17	San Diego	2.6	2.5	-0.1	8	22	Charlotte	10.5	7.3	-3.2
9	12	SF-Oakland	8.6	5.8	-2.9	9	12	SF-Oakland	2.2	2.1	-0.1	9	12	SF-Oakland	10.9	7.9	-3.0
10	22	Charlotte	7.9	5.1	-2.8	10	4	Dallas	3.0	3.0	0.0	10	17	San Diego	11.8	8.9	-2.9
11	17	San Diego	9.2	6.4	-2.8	11	14	Detroit	3.4	3.5	0.1	11	11	Boston	10.4	7.7	-2.7
12	24	Portland	9.4	6.7	-2.7	12	10	Phoenix	3.6	3.7	0.1	12	24	Portland	12.3	10.0	-2.3
13	18	Tampa	8.5	5.9	-2.6	13	27	Pittsburgh	2.7	2.9	0.1	13	9	Atlanta	12.4	10.3	-2.1
14	20	St. Louis	7.9	5.4	-2.5	14	5	Houston	2.8	2.9	0.2	14	5	Houston	12.9	10.9	-2.0
15	9	Atlanta	9.3	6.8	-2.4	15	28	Austin	2.8	3.0	0.2	15	23	Orlando	12.0	10.0	-2.0
16	23	Orlando	9.4	7.0	-2.4	16	11	Boston	2.3	2.6	0.3	16	14	Detroit	10.8	9.1	-1.6
17	19	Denver	10.7	8.3	-2.4	17	9	Atlanta	3.1	3.4	0.3	17	30	Kansas City	11.3	9.8	-1.6
18	15	Seattle	10.3	8.1	-2.2	18	24	Portland	2.9	3.3	0.4	18	20	St. Louis	10.5	8.9	-1.6
19	5	Houston	10.1	7.9	-2.2	19	23	Orlando	2.6	3.0	0.4	19	15	Seattle	13.2	11.7	-1.5
20	8	Miami	8.5	6.6	-1.9	20	1	New York	1.7	2.2	0.5	20	19	Denver	14.1	12.7	-1.4
21	14	Detroit	7.4	5.6	-1.7	21	6	Washington, D.C.	2.5	3.0	0.5	21	18	Tampa	11.0	9.7	-1.4
22	3	Chicago	7.9	6.4	-1.5	22	16	Minneapolis	3.5	4.1	0.6	22	25	San Antonio	12.2	10.9	-1.2
23	16	Minneapolis	7.6	6.2	-1.4	23	7	Philadelphia	2.2	2.9	0.6	23	8	Miami	10.8	9.8	-1.1
24	30	Kansas City	8.0	6.8	-1.2	24	15	Seattle	2.9	3.5	0.7	24	16	Minneapolis	11.1	10.3	-0.8
25	25	San Antonio	9.3	8.3	-1.1	25	8	Miami	2.3	3.2	0.8	25	1	New York	7.7	7.1	-0.5
26	1	New York	5.9	4.9	-1.0	26	20	St. Louis	2.6	3.5	0.9	26	3	Chicago	10.2	9.7	-0.5
27	21	Baltimore	6.6	5.8	-0.8	27	21	Baltimore	2.0	3.0	0.9	27	6	Washington, D.C.	8.9	8.9	0.0
28	6	Washington, D.C.	6.4	5.9	-0.5	28	19	Denver	3.4	4.4	0.9	28	21	Baltimore	8.6	8.7	0.1
29	7	Philadelphia	5.6	5.2	-0.4	29	3	Chicago	2.3	3.3	1.0	29	7	Philadelphia	7.8	8.0	0.2
30	27	Pittsburgh	5.6	6.1	0.5	30	18	Tampa	2.5	3.7	1.2	30	27	Pittsburgh	8.4	9.0	0.6
Total United States			7.9	6.1	-1.9	Total United States			2.5	2.9	0.4	Total United States			10.4	8.9	-1.4
30 Metro Average			9.0	6.6	-2.4	30 Metro Average			2.7	3.0	0.3	30 Metro Average			11.7	9.6	-2.1
Standard Deviation			2.2	1.2	1.4	Standard Deviation			0.5	0.6	0.5	Standard Deviation			2.5	1.5	1.7

Notes: Change from 2010 to 2019 in local renter household mobility rate equals the percentage point change from 2010 to 2019 in local renter household mobility rate as % of locally-resident all households in a metro area. The same denominator was applied to owner mobility and total mobility.

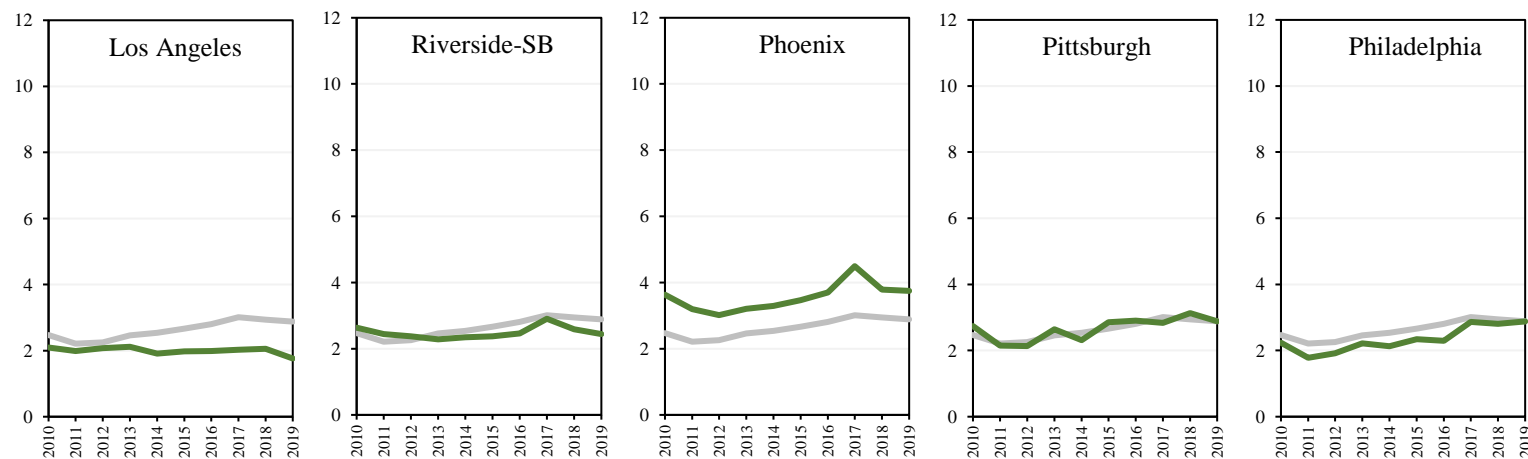
Sources: 2010 and 2019 ACS IPUMS microdata files (Ruggles et al., 2020). The workbook is available at [USC PopDynamics](#) at the link [HERE](#).

Exhibit 7. Metropolitan Patterns of Renter Mobility and Owner Mobility, Select Metropolitan Areas Compared to the United States (Grey Line), 2010 to 2019 (Percent of Locally-resident Households that Changed Residence within the Same Metro Area in Last Year)

(a) Renter Mobility



(b) Owner Mobility

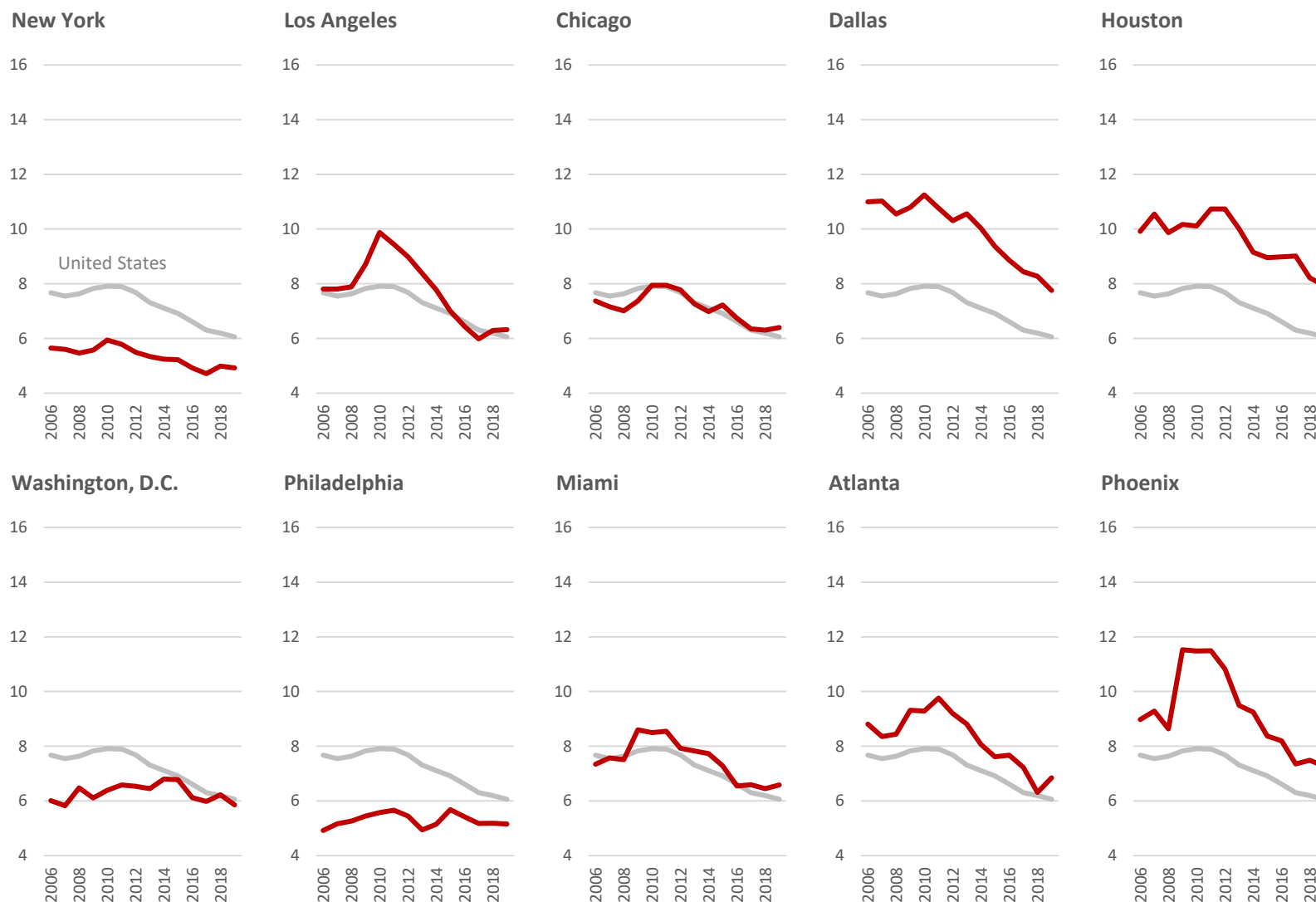


Sources: 2006 through 2019 ACS IPUMS microdata files (Ruggles et al., 2020).

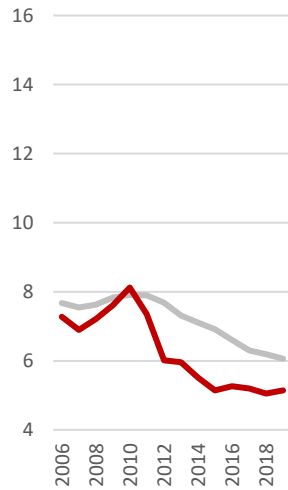
Appendix A. Metropolitan Patterns of Renter Mobility and Owner Mobility, Top 50 Metropolitan, 2006 to 2019

(a) Percent of **RENTER Households** that Changed Residence within the Same Metro Area in Last Year

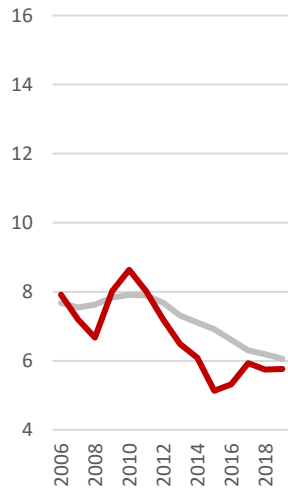
The tabulations of Renter/Owner mobility for top 50 MSAs are available at [USC PopDynamics](#) at the link [HERE](#).



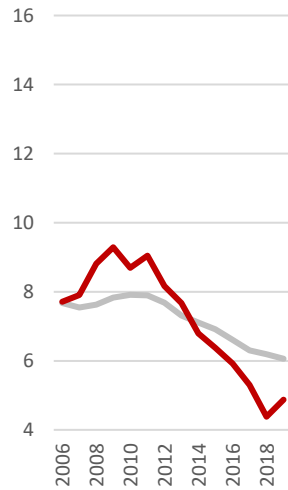
Boston



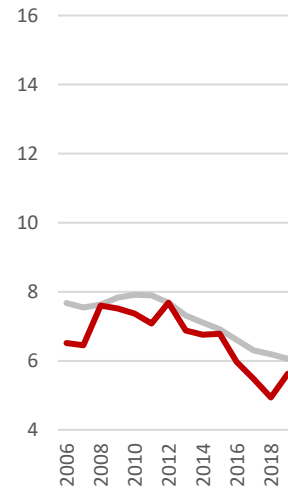
SF-Oakland



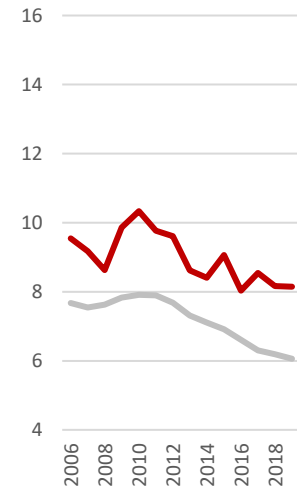
Riverside-SB



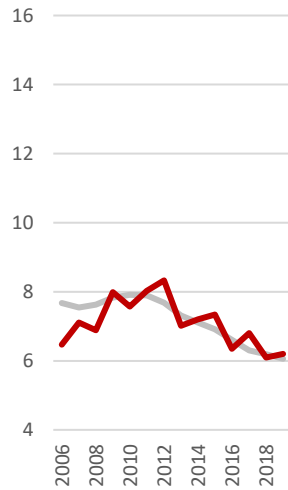
Detroit



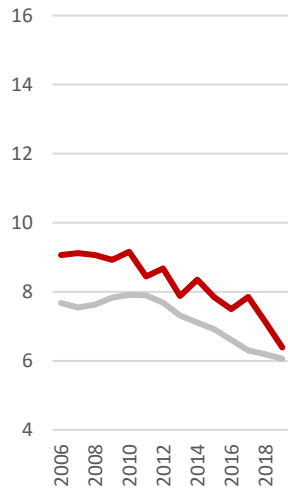
Seattle



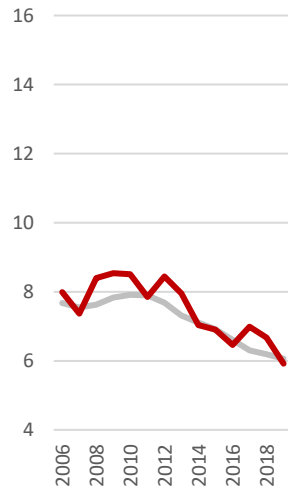
Minneapolis



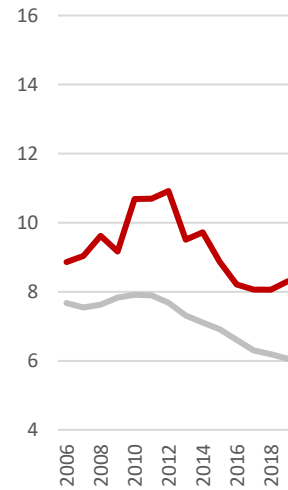
San Diego



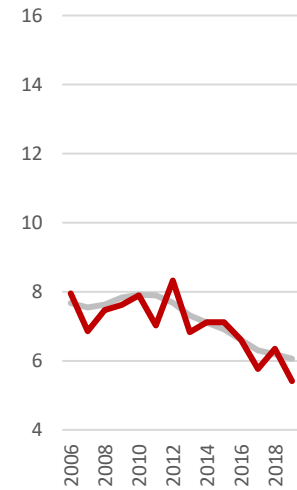
Tampa



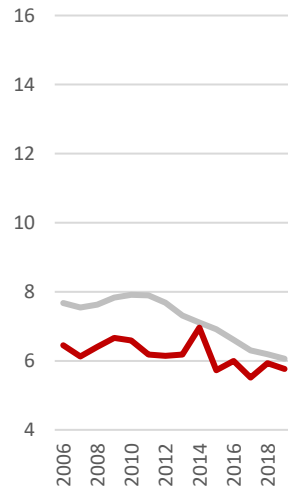
Denver



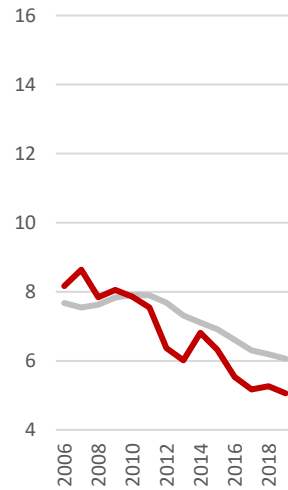
St.Louis



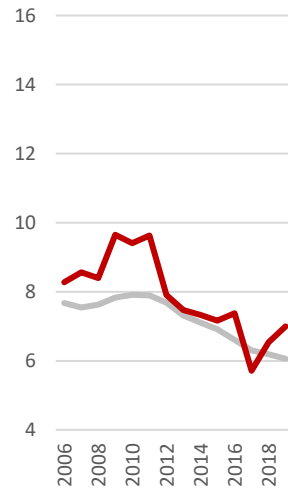
Baltimore



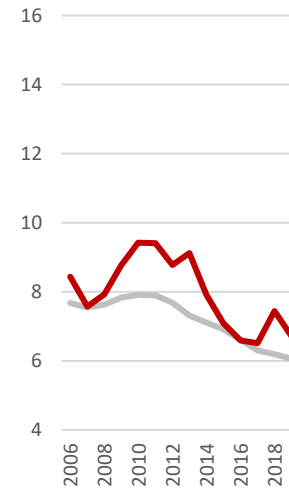
Charlotte



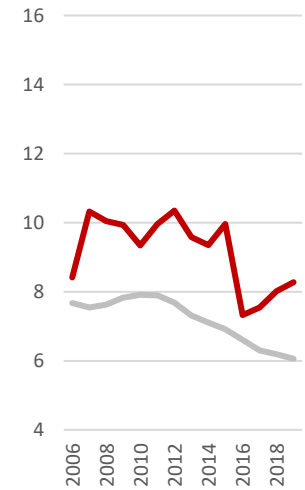
Orlando



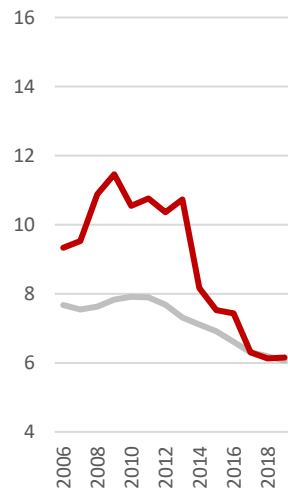
Portland



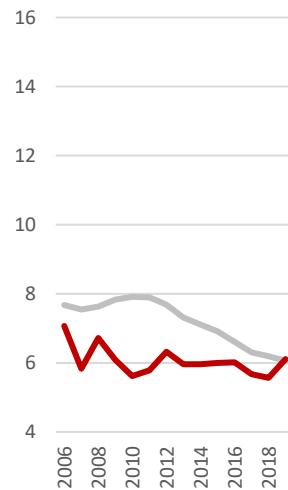
San Antonio



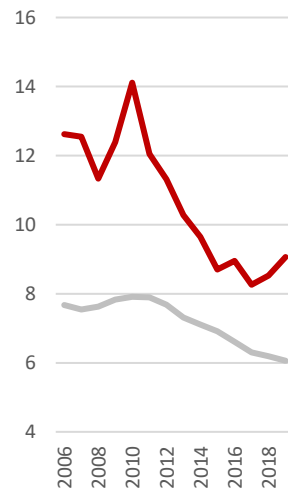
Sacramento



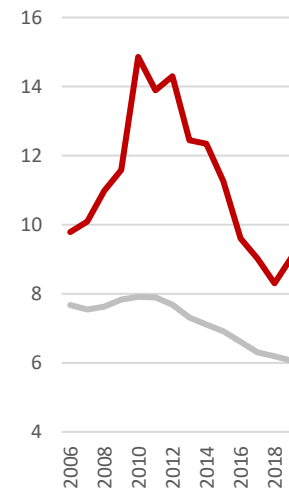
Pittsburgh



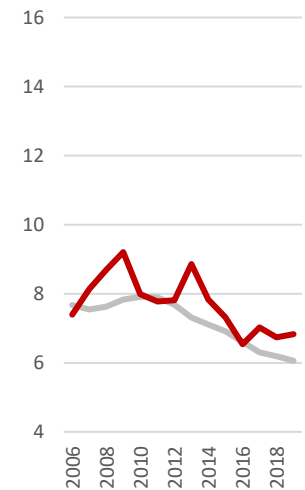
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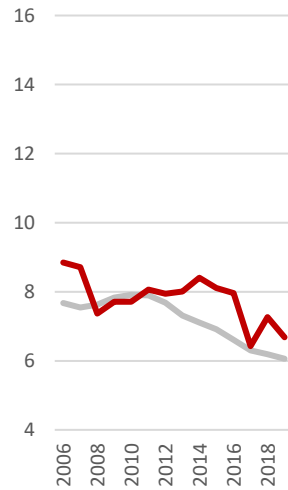
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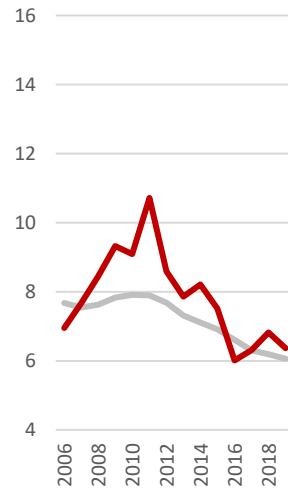
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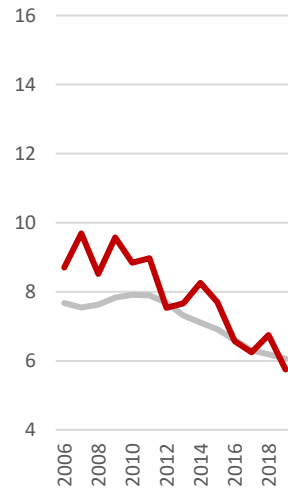
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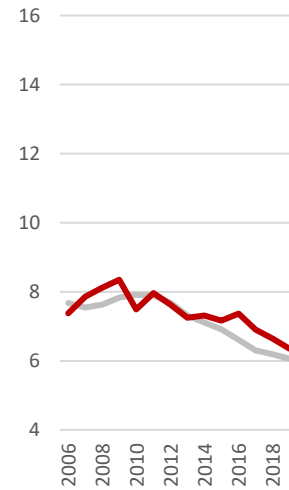
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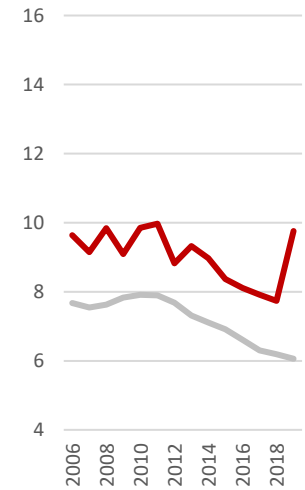
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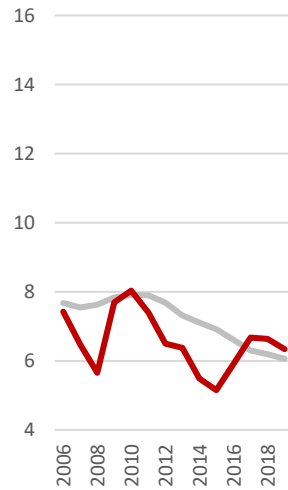
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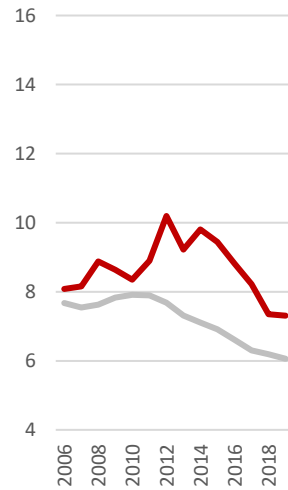
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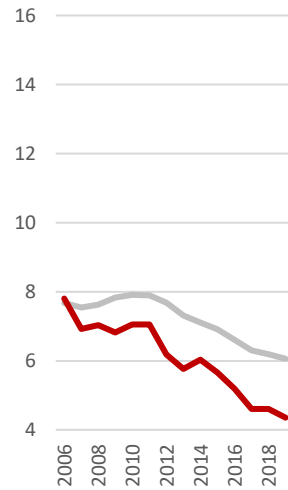
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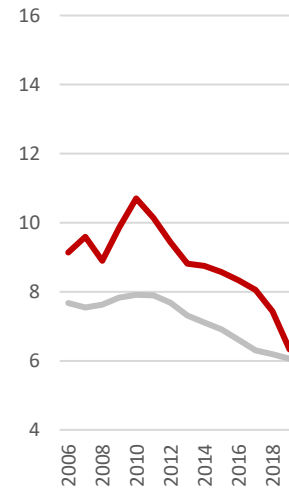
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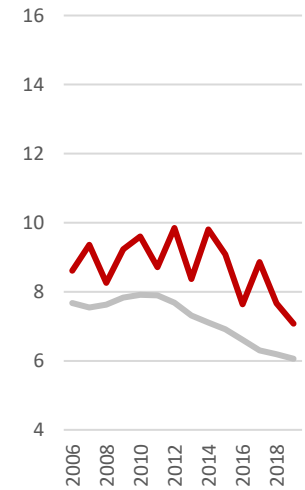
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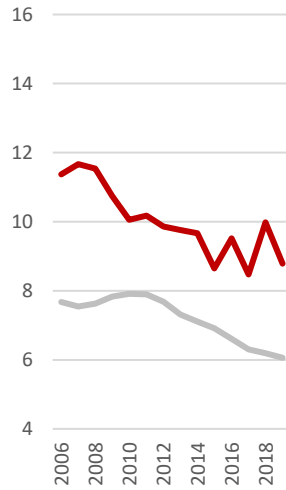
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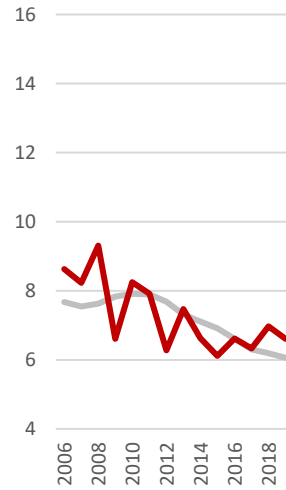
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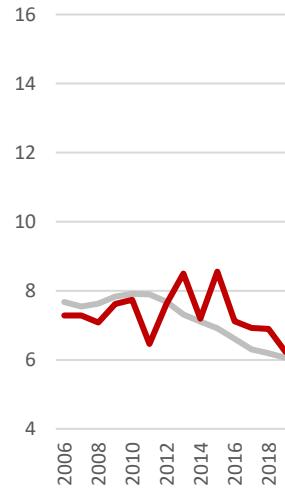
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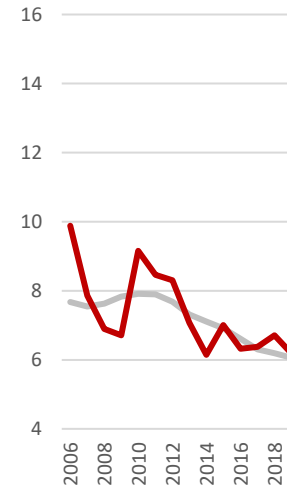
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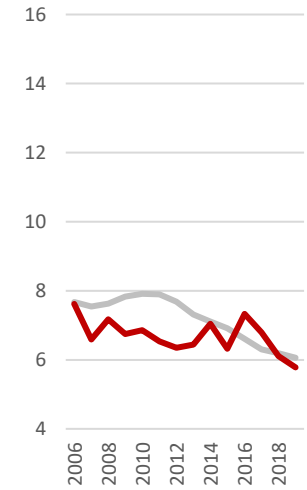
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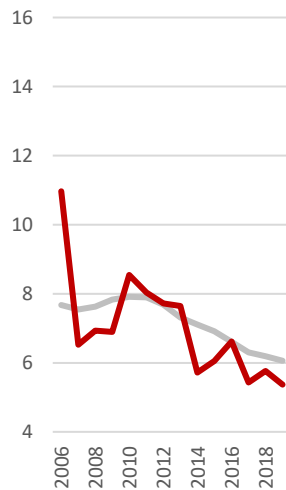
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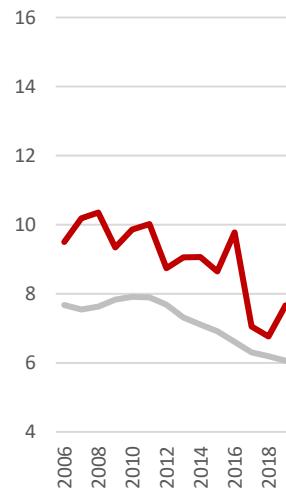
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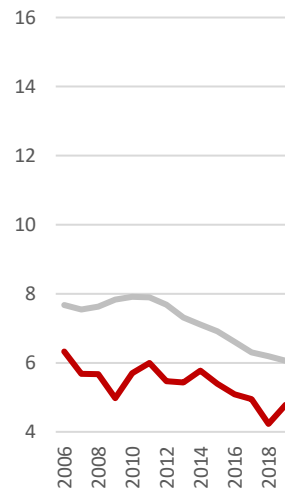
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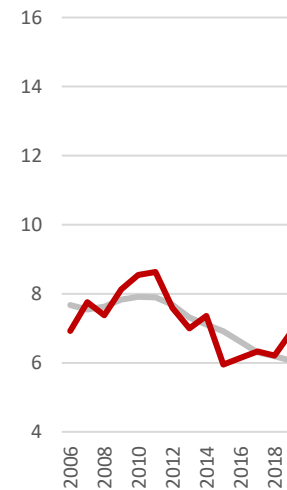
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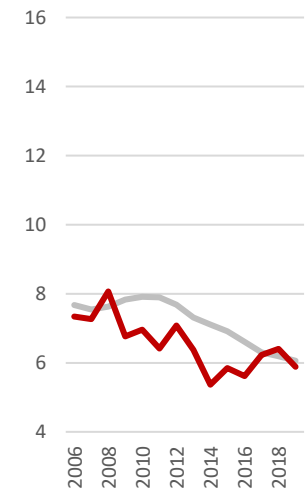
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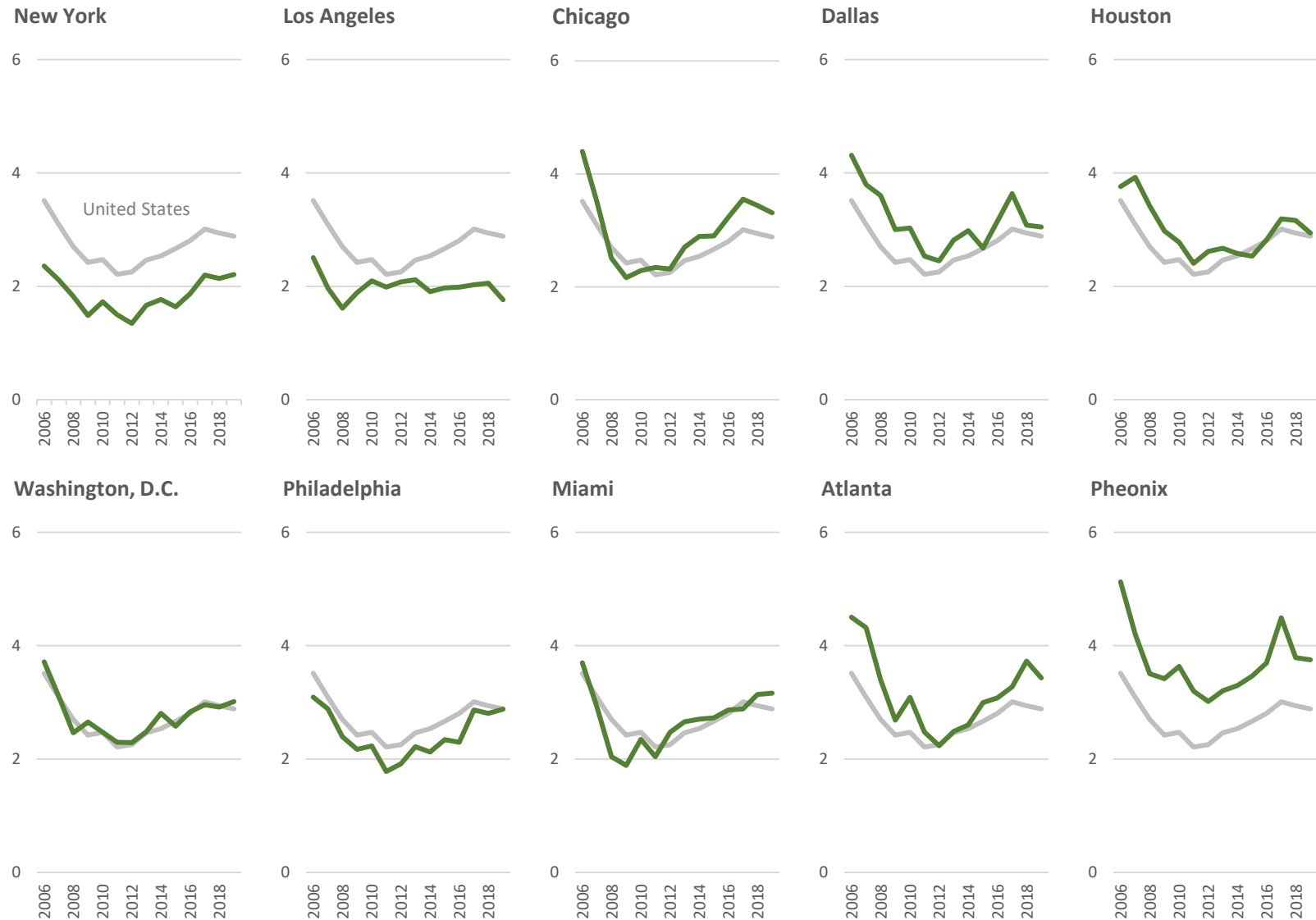


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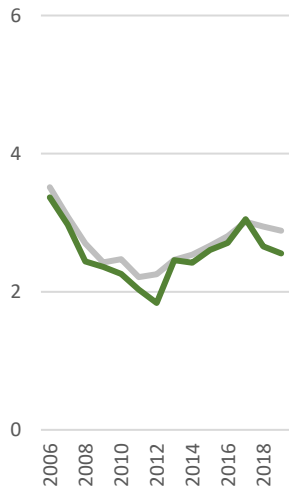


(b) Percent of OWNER Households that Changed Residence within the Same Metro Area in Last Year

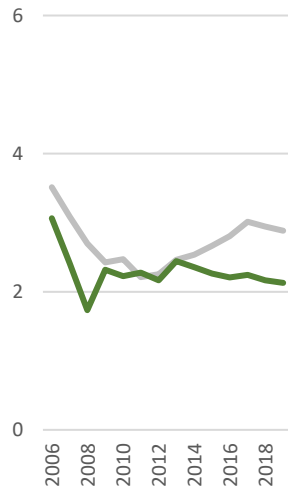
The tabulations of Renter/Owner mobility for top 50 MSAs are available at [USC PopDynamics](#) at the link [HERE](#).



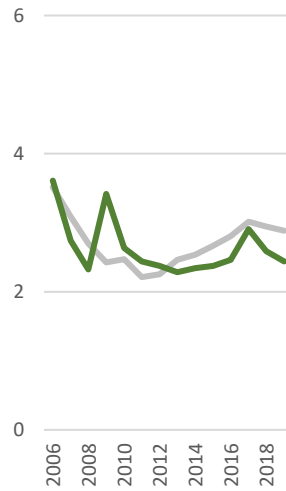
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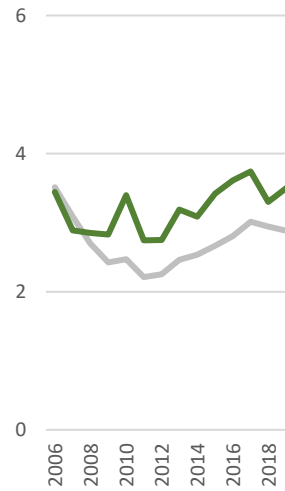
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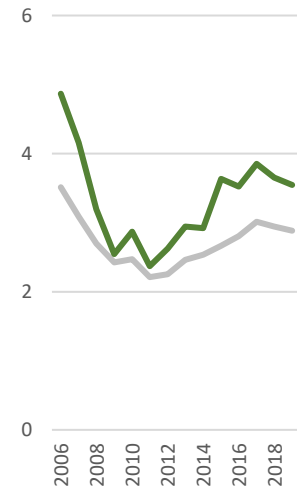
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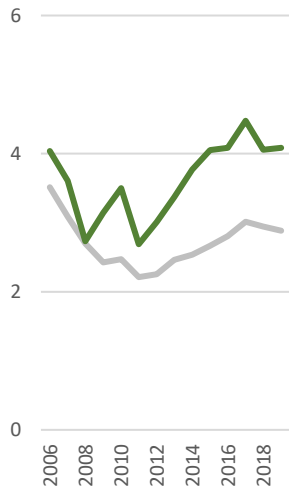
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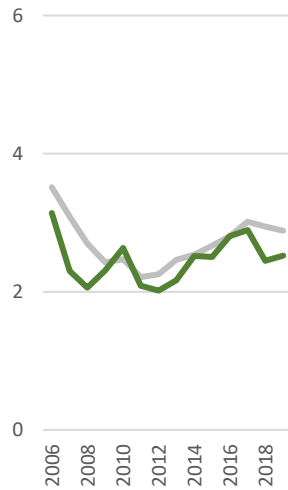
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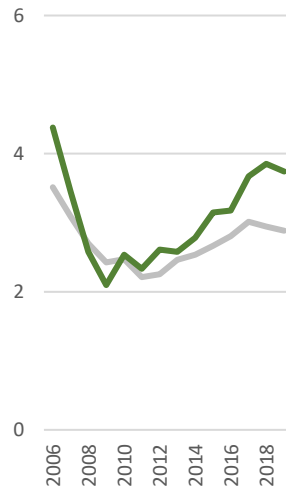
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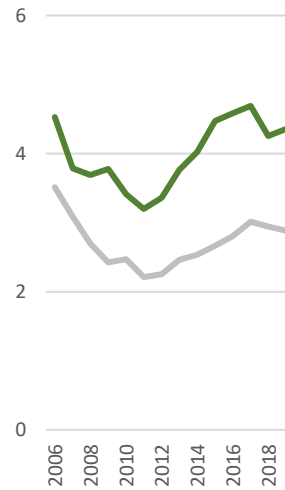
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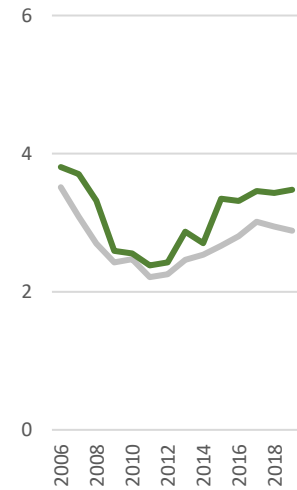
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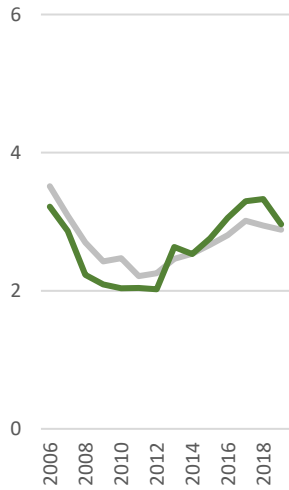
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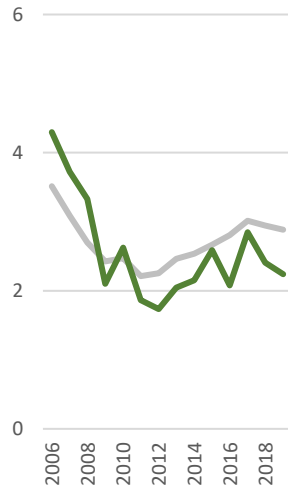
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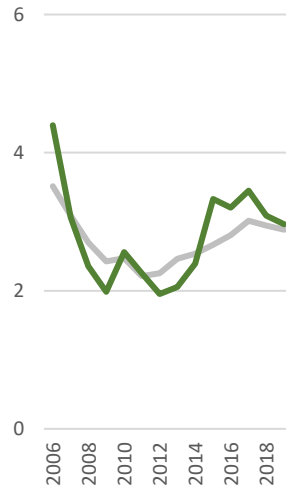
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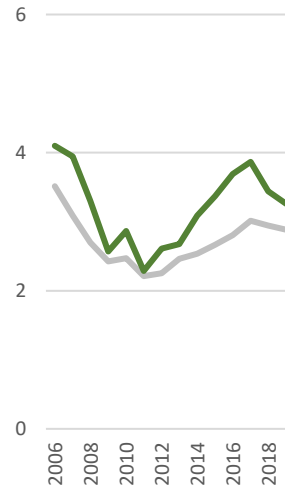
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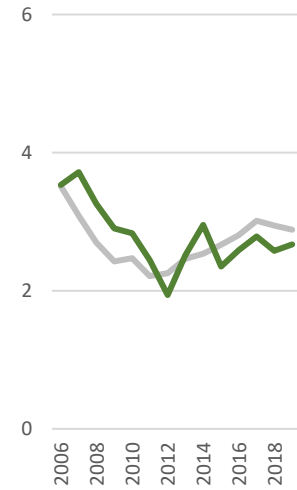
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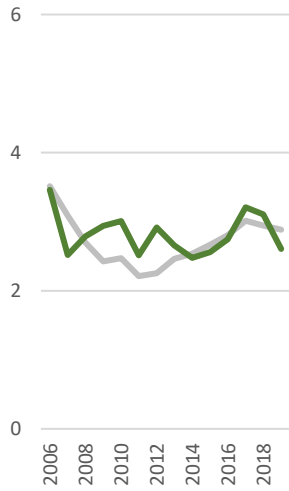
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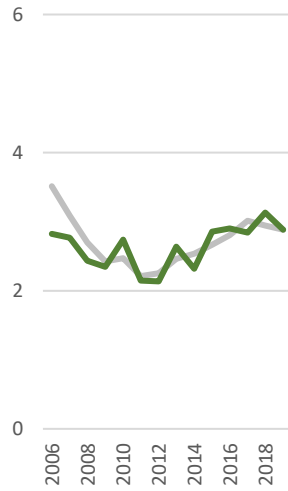
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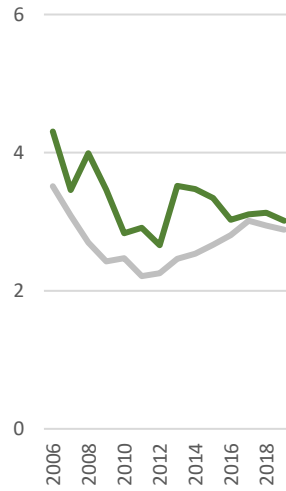
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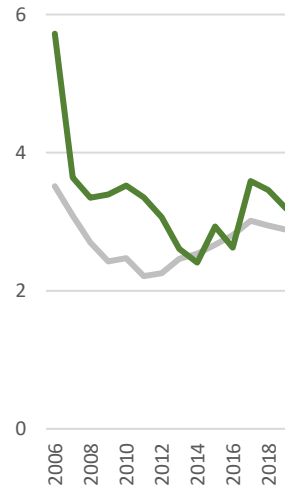
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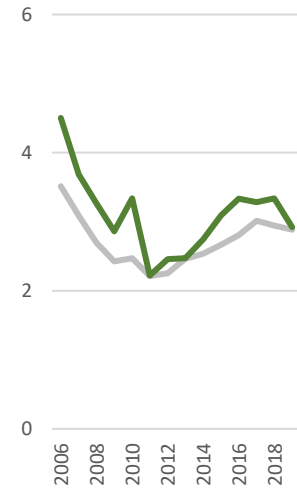
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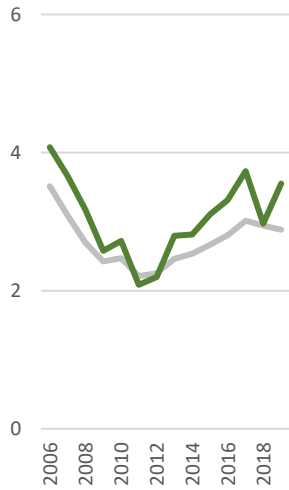
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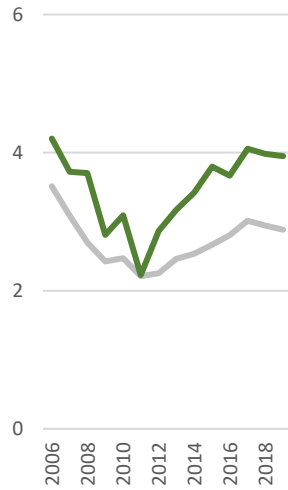
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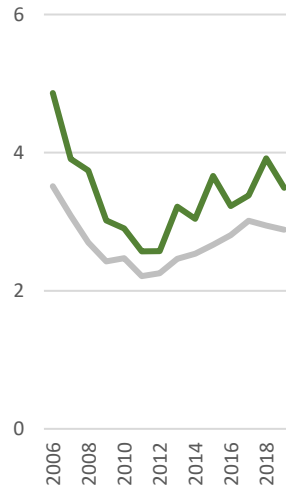
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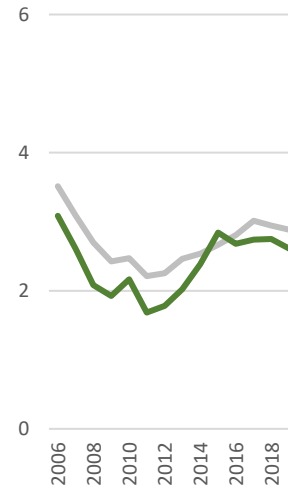
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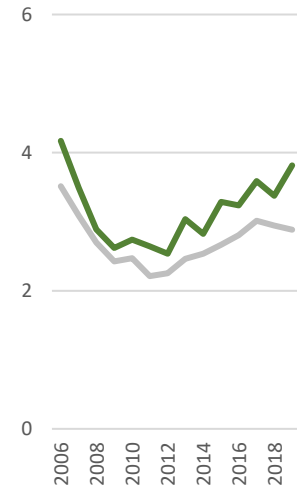
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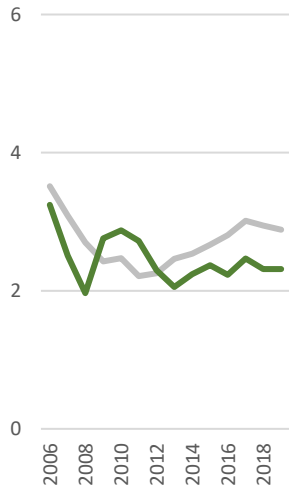
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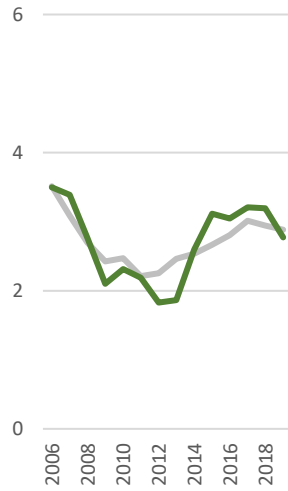
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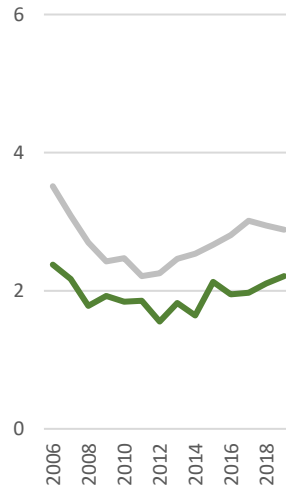
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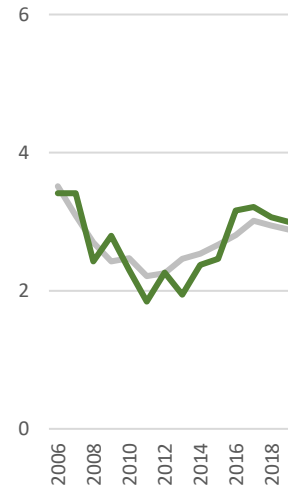
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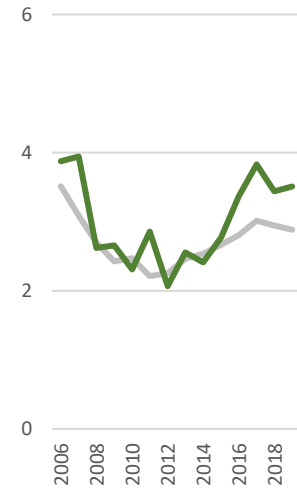
Providence



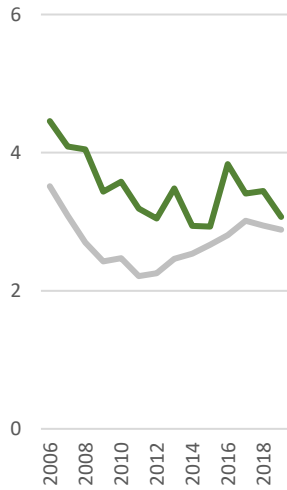
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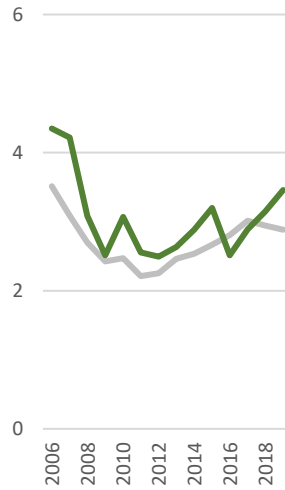
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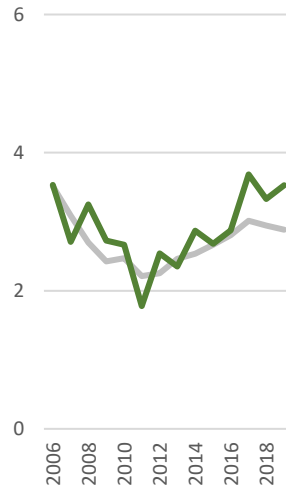
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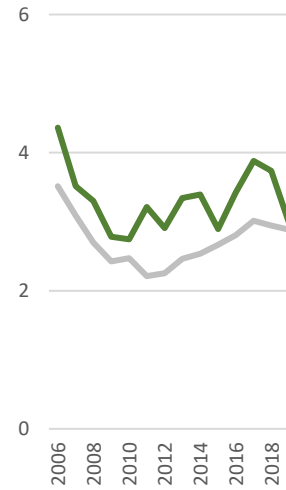
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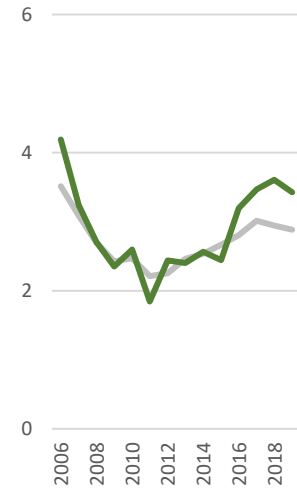
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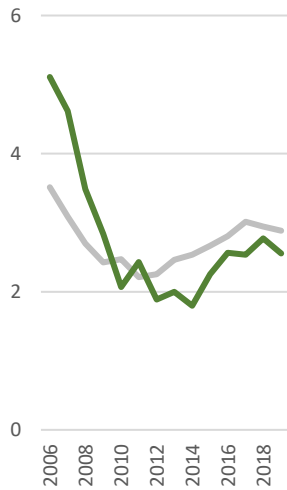
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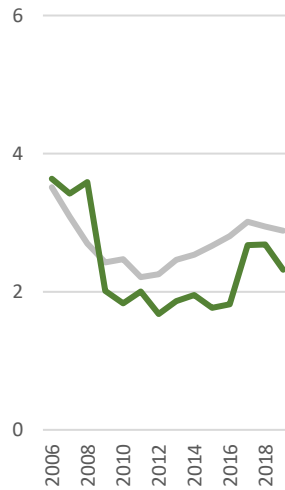
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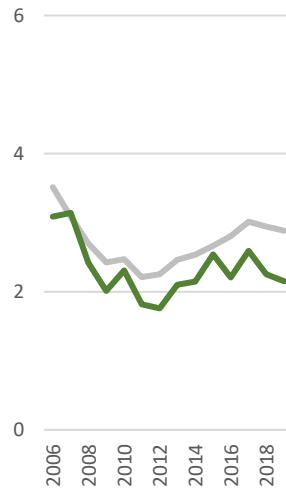
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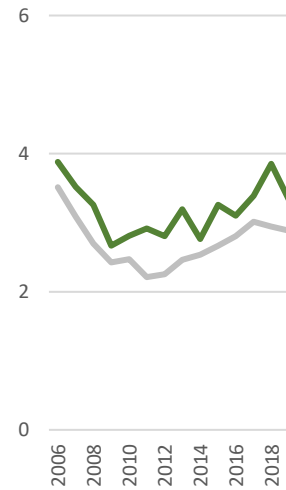
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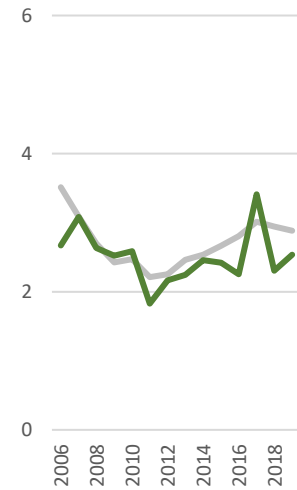
Hartford



Birmingham



Buffalo



Appendix B. Comparisons of measures on annual residential mobility, 2006 to 2019, Top 100 MSAs

This appendix compares different definitions of mobility within metropolitan areas. Table B1 compares the local household and population mobility. The latter is slightly higher in magnitude and extremely correlated with the alternative.

Table B2 and B3 compare the two types of probability of residential mobility for renter- or owner-occupied households. The difference between the two types is the denominator depending on the objective of the measure. If the denominator is all households, the measure for mobility rates means the share of all households that are both renters (or owners) and movers. This measure helps to compare the magnitude of mobility between renters and owners because they share the same denominator. The sum of renter and owner mobility rates equals to all local household mobility.

If one presumes a different make-up of renter and owner households in a certain MSA, the denominator should change to calculate the share of movers relative to the ***tenure-specific number of households*** that were locally resident in the MSA. This measure indicates the probability that renter (or owner) households moved within the same MSA among all renter (or owner) households. This yields a more precise estimate of behavior, but renter and owners mobility rates have different scales (because of their different denominators) and the two rates cannot be traded off against one another. However, the advantage in this case is that mobility rates divided by renter households (or owner households) help us to compare behavior across MSAs in response to explanatory factors.

This is the definition used in the statistical analysis of the *Housing Studies* article and in the local graphs of Appendix A. In contrast, the table and graphs of Exhibits 6 and 7 are based on the ***all-household denominator***, so that renter and owner mobility can be compared and summed to total household mobility.

Please note that we cannot fully interpret this mobility rate as a conditional probability of moving specifically for renter or owner households. That is because the ACS data questionnaire only enables post hoc estimates (status after the move) so that we cannot identify the previous housing tenure status of the respondents who were at risk of moving. Also missing from the data are previous residents who moved away from the MSA, and we choose to further exclude households who moved into the MSA from a longer distance. The analysis is designed to reflect local movers only.

Table B1. Local Household Mobility versus Population Mobility rates

Local Household Mobility = Households who moved within same MSA / All Households

Local Population Mobility = Population who moved within same MSA / All Population

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Household	Mean	11.6	11.0	10.6	10.5	10.9	10.5	10.2	9.8	9.9	9.7	9.6	9.5	9.3	9.1
Mobility	S.D.	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.1	1.9	1.9	1.9	1.7	1.9	1.7
Population	Mean	12.4	11.8	11.5	11.6	11.7	11.3	11.0	10.7	10.7	10.4	10.3	10.1	9.8	9.5
Mobility	S.D.	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.0	1.9	1.8	1.9	1.8
Corr. Coef.		0.97	0.97	0.96	0.97	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.94	0.96	0.95

Table B2. Renter Mobility by All HHs versus by All Renters

Local Renter Mobility by All HHs = Renter households who moved within same MSA / All households

Local Renter Mobility by Renters = Renter households who moved within same MSA / Renter households

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Renter	Mean	7.9	7.8	7.8	8.1	8.3	8.2	7.9	7.4	7.3	7.0	6.7	6.3	6.2	6.1
Mobility	S.D.	1.7	1.7	1.7	1.7	1.9	1.9	1.8	1.8	1.6	1.6	1.6	1.4	1.4	1.4
by All HHs															
Renter	Mean	24.6	24.3	23.9	24.0	24.2	23.5	22.2	20.3	20.1	19.3	18.4	17.7	17.6	17.5
Mobility	S.D.	4.6	4.9	4.7	4.3	4.7	4.4	4.3	4.2	3.9	4.2	4.0	3.5	3.8	3.7
by Renters															
Corr. Coef.		0.79	0.80	0.80	0.78	0.79	0.81	0.82	0.84	0.81	0.84	0.84	0.82	0.82	0.82

Table B3. Owner Mobility by All HHs versus by All Owners

Local Owner Mobility by All HHs = Owner households who moved within same MSA / All households

Local Owner Mobility by Owner = Owner households who moved within same MSA / Owner households

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Owner Mobility by All HHs	Mean	3.7	3.2	2.8	2.5	2.6	2.3	2.3	2.5	2.6	2.7	2.9	3.1	3.0	2.9
	S.D.	0.8	0.7	0.7	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7
Owner Mobility by Owners	Mean	5.4	4.7	4.2	3.8	3.9	3.5	3.6	3.9	4.1	4.3	4.6	4.9	4.7	4.6
	S.D.	1.2	1.0	1.1	0.9	0.9	0.9	0.8	0.9	0.9	0.9	1.0	1.0	1.1	0.9
Corr. Coef.		0.95	0.96	0.96	0.95	0.93	0.94	0.92	0.94	0.94	0.94	0.94	0.93	0.95	0.93

Appendix C. Data Sources and Mobility Definitions in Each Exhibit in This Ranking Report

Exhibit Num	Exhibit Title	Data	Type	Denominator	Numerator
1	Four Decade Trend in the Percent Moving to a Different Residence in the Last Year, United States, 1980 to 2020	CPS	Summary Table	Total population (age 1+)	Varying Numerators
2	Reasons for Moves, By Type of Movement, United States, 2019	CPS	Microdata	Total population (age 1+)	Varying Numerators
3	Trends in County Level Mobility for Total Population and Total Households, Based on Current Population Survey (CPS) and American Community Survey (ACS), United States, 2006 to 2019	CPS and ACS	Microdata	Total population (age 1+) and total HHs	Same county
4	Trend in Metro Level Mobility to Rented or Owned Units, United States, 2006 to 2019	ACS	Microdata	Locally-resident HHs	Same metro
5	Bivariate Relationships Between Rental Mobility Downturns (Y-axis) and Key Supply and Demand Factors (X-axis), 100 Largest Metropolitan Areas, 2012 to 2018 (A Simplified View that is Consistent with Multivariate Controls)	ACS	Microdata	Locally-resident Renter HHs	Same metro
6	Ranking Table of Greatest Decline in Renter Mobility and Least Recovery in Owner Mobility, 30 Largest Metropolitan Areas, 2010 to 2019	ACS	Microdata	Locally-resident HHs	Same metro
7	Metropolitan Patterns of Renter Mobility and Owner Mobility, Select Metropolitan Areas, 2010 to 2019	ACS	Microdata	Locally-resident HHs	Same metro
Appendix A	Metropolitan Patterns of Renter Mobility and Owner Mobility, Top 50 Metropolitan, 2006 to 2019	ACS	Microdata	Locally-resident HHs	Same metro
Appendix B	Comparisons of measures on annual residential mobility, 2006 to 2019, Top 100 MSAs	ACS	Microdata	Locally-resident HHs	Same metro