Cohort Transitions and Age Group Analysis of Millennial Homeownership Demand: Understanding Trajectories of Recovery Following the Great Recession

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INTRODUCTION

The fate of Millennials in the housing market has drawn widespread attention, and for good reason. Young-adult housing consumption suffered a major downturn during the recession, with indicators like headship rates and homeownership rates falling sharply in age groups occupied by both Millennials (born 1980 to 1999) and Gen Xers (born 1965 to 1979).[1] Even though young-adult unemployment rates and household incomes have largely recovered to pre-recession levels, demand for homeownership appears to remain sharply depressed. Meanwhile, rental demand has been booming, with rising rents and burgeoning numbers of young adults flocking to both multifamily apartments and single-family rentals. Is this evidence of a lost desire for homeownership among young Americans? Or has the evidence been misinterpreted, and is young-adult homeownership demand actually rebounding along with the economy?

Better understanding trajectories of young-adult homeownership attainment is crucial not only because of what it tells us about Millennials' housing preferences and their financial ability to achieve homeownership, but also because of what it means for the future of overall housing demand. The Millennials have special importance because they are launching housing careers that will persist into the middle of the century and beyond. In addition, because the Millennials are the largest generation in history, their housing consumption patterns will play a big role in shaping overall market trends in homeownership rates, types of housing produced, volume of home sales, price and rent trends, and more.

Housing has been the last sector of the economy to fully recover from the deep recession. Many questions have been raised as the nation emerges from one of the most severe housing downturns in U.S. history. So far, the recovery has seemed nonexistent or excruciatingly slow for homeownership and single-family construction, whereas rental markets have rebounded quickly. Explanations remain uncertain, with many possible contributing factors. Whether the slow recovery is a matter of credit restrictions, loss of interest in home buying, growing student loan burdens, a shortage of construction workers, local political resistance to new development, or all of the above, most explanations involve changing demographics and the unique circumstances of the Millennials.

Certainly, a substantial increase in demand for owner-occupied housing among Millennials would go a long way towards stimulating a more robust recovery in homeownership and single-family home building. However, steady declines in the nation's homeownership rate have fixed the attention of market observers. Reported every quarter through the Census Bureau's Housing Vacancy Survey (HVS), the steady declines in the homeownership rate from the mid-2000s peak have weighed heavily at a time, post-2010, when the recession has ended and

[1] There is no firm agreement about the birth years defining these two generations. Nonetheless, the range of years posited in the text is both often recognized and convenient.

economic and housing market recoveries are under way.[2] The HVS is not only used to monitor the overall homeownership rate, but also changes in rates for fixed age groups, including young adults under age 35. This traditional "age-group approach" has shown that some of the greatest homeownership rate declines were among these younger adults and that their rates have yet to stage much of a rebound, lending credence to the notion that the nation's youth was abandoning homeownership.

Measuring trajectories of homeownership recovery for young adults has proven elusive. Despite the downward trend in the homeownership rate, as evidenced by the age group approach, other evidence suggests a renewal of young-adult homeownership demand. Between the depths of the housing recession in 2011 and 2016, the annual number of recent-mover owner-occupants aged 25 to 34 increased by 37 percent and the number of home sales to first-time home buyers grew by 65 percent, despite the fact that the total number of 25 to 34 year olds increased by only 7 percent during this period.[3] And survey data from Fannie Mae and others suggest that the desires and intentions for homeownership among young adults remain strong. How to reconcile these with the declining rates of homeownership among young adults, in particular, remains a puzzle. We believe the answer lies with cohort insights on changing demand rather than the traditional age group approach.

Cohort methods for measuring housing demand trajectories are little known and infrequently used by housing analysts. Not to be confused with traditional analysis based on static age groups, the dynamic cohort approach tracks changes for a group of individuals as they grow older and pass from one age group to the next. This alternative approach links a group's current housing status to that of earlier years, providing a measure of net growth in demand that may accord much more closely with observed demand in the market place. Researchers have begun to use cohort analysis to provide early detection of post-recession changes in housing behaviors for the large and influential Millennial generation (Simmons and Myers 2017). Because of its structure that links past and present, cohort analysis also holds potential for projecting housing consumption trajectories into the future, as demonstrated in Myers and Lee (2016).

The cohort perspective might help to resolve a nagging paradox between what the static age-group approach is telling us about young-adult homeownership rate trends and what front-line housing professionals are observing in terms of starter-home demand. To date, age-group

[2] The HVS did not register a statistically significant year-over-year rise in the national or under-35 age-group homeownership rate until the second quarter of 2017. Prior to that increase, neither rate had risen significantly for more than a decade. Defying any sign of recovery in the housing market, the national homeownership rate had plunged steadily from 69.2 percent in the fourth quarter of 2004 to 62.9 percent in the second quarter of 2016. The under-35 homeownership rate fell from 43.3 percent to 34.1 percent during the same period. www.census.gov/housing/hvs/files/currenthvspress.pdf

[3] Data on recent-mover (householders who moved into the unit within the past twelve months) owner occupants are from the U.S. Census Bureau, American Community Survey. Data on home sales to first-time buyers (defined as those who have not owned a principal residence in the prior three years) is from Genworth Mortgage Insurance. The total number of 25-34 year olds is estimated from U.S. Census Bureau Population Estimates.

analysis shows virtually no improvement in young-adult homeownership rates. Yet, for the last couple of years real estate agents and home builders have been witnessing rejuvenated demand from young adults and first-time buyers, as reflected in the market data summarized above. As to be demonstrated in this report, cohort analysis reveals recently accelerated growth in young-adult homeownership demand that is entirely consistent with the rebound observed by real estate professionals.

This report offers sharply contrasting perspectives on recent trends in homeownership demand, as viewed from the dynamic cohort perspective versus the traditional analysis of static age groups. Examining change every two years from 2006 to 2016, we find that the turning point in net inflows into homeownership is visible *four years earlier* in the cohort analysis than in the age group analysis. Delayed detection of the young-adult homeownership rebound in the age analysis is likely because homeownership rates for static age groups blend the most recent upturns in homeownership demand with prior deficits that accrued in earlier years that were part of the recession. In essence, the age group homeownership rates are lagging indicators of demand, while the current cohort transitions represent contemporaneous indicators. The practical import is that the cohort method detects earlier and stronger inflows into homeownership.

How widespread is the cohort-based recovery of young-adult homeownership demand across the nation? And what clues can be discerned from the explanation of differences between metropolitan areas that might inform understanding about the basis for the national trends? The report studies cohort transitions to estimate net inflows into homeownership by young adults in the 100 largest metropolitan areas. We seek to discover where the homeownership recovery has proceeded most strongly and identify differences among young adults between ages 20 and 30. We develop models that test a number of explanatory factors that may have impeded or accelerated the upturn in homeownership demand in the post-recession period. Some factors are found to impact cohorts more acutely in their early 20s, while other factors prove more important to cohorts in their late 30s.

COHORT METHODOLOGY: ADVANTAGES AND DISADVANTAGES

Population-based Housing Analysis

Housing demand is simply people living in housing, assisted by income and subject to prices. Housing demography emphasizes the front end of the definition—people living in housing—by expressing housing consumption as the number and type of housing units of a given type that are occupied by people (householders[4]) of a given type. In the housing field,

[4] The conventional definition of householder, or head, is the person, or one of the persons, in whose name the unit is rented or owned.

consumption is typically measured for households, represented by their heads of household or householders. Yet, that analysis is incomplete because it does not include the full population base that is so important to follow in times of demographic change.

Household-based analysis neglects the excluded non-heads, who have the potential to become householders themselves and occupy even more housing units. Recent studies have drawn attention to the unwise neglect of the full population base, because that leaves unaccounted the variable factor of household formation from the population, which can be especially important for young adults in their 20s (Lee and Painter 2013). As a result, the literature on the linkage between household formation and homeownership has identified the use of a household base in most housing research as a fault that hampers research on changes over time (Haurin and Rosenthal 2007, Yu and Myers 2010).

The measurement scheme used in population-based housing research makes use of consumption rates *per capita* rather than per household. This directly measures the consumption by different types of people, rather than by the intermediary of households, and is more precise for measuring changes over time. In this mode, in contrast to the conventional homeownership rates, which are measured as owner householders per 100 householders, the *per capita* homeownership rates are measured as the number of owner householders of a given age (or race or other characteristic) per 100 *people* of the same demographic group.

Summary of the Cohort Method

Definition. The analysis in this report is based on demographic principles, using a full population base, not solely households and householders, and structuring models of change in terms of age groups, cohorts, and periods. At a given point in time, an age group is identical to a cohort, but when measuring change over periods of time, the two diverge. Either we compare the same age group over time (but with different people occupying that fixed age range as time progresses) or we track the same cohort of individuals from one period to the next as they move through progressively older age groups.

A *cohort* is a group of people who share the same age throughout their advancing life course by virtue of their birth in a common year.[5] For research purposes we draw a sample of the cohort by selecting cases from progressively older age groups that are surveyed in successive years. In the same way that an age group in a survey is a sample of all the people in the nation of that age, so is a cohort a sample of all people belonging to a given birth cohort in the nation. The exact membership in the sample may change each time the sample is drawn, but the members randomly represent the cohort as a whole. Thus a cohort that is traced over time need not include the same exact individuals—such a collection of individuals for repeated observation is defined as a panel of study subjects (Myers 1999).[6] When tracking cohorts in social science we cannot connect individual characteristics over time but only the group average, so that, for example, the cohort's average homeownership rate at time 1 strongly shapes its rate at time 2. The cohort's average homeownership rate at times 1 and 2 is also systematically influenced by price trends and other market conditions.

Advantages. Cohorts carry their attributes forward from one period to the next with strong legacy effects or lagged effects. In contrast, age groups observed at different points in time may share the same age, but their histories are all different because they arrive at key ages at different points in history. For example, among the strongest recent cohort effects is likely to be the trajectory of job success achieved by the cohort that graduated college in 2009, when the labor market was still severely strained by the Great Recession, compared to the cohort that graduated five years earlier or later. Similarly, cohorts that arrived at age 25-29, a peak age for home buying, during the financial crisis and subsequent mortgage market turmoil may have substantially depressed homeownership rates that are carried forward, through *cohort momentum*, for many years (Myers and Lee 2016).

In the case of age group analysis, we might observe a rising or falling homeownership rate, but these changes reflect both the effects of recent changes in market conditions and lagged or legacy effects from prior periods. The current trend cannot be explained solely by current conditions. The age group changes thus become lagging indicators of change, while

[5] This definition applies specifically to a birth cohort. More generally, a cohort is defined as any group of objects that enter a system at the same time. Examples of cohorts include vintages of houses by year of construction, vintages of mortgages by year of origination, or cohorts of college graduates by year of graduation.

[6] An exception to the distinction of panel from cohort is in medicine and health studies where a cohort is commonly understood to mean a group of individuals who are followed up individually for treatment and observation over time.

leading indicators are typically more useful. This distinction becomes especially crucial in the context of the unusually pronounced recent rise and fall of housing markets, with the bust commencing just as the large Millennial generation started to enter the housing market.

A further advantage of the cohort analytic approach in contemporary research is that it can be paired with the annual time series data from the American Community Survey (ACS), which began full operation in 2006, near the height of the housing boom. The cohort approach in housing analysis has been established for decades, beginning with Pitkin and Masnick (1980), but past applications have been hamstrung by the limitations of available data. The decennial census provides an extremely large sample, but because it is only conducted every 10 years, change can only be measured over decades at a time, and those intervals may not line up neatly with distinct housing and economic cycles. Other commonly used sources, like the Annual Social and Economic Supplement to the Current Population Survey (CPS-ASEC), though collected annually, have such small samples that it is necessary to use relatively wide cohorts to get precise estimates. It is also impossible to use the CPS-ASEC to represent all states or metropolitan areas with any precision.

The very large annual ACS sample, on the other hand, permits precise measurement of change over relatively short historical intervals for narrowly defined birth cohorts. Use of short historical intervals allows measurement of changes in housing consumption during distinctive economic and housing market climates. Equally important, narrowly defined birth cohorts also allow us to observe changes in behavior over targeted segments of the life cycle when key housing changes are most likely to occur. And for the first time outside of analysis based on the decennial census, the ACS makes it possible for us to conduct cohort analysis for multiple subnational geographies. In a nutshell, the ACS has opened up a whole new world for cohort analysis, and fortunately the ACS data became available just in time to track recovery from the deep recession.

Disadvantages. Although cohort analysis provides many advantages, some disadvantages also deserve highlighting. The foremost concern is that cohorts are treated as aggregates, and the component individuals cannot be linked over time, as discussed above. As a result, net changes of mean attributes are tracked over time, and those may be influenced by unobserved churning in the local membership in a cohort. In and out-migration can substantially alter the make-up of a cohort, especially over longer time intervals. In the multivariate analysis of the present study, this is mitigated by using shorter intervals (two

years instead of 10), and by also indicating what share of the cohort at the end of an observation interval has been added through in-migration.

In addition, somewhat greater data management overhead is required than in the case of traditional age-group analysis, because observations of a cohort over time can only be achieved by linking data for different age groups at different points in time. Cohort analysis is also sensitive to any fine-scaled movements in the data, including both real changes and sampling or measurement errors. The refined measurements cast a spotlight on changes in variable definitions or geographic boundaries, in addition to the compounding of sampling error that arises when using difference models. While these data faults underlie all uses of the data, they are more exposed in cohort analysis than in the simple analysis of separate age groups. Hence, added care is needed with data preparation and in the interpretations of changes.

The results of cohort analysis are also more difficult to present and explain due to use of terminology that isn't broadly familiar. Whereas most readers have ample exposure to analysis of change for age groups, they have much less experience reading cohort-based studies. Furthermore, the juxtaposition of age-group and cohort analysis, as presented in this paper, forces careful exposition of the different types of change that each approach analyzes. And, in fact, there are multiple dimensions of time that should be invoked. The glib phrase "change over time" cannot be used in cohort analysis that entails so many windows on mechanisms of change. In addition to the simple passing of historical time, we have the aging of cohorts as they pass from one age to the next, the net changes that accrue *within* cohorts, and the changes that occur *across* successive cohorts, all of which may depend on their location in different periods of history. "Change over time" clearly deserves to be handled with more precise meaning for the various circumstances, which poses a challenge to linguistic formulation. Fortunately, the current subject for analysis – homeownership rate trends – presents a familiar topic for exploring the potential of the cohort approach.

Data, Sample, and Specifications

Data for the homeownership analyses throughout this report are drawn from the annual files of the American Community Survey (ACS), 2006 through 2016. Analysis is carried out for both the nation as a whole and also for the 100 largest metropolitan areas, the smallest of which has a population of just over 500,000.

For the most part we draw data from every even year, defining a series of two-year intervals within which we can observe change. These extend from 2006-08 to 2014-16. For portions of the analysis we also utilize a single four-year interval, 2012-16, that defines the recent recovery period of the housing market. The broader interval is useful for summarizing trends in each of the 100 largest metropolitan areas.

The primary focus is on the net cohort transitions into homeownership as the cohorts grow two years older in each interval. For example, a cohort age 23-24 might increase its per capita homeownership rate from 16 to 19 percent as it ages to 25-26 between 2006 and 2008, an incremental increase of 3 percentage points. That increment represents a net inflow of that cohort into homeownership equal to 3 percent of the cohort population size over the two-year length of the interval. (A lower per capita ratio at the second observation would signify a net outflow from homeownership.)

Our housing consumption outcome measure is the per capita occupancy rate in owner-occupied units of all structure types (including single-family detached and attached units, multifamily units, and manufactured homes). Details about explanatory variables in our multivariate analyses are provided in later sections.

NATIONAL COHORT AND AGE-GROUP COMPARISONS OF HOMEOWNERSHIP TRENDS

This national summary of trends compares changes in per capita homeownership rates for age cross-sections and cohort transitions using graphic displays of descriptive tabulations.

Homeownership Trends from Two Different Perspectives

Consider two representations of homeownership trends drawn from the same data (American Community Survey, U.S. total, 2006 to 2016). Figure 1 presents a pair of graphs for per capita homeownership rates. The top graph gives the traditional age group comparisons over time, while the bottom graph gives the net cohort transitions, the increment in each cohort's homeownership rate as it grows two years older. The graphs cover a sequence of two-year time spans, from 2006 to 2016, with the age groups and cohorts both defined using two-year age spans.

As shown in Figure 1a, the age cross-sectional pattern of homeownership is higher in each successively older age group (follow any individual year of data from left to right across age

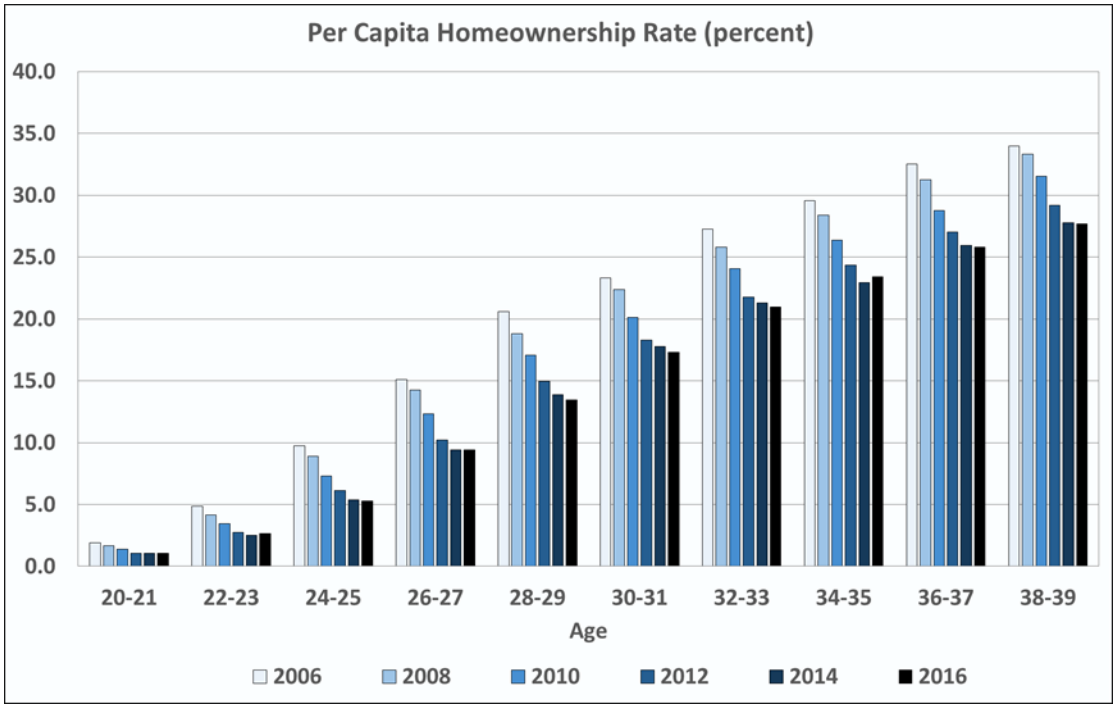
categories), and yet for every age the homeownership rates were falling between 2006 and 2014 or 2016. (Focus within a specific age category on changes across years.) The steepest declines in virtually every age group occurred from 2008 to 2012, the years of crisis and sluggish early recovery. The decline during this period is even steeper than the downturn from the peak of the housing boom in 2006 to 2008, a period that included most of the Great Recession but that may not have yet accumulated its full impacts on housing. In the most recent interval, 2014 to 2016, the age cross-sectional homeownership rates appear to have leveled off at their lowest level in every age group.

In contrast, the cohort transition data (Figure 1b) reveal the net inflow into homeownership as each two-year cohort grows two years older, passing from one age group to the next, as labeled in the x-axis, e.g. ages 24-25 -> 26-27, and with the bars representing the changes estimated in successive periods. Here we see evidence that, first, the greatest advances into homeownership occur in the mid- and late-20s, with much less inflows to homeownership in the 30s, although substantial gains have also been registered for young adults passing through their early 30s in more recent years. (The uptick at ages 34-35-> 36-37 in 2014-2016 suggests possible catch-up from prior intervals of slow transition.)

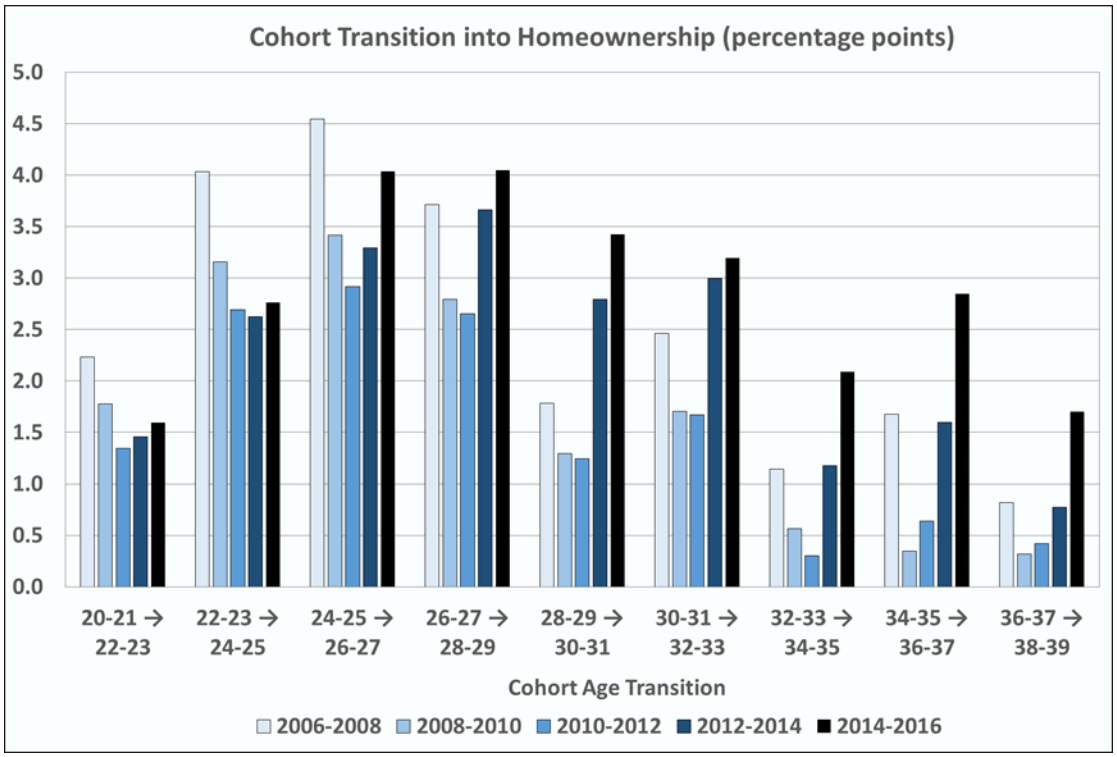
Secondly, and most important, in contrast to the continuous decline or leveling observed across periods in the age group rates, the cohort transitions reveal a *substantial acceleration* of home buying in the 2012-2016 period compared to the recession years. In fact, cohorts arriving at age 28-29 or older in 2016 exhibited greater inflow into homeownership than was witnessed in 2006-08, which was just after the peak of the housing boom. However, it is striking that the age group analysis reveals no such improvement, merely a cessation of further declines.

Figure 1. Age-group and cohort perspectives on homeownership rate change

1.a.



1.b.



Source: American Community Survey, 2006-2016.

How can we explain this disparity in measurements of market change between the age group and cohort approaches? And which method affords a more realistic view of the changing prospects for homeownership among Millennials?

Paradox of Growth in New Homeowners. The same data set (ACS) that is used to track changes in homeownership rates also provides a count of the number of owner-occupants each year who moved into their home within the last 12 months, a proxy for sales of primary residences.[7] We track this home sales proxy both for all age groups and for 25-34 year olds for each year from 2006 to 2016 (Figure 2). A comparison of Figure 2 with Figure 1a reveals a paradox: whereas age group homeownership rates for young adults have remained constant or declined, total and 25-34 year old primary residence home sales have risen markedly in recent years.

Yet, the results for the cohort homeowner transitions, measuring net flow into homeownership, are striking. We see that the trough of the cohort transition for homeowners is located in 2010-2012 (Figure 1b), a period that also includes the trough of both of our home sales proxies (Figure 2).

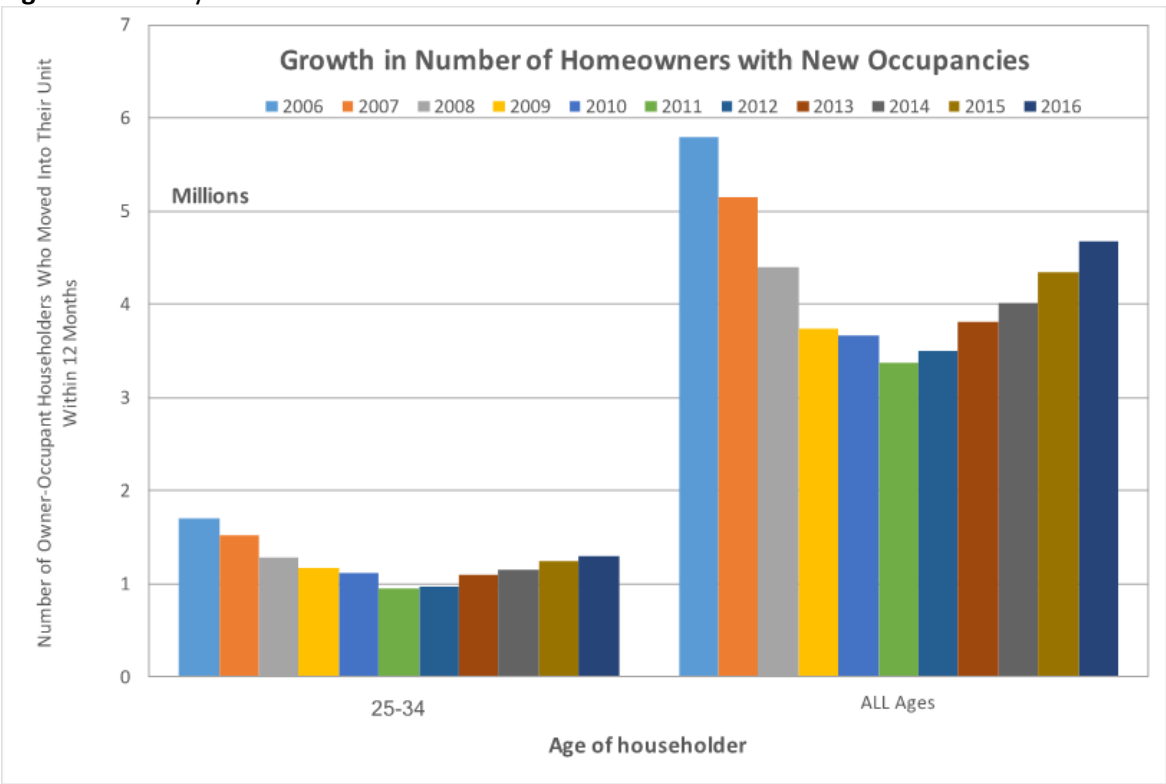
The paradox is that home sales have increased rapidly in number, while the age group homeownership rates have declined. How is this possible? The explanation lies with the cohort transitions instead of the age group rates of homeownership. From 2011 forward, the number of primary residence sales grows rapidly, by 37.3% among households ages 25-34 (many of whom are first-time buyers) and by 38.5% among all ages combined (bottom of Table 1). Also reported in Table 1 is the growth in the number of new and existing home sales,[8] which increased from 4.1 million in 2011 to 5.4 million in 2016, an increase of 32.0%, similar to the estimated growth of homeowners in the ACS. Finally, the number of home sales to first-time buyers (those who have not owned their primary residence within the preceding three years) increased by an even more impressive 64.7 percent during this period.[9] By any of these measures, the volume of home buyers increased by at least one-third in 5 years.

[7] As a reality check on our ACS-based home buying proxy, we compared ACS estimates of all owner-occupant householders who moved into their housing unit within the past 12 months with National Association of REALTORS® estimates of principal residence home purchases. Trends in the two indicators tracked quite closely.

[8] New and existing single-family home sales are from the U.S. Census Bureau and the National Association of REALTORS®, respectively.

[9] Genworth Mortgage Insurance, *First-Time Homebuyer Market Report*.

Figure 2. Primary residence home sales have rebounded



Source: American Community Survey, 2006-2016.

Table 1. Comparing homeownership rate change and home buyer growth

Age Group Per Capita Homeownership Rate Change Since 2011			
	2011	2016	Change (pp)
25-34	16.9	14.9	-2.0
35-44	31.0	28.3	-2.7
45-54	38.6	36.5	-2.1
Cohort Per Captia Homeownership Rate Change Since 2010-2012			
	2010-12	2014-16	Change (pp)
24-25 → 26-27	2.9	4.0	1.1
26-27 → 28-29	2.7	4.0	1.4
28-29 → 30-31	1.2	3.4	2.2
30-31 → 32-33	1.7	3.2	1.5
32-33 → 34-35	0.3	2.1	1.8
Average	1.8	3.4	1.6
Home Buyer Growth Since 2011			
	Number (000s)		Change
	2011	2016	(%)
ACS, age 25-34	944	1,296	37.3
ACS, all ages	3,371	4,668	38.5
Sales of homes to first-time home buyers	1,180	1,943	64.7
Sales of new & existing single-family homes	4,091	5,399	32.0

Note: We use American Community Survey (ACS) data on owner-occupant householders who moved into their unit within the preceding 12 months as a proxy for recent home buyers.
Sources: U.S. Census Bureau, American Community Survey and New Home Sales Survey; National Association of REALTORS®, Existing Homes Sales Survey; Genworth Mortgage Insurance, *First-Time Homebuyer Market Report.*

Comparing the "Market Truth" of Age Group or Cohort Homeownership. The implications of this "market truth" comparison deserve underlining. When the age group homeownership rates are compared to the measures of growing home sales, a clear disparity appears. As displayed in Figure 1 and summarized in Table 1, the percentage point changes in age group per capita homeownership rates for ages 25-34 and two other key ages all *declined* by between 2.0 and 2.7 percentage points. It is not clear how such declines can support a rising number of home sales in the same time period.

However, the cohort changes in the homeownership rate all show a *positive upturn*. The net per capita inflow into homeownership in the 2010-12 interval averaged 1.8 percentage points for cohorts occupying the age range of 24 to 35. That inflow nearly doubled to a 3.4 percentage

point gain in homeownership in the interval of 2014-16, which apparently was enough to boost home sales substantially.

Concluding this analysis of homeownership rates, the cohort transitions carry two major advantages. One is that the upturn in cohort flow into homeownership closely follows the upturn in home sales. The second advantage of the cohort measures of demand is that the change in the transition rates is an early indicator of a turning point in the market, whereas changes in the age group rates substantially lag behind. We suspect that the transition rates also have more to say about the future of homeownership than do the lagging age group rates.

Age-Group Rates of Homeownership as Accruals from the Past. A close look at the construction of age-group homeownership rates demonstrates that they are backward looking, based on accruals of homeownership from the past. That is, age-group rates reflect the cumulative home buying experience of a cohort over its *entire* housing career up to its present age, within which *recent* home buying behavior is only a small subset. In contrast, the cohort transitions emphasize only the most recent increment of experience, and so they provide a more current measure of market behavior.[10] The net change in homeownership attainment during the most recent period is closely related to the cohort's current home buying activity, and thus tracks closely with market indicators of demand such as the numbers of homes sold to young adults and first-time buyers.[11]

The above assertion is more likely true when the interval of observation is fairly short, say one or two years, rather than a decade, and when economic conditions have been changing most rapidly. Since 2000, economic conditions have changed abruptly every few years, including the housing bubble, the financial crisis, the deep recession and then recovery. The rapidly changing conditions can be seen in the accrual of homeownership rates for two different cohorts of 28-29 year-olds, observed in 2012 and 2016 (Figure 3). Only four years apart, their histories of homeownership accumulation could hardly be more different. When these cohorts were early in their housing careers at age 22-23, they faced dramatically different housing and economic

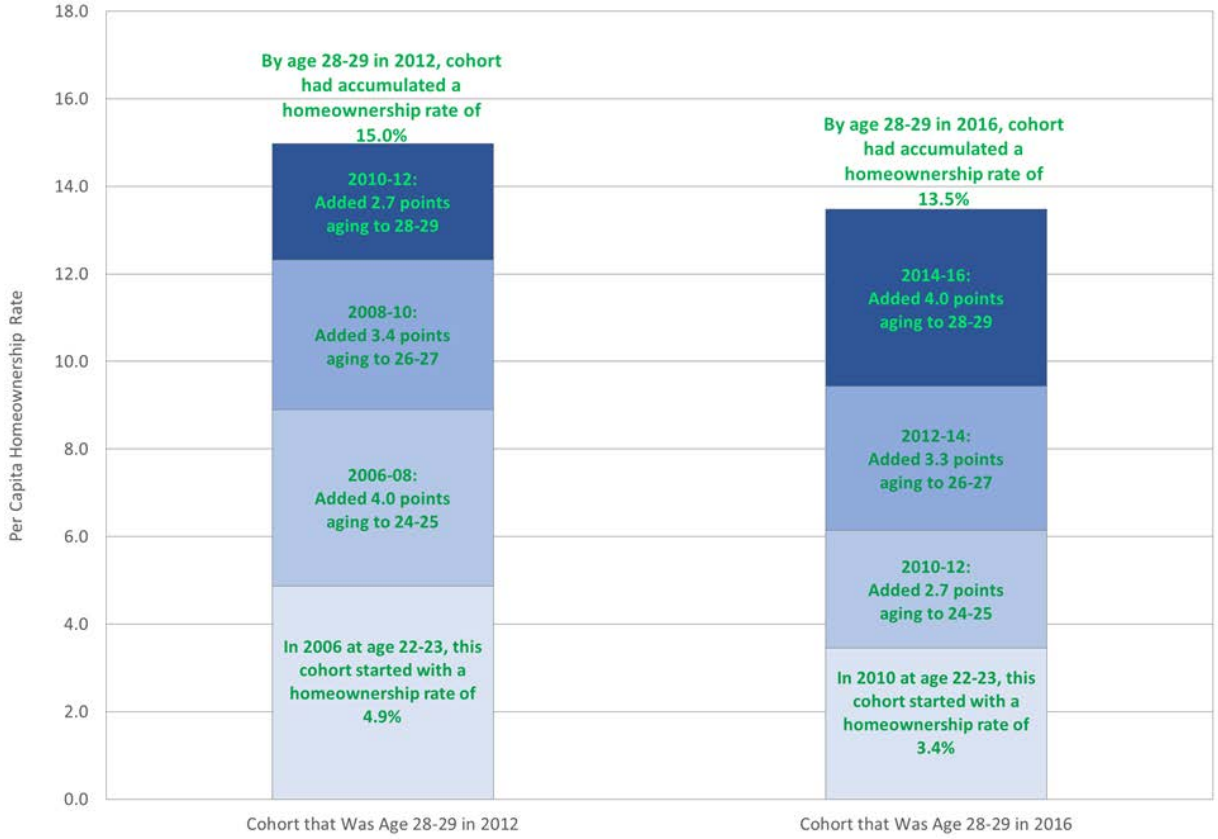
[10] The net change in homeownership attainment for a cohort during any period reflects both gross inflows into homeownership during that period, typically via principal residence home purchases by members of the cohort who were previously renters or non-householders, and gross outflows due to foreclosure, divorce, temporary reversion to renting after job-related relocations, death, or other events. During the young-adult years, gross inflows tend to dominate, and thus a cohort's homeownership rate generally increases fairly rapidly during the early stages of its housing career.

[11] The validity of using the most recent cohort increment in homeownership as an indication of current home buying activity is contingent on the length of interval over which cohort change is measured. The pace of cohort advancement can vary substantially within a long measurement interval (as, for example, in the decade-long intervals that characterize cohort analyses based on the decennial census), both because the longer interval increases the chances of substantial variations in economic and housing market conditions during the measurement period, but also because a longer interval encompasses housing behaviors over a wider swath of the life cycle. As previously noted, the advent of the annual, large-sample ACS enables measurement of cohort change over short historical intervals and brief segments of the life cycle, thus making the most recent cohort increment more indicative of current home buying behavior.

environments. When the earlier cohort was this age in 2006, the economy was still a year away from the Great Recession, mortgage credit standards were loose, and the national homeownership rate was near its all-time high. In contrast, *the recent cohort was that young age in 2010*, when the homeownership bust was in full swing, credit was much tighter, and the young-adult unemployment rate reached its cyclical peak. These drastically different economic and housing climates are reflected in the homeownership rate differential between the cohorts at age 22-23, with the earlier cohort enjoying a 1.5 percentage point advantage. (Compare the bottom segments of the two stacked bars in Figure 3.)

The earlier cohort's homeownership advantage expanded as it aged to 24-25 between 2006 and 2008, still riding the tail end of the housing boom and the 2000s economic expansion. It added 4.0 percentage points to its per capita homeownership rate, compared to an increment of only 2.7 points for the recent cohort, which was struggling through the late stages of the housing bust and the weak initial phase of economic recovery when it moved through the same age range between 2010 and 2012.

Figure 3. How Current Age Group Homeownership Rates Are Built from Gains of Prior Periods



Source: Derived from Figure 1.a. and 1.b.

As the cohorts aged past their mid-twenties, however, the tables began to turn with respect to both the economic climate and the pace of homeownership attainment. The earlier cohort aged to 26-27 years old between 2008 and 2010, during the depths of the Great Recession

and housing bust, whereas the younger cohort traversed this age range between 2012 and 2014, when the economic recovery was well underway. As a result, the more recent cohort registered a homeownership rate increase across this age range (3.3 percentage points) that was roughly equal to that of its earlier counterpart (3.4 points). As the economy continued to improve between 2014 and 2016, the recent cohort accelerated its pace of homeownership attainment to 4.0 percentage points as it aged to 28-29 years old, far surpassing the 2.7 point increment achieved by the earlier cohort across the same age range. (Compare the top segments of the two bars in Figure 3.) By age 28-29, these very different histories of homeownership accrual had added up to a cumulative per capita homeownership rate of 15.0 percent for the earlier cohort in 2012, but only 13.5 percent for the more recent cohort in 2016.

This historical accumulation of homeownership that is represented in current age group rates has several implications. Foremost is that only the most recent homeownership increment added in the last two years comes close to representing current behavior. In contrast, the bulk of the cumulative age-group rate was built up under very different economic conditions of prior periods. In our example, the homeownership rate for the 28-29 age group observed in 2012 reflects weak gains of 2010-12, but those are overlaid on a large base of homeownership carried forward from more prosperous years. Conversely, the 28-29 age group observed in 2016 presents the opposite indications: although it does indeed have a lower cumulative homeownership rate (which might be interpreted by some as a lower preference for homeownership), that is entirely a legacy of its small accruals during the recession years. This cohort's most recent home buying behavior has been quite robust, with an incremental homeownership rate gain between 2014 and 2016 that exceeds or rivals any of the accruals registered by the earlier, apparently more advantaged cohort.

At our present point in history, when even relatively recent prior periods represent extremely different conditions, including the housing and credit bubble of the early to mid-2000s, the financial crisis, the severe economic slump, and now a steady, solid recovery, the widely varying histories behind younger and middle aged groups lead to highly distorted comparisons involving fixed age groups over time.

The conclusion to be drawn is that the cumulative age group rates of homeownership clearly do not represent current behavior, and it is current behavior that drives current market activity. Thus to better understand the demographic underpinnings of current market activity, it is clear that the emphasis of analysis should focus only on the most recent increment of cohort progress in each time period.

Discussion and Questions Raised

It is apparent from the preceding evidence that the age cross-sectional pattern of homeownership rates, if compared across periods, can be very misleading about direction, persistence, and magnitude of current trends. Cohort modeling holds a distinct advantage of highlighting *current* trends in net flows into homeownership. The age group rates of

homeownership combine the most recent changes with the accumulated effects of past accumulation or deficit carried forward by cohorts from younger ages. Thus the trends in the *age group rates are backward looking*, while the cohort transitions in the current period are more *present focused*. Further, the comparisons across these current measures in recent periods may provide greater insight into future transitions.

One major question is how persistent are the recent trends. The lagged effects of age group accumulation of homeownership make this a very poor metric of future persistence. From the cohort vantage point we see how rapidly homeownership expands in certain age ranges—more in some periods than others—and how the net inflow slows dramatically in subsequent ages. As to the frequent assumption, based on declining age group rates in recent years, that young adults may have forsaken homeownership and that they have settled into a lifestyle of renting, the cohort evidence tells a different story.

These findings lead to a second major question of whether there are identifiable market characteristics of metropolitan areas that can explain the different pace of transition into homeownership in different areas. Entry into homeownership is constrained by many financial factors, including the prevailing prices and rate of price appreciation in different metropolitan areas, incomes of young adults, difficulties accumulating down payments, or credit access in different time periods.

As a result, we might expect that transition into homeownership happens at younger ages in metros where housing is lower priced relative to incomes, on average. Demographic differences between metros could also have an effect, with more rapid transition into homeownership when the share of local cohorts that is married or with children increases more quickly, or if cohort members have more rapidly rising incomes on average. Slower transition might be expected, all things being equal, if more of the young cohort members are less-educated or black and Latino.

A third major question is how much the variations observed across two-year periods between 2008 and 2016 in the rate of transition into homeownership are reduced when we control for all these other factors that constrain or expedite the transition into homeownership. In other words, to what extent does the time trend remain for inflows into homeownership after adjusting for all these factors?

VARIATION AND EXPLANATION OF HOMEOWNER GAINS IN THE 100 LARGEST METROPOLITAN AREAS

The variation in homeownership transitions that is observed across metropolitan areas with widely different market conditions could provide useful insights into the determinants of the pace of net transition into homeownership. For this reason, detailed analysis of transitions into homeownership is conducted for the set of 100 largest metropolitan areas, as defined in 2010. The largest metropolitan area is New York and the 100th is Modesto, CA, which was home to about 514,000 people in 2010. The analysis is based on the American Community Survey (ACS) 1-Year

Public Use Microdata Sample (PUMS) files from 2006 to 2016. The microdata provide annual data with a large sample size, ranging from 3.1 to 3.3 million, which enables us to detect changes in the housing choices for narrowly defined age and cohort groups over short time periods. As the geographic units of the PUMS data, Public Use Microdata Areas (PUMAs), might not align completely within metropolitan boundaries that have changed over time, we created a standardized set of metros with constant boundaries.[12]

The analysis is restricted to the population between the ages of 20 and 39. For this young adult sample, we group the ages to secure an adequate sample size to reduce sampling variability, which becomes a particular challenge in smaller metropolitan areas. Our primary set of age groupings consists of two-year age groups observed two years apart: 2006, 2008, 2010, 2012, 2014, and 2016. Ages include 20-21 to 38-39, after which net transitions into homeownership are very sparse. (In the cohort analysis, the oldest age transition is from age 38-39 to age 40-41.) A secondary set of broader age groupings, for use in ranking metro cohort homeownership transitions, consists of a 4-year interval that enables us to compare the trends in the recovery period (2012–16). Based on findings in the 2-year analysis, we expect the temporal dynamics to be well-preserved in this 4-year aggregation, while the stability of the statistical estimates is much improved for analysis of smaller areas.

Variable Selection and Model Specification

Given this sample, we conduct a series of regression analyses to explore the role of cohort and metropolitan characteristics in the cohorts' homeownership trajectories. The dependent variable is the net change in the cohort per capita rate of owner occupancy during two-year intervals.

The basic model to be estimated can be expressed as

$H_{t, t+2}$ = f (**P**eriod, **A**ge$_t$, **M**arket characteristics, **C**ohort characteristics)

Where

H = Percentage point change (from t to t+2) in share of the cohort population that is an owner-occupant householder

P = Period interval for estimating the change: 2006-08 (reference), 2008-10, 2010-12, 2012-14, and 2014-16

[12] To construct these constant-boundary metros in all data years, we reassign PUMAs fractionally where needed by estimating proportional weights. These are based on the numbers of persons and households by age estimated through an interpolation method using the age-specific population at the census-tract level. The necessary small-area population by age was obtained from the 2000 and 2010 Censuses and was applied to the corresponding ACS PUMS files.

A = The individual population age cohorts, identified by their age at the beginning (t) of the interval, in 2-year groups from 20-21….38-39.

M = Market area characteristics, as described in Table 2

C = Cohort characteristics, as described in Table 2

We relate the homeownership rate trajectories among cohorts, defined by the age of cohort at the beginning of each interval, with a number of characteristics that describe the cohort over the interval. These include the change in the mean personal income for a cohort, change in the share of people currently married, change in the share of people with own child(ren) in the same household, and change in the share of people with higher education (Bachelor's degree or more). We also include the share of the cohort that belongs to racial/ethnic minority groups. In addition, to address concerns about the effects of migration during the interval, we include an indicator for the share of people at the end of the interval who had in-migrated within the last 12 months.

Net of all these cohort characteristics, our principal interest is in how local market characteristics serve to shape the pace of net transition into homeownership. The metro characteristics we considered include indicators of economic trends *prior to the beginning* of the interval: employment growth, the percentage change in the Federal Housing Finance Agency (FHFA) House Price Index (HPI), and new construction in the two years prior to the beginning of the interval. Past growth indicates the cumulative strength of recovery in the local economy, representing growing confidence in the local economy, and it should reflect greater progress in career building, with respect to both jobs and housing ambitions. We use the prior increase in the price index as a proxy for expectations about price gains in the current interval and changes in building permits for single-family and multifamily homes to capture changes in housing supply. A home purchase affordability indicator, the ratio of home value to income among 25-to 39-year-olds, is measured at the beginning of the interval. While the value-to-income ratio is based on the ACS PUMS, employment growth is from the Bureau of Labor Statistics' Local Area Unemployment Statistics program, and building permit information is from the Census Bureau's Building Permit Survey.[13]

Table 2 presents descriptive statistics for the dependent and control variables in the models. The units of observation in the metropolitan analysis are individual cohorts, with the total of 5,000 given by 100 metros by 5 periods by 10 cohorts.

Models are estimated by binomial linear probability regression. Models are stratified by period and, alternatively, by age. Through these stratifications we seek to identify effects that are more concentrated in certain time periods and age ranges. However, the sample of observations

[13] We tested alternative form of employment growth and building permit variables, by measuring percentage change, to consider the different magnitudes of growth across metropolitan areas of different sizes. The results were qualitatively unchanged by using alternative forms of these variables.

is reduced to only one-fifth of the total, which also reduces the likely significance of any coefficients.

Each set of stratified models is executed in three stages: 1) a base model of cohorts and periods to estimate the gross transitions by age in each time period; 2) the base model plus metro characteristics, estimating overall differences by market characteristics; and 3) the full model that includes cohort characteristics as well as market characteristics. This sequence enables us to see the overall trends in housing trajectories and then the factors associated with such trends.

Table 2. Descriptive Statistics of Variables in the Models

	Obs.	Mean	S.D.	Median	Min.	Max.
Net cohort transition into homeownership	5,000	2.065	4.097	2.034	–21.058	22.888
Cohort characteristics						
Median personal income (in 000s; t, t+2)	5,000	2.804	4.383	2.946	–16.437	21.437
% married (t, t+2)	5,000	4.261	6.536	4.356	–22.305	33.587
% with own child in the HH (t, t+2)	5,000	2.278	5.071	2.499	–30.632	26.258
% Bachelor's degree or higher (t, t+2)	5,000	4.097	7.727	2.964	–26.313	39.759
% Minority (at t)	5,000	40.164	18.313	37.091	2.810	99.014
% Bachelor's degree or higher (at t)	5,000	27.868	12.682	29.742	0.000	62.329
% Migrant (t+2)	5,000	4.652	2.927	4.138	0.000	24.094
Metro characteristics						
Employment growth (in 000s; t, t+2)	5,000	15.343	52.141	8.347	–395.052	276.524
Past employment growth (in 000s; t-2, t)	5,000	15.352	53.169	8.436	–395.052	276.524
Past SF bldg. permits (in 000s; t-2, t)	5,000	11.607	15.875	6.488	0.272	119.721
Past MF bldg. permits (in 000s; t-2, t)	5,000	4.407	7.623	1.629	0.000	65.570
Past % HPI change (t-2, t)	5,000	2.287	15.995	–0.265	–42.421	59.737
Price-to-income ratio, 25 to 39 (at t)	5,000	7.299	3.111	6.275	3.888	22.486

Period Stratified Estimates of Cohort Transitions into Homeownership

Since the economic recovery began in 2009, labor and housing market conditions have changed substantially, suggesting that we stratify our regression models of cohort transitions into homeownership by time periods to see if effects differed across stages of the recovery. After running one model with all years pooled together, we estimate separate models for each time period. We first run the regression models with age and period fixed effects only and then introduce controls for metropolitan area characteristics, followed by addition of cohort-specific characteristics.

Age only. The first column of Table 3, reflecting results for a model with age and period dummies only, shows the general homeownership attainment pattern over a life-course. The constant terms in these models reference the percentage point gain in the per capita

homeownership rate as a cohort ages from 20-21 -> 22-23, which is substantially lowered after 2010, falling from a 1.82 percentage point gain in homeownership in 2006-08 to only about a 1.30 point gain in both 2012-14 and 2014-16. However, the recovery at older ages is quite substantial, first in 2010-12 reducing the previous strong negative associations in the 30s, then in 2012-14 building stronger inflows in the 20s, and finally in 2014-16 strengthening those young inflows while also building more positive inflows in the 30s. Of course, these coefficients are all expressed relative to the constant term for the period, pertaining to the youngest cohort, which has been declining, as noted. Even subtracting the maximum difference in this base coefficient (2.01 – 1.30), the pattern of much stronger coefficients in the 20s and 30s in recent years remains.

Table 3. Period Estimates of Cohort Transitions into Homeownership (age only)

	all years		2006–08		2008–10		2010–12		2012–14		2014–16	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age of cohort (at t, ref: 20 to 21)												
22 to 23	1.470	***	1.895	***	1.736	***	1.008	***	0.998	***	1.715	***
24 to 25	2.654	***	3.644	***	2.268	***	1.722	***	2.383	***	3.253	***
26 to 27	1.710	***	1.898	***	0.933	*	0.821	*	2.298	***	2.598	***
28 to 29	0.969	***	0.777		–0.140		–0.448		2.236	***	2.419	***
30 to 31	0.874	***	0.525		–0.664		0.378		2.055	***	2.075	***
32 to 33	–0.654	**	–0.107		–2.009	***	–1.169	*	–0.825	+	0.839	+
34 to 35	–0.336		–0.408		–2.468	***	–0.676	+	0.000		1.873	***
36 to 37	–0.461	*	–0.472		–1.919	***	–0.922	+	–0.081		1.089	*
38 to 39	–1.374	***	–0.571		–2.755	***	–1.774	**	–0.796	+	–0.975	+
Period FEs (Ref: 2006–08)												
2008–10	–1.032	***										
2010–12	–1.177	***										
2012–14	–0.400	*										
2014–16	0.248											
Constant	2.052	***	1.819	***	2.007	***	1.466	***	1.310	***	1.297	***
Number of obs	5,000		1,000		1,000		1,000		1,000		1,000	
Adj R-squared	0.100		0.085		0.143		0.060		0.093		0.094	

Note: + = p < 0.10, * = p < 0.05, ** = p < 0.01, *** = p < 0.001.

Age + Metro characteristics. By introducing the metro characteristics into the model, we examine how the association between transitions into homeownership and local market conditions may have changed over time. Many of the factors are statistically significant only in the model pooled across periods or in the model for 2006-08 (first and second columns, Table 4). Examined in 2006-08, we find that recent and current employment growth both had significant positive associations with the rate of transition into homeownership. At the same time, the rate of homebuilding, both single-family ("Past SF bdg pmt" in Table 4) and multifamily ("Past MF bdg pmt"), was negative and significant. After 2008, surprisingly, none of these factors was of any influence. We discuss these changes in a following section.

Also in 2006-08, our home buying affordability indicator, the price-to-income ratio for young adults in the metro (labeled "PTI ratio, 25-39" in Table 4), had a strong negative association with the rate of homeownership gain. This effect disappeared in the next two periods, during the depths of the housing downturn from 2008 to 2012, only to re-emerge with a moderate negative

influence during the recovery years after 2012. Also of interest is the effect of the rate of house price increase in the metros ("Past % HPI chg"). Net of employment growth, home building and purchase affordability, the effect of price increase in the preceding two years is positively associated with homeownership gains in 2008-10 and 2010-12, but not in any other periods.

Table 4. Period Estimates of Cohort Transitions into Homeownership (age and metro characteristics)

	all years		2006–08		2008–10		2010–12		2012–14		2014–16	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age of cohort (at t, ref: 20 to 21)												
22 to 23	1.470	***	1.895	***	1.736	***	1.008	***	0.998	***	1.715	***
24 to 25	2.654	***	3.644	***	2.268	***	1.722	***	2.383	***	3.253	***
26 to 27	1.710	***	1.898	***	0.933	*	0.821	*	2.298	***	2.598	***
28 to 29	0.969	***	0.777		–0.140		–0.448		2.236	***	2.419	***
30 to 31	0.874	***	0.525		–0.664		0.378		2.055	***	2.075	***
32 to 33	–0.654	**	–0.107		–2.009	***	–1.169	*	–0.825	+	0.839	*
34 to 35	–0.336		–0.408		–2.468	***	–0.676	+	0.000		1.873	***
36 to 37	–0.461	*	–0.472		–1.919	***	–0.922	+	–0.081		1.089	*
38 to 39	–1.374	***	–0.571		–2.755	***	–1.774	**	–0.796	+	–0.975	+
Metro characteristics												
Emp. growth (t, t+2)	–0.001		0.011	***	–0.004		0.001		–0.004		0.000	
Past emp. growth (t-2, t)	0.001		0.015	**	0.001		0.002		–0.002		0.001	
Past SF bdg pmt (t-2, t)	–0.012	***	–0.026	***	0.011		–0.026		–0.015		–0.007	
Past MF bdg pmt (t-2, t)	0.008		–0.056	*	–0.033		0.003		0.075		–0.015	
Past % HPI chg. (t-2, t)	0.000		–0.016		0.052	**	0.022	+	0.009		0.001	
PTI ratio, 25-39 (at t)	–0.115	***	–0.145	***	0.057		0.026		–0.092	+	–0.109	*
Period FEs (Ref: 2006–08)												
2008–10	–1.231	***										
2010–12	–1.413	***										
2012–14	–0.727	**										
2014–16	–0.025											
Constant	3.204	***	3.608	***	1.725	***	1.713	***	2.082	***	2.140	***
Number of obs	5,000		1,000		1,000		1,000		1,000		1,000	
Adj R-squared	0.108		0.130		0.153		0.059		0.093		0.096	

Note: + = p < 0.10, * = p < 0.05, ** = p < 0.01, *** = p < 0.001.

Age + Metro + cohort characteristics. Lastly, the models with all variables confirm that the cohort characteristics in different metropolitan areas are a strong predictor of homeownership attainment, compared to the metro characteristics, in every period, with the overall explanatory power of the models substantially improved (Table 5). For example, the adjusted R-Squared in the pooled-period model is boosted from 0.108 to 0.173 once cohort characteristics (beyond age) are added to metro characteristics in Table 5.

Among the cohort characteristics, in the pooled model current-period changes in median personal income ("Med. Inc.") and the proportion of the cohort that is married are strongly and positively associated with the cohort's net increase in homeownership, as might be expected. The proportion of the cohort with a bachelor's degree ("%BA+") at the beginning of the interval, and the increase in the proportion holding a bachelor's during the interval, also have significant

positive effects. One finding that might be surprising is that the proportion of the cohort that is a racial/ethnic minority is not associated with the pace of transition into homeownership, net of all other factors.[14] This result provides additional evidence suggesting that the growing racial transition in America—by itself—may not have substantial impacts on the nation's homeownership rate (Myers et al 2017).

A few notable differences are observed across the period-specific models. Growth in median personal income is somewhat lessened as an explanatory factor in 2014-16, when the economic recovery was well advanced and incomes were rising more rapidly across the nation. Marriage, although highly influential in all periods, had its strongest association with homeownership gains in 2008-10, the time of strongest downturn. Conversely, presence of children was significant only in 2014-16. One interpretation of these family dynamics is that newly married people at the beginning of the recession attempted to carry forward their plans for homeownership, while in subsequent years the newly married sheltered in apartments, with or without children. Another possible explanation is that the first-time homebuyer tax credits of 2008 to 2010 might have enticed some married couples, who might have been predisposed to homeownership, into purchasing a home despite the recession. Meanwhile the presence of children built ambition for movement into homeownership that was actualized only after the economic recovery was well underway.

One final cohort characteristic is the share that migrated into the metro during the interval. This migration variable has a significant negative effect on transition into homeownership, but only prior to 2012. In the recession and early recovery years, higher shares of migrants among young people may have indicated economic refugees from other regions who did not have good prospects for homeownership. However, once recovery was well underway in the nation, this economic refugee effect dissipated.

The metro characteristics generally lost explanatory power after introduction of the cohort characteristics. The exception is housing affordability, which was negatively associated with homeownership gains in both 2006-08 and 2014-16, with and without cohort controls. In contrast, the prior-period price trend loses any influence after cohort characteristics are introduced. Employment and home building effects also lessened somewhat with the addition of cohort controls. One notable change with the introduction of cohort characteristics is that the rate of apartment building in the two years previous to 2014-16 has a significant negative association with the rate of inflow into homeownership.

[14] Models were tested with separate indicators for percent black, Asian, Hispanic, and other (using non-Hispanic white as the omitted reference group), but none of these race/ethnicity variables were significant. Accordingly, we pooled all people of color into a single aggregated "minority" measure, which also tested insignificant, save for a small effect only in 2012-14.

Table 5. Period Estimates of Cohort Transitions into Homeownership (all variables)

	All Periods		2006–08		2008–10		2010–12		2012–14		2014–16	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age of cohort (at t, ref: 20 to 21)												
22 to 23	1.029	***	1.466	**	1.451	**	0.968	*	0.585		1.155	**
24 to 25	2.638	***	3.752	***	2.580	***	2.635	***	2.198	***	2.769	***
26 to 27	2.087	***	2.233	**	1.857	**	2.304	**	2.406	***	2.260	***
28 to 29	1.704	***	1.342		0.888		1.477	+	2.723	***	2.463	***
30 to 31	1.871	***	1.296		0.734		2.614	**	2.831	***	2.282	**
32 to 33	0.582		0.725		0.016		1.062		0.316		1.150	
34 to 35	0.892	*	0.273		–0.580		1.604	+	1.069		2.324	**
36 to 37	0.991	**	0.396		0.016		1.736	+	1.060		1.918	*
38 to 39	0.282		0.309		–0.613		1.079		0.560		0.121	
Cohort characteristics												
Med. Inc. (t, t+2)	0.177	***	0.159	**	0.168	***	0.232	***	0.190	***	0.117	**
% married (t, t+2)	0.098	***	0.067	**	0.124	***	0.068	**	0.092	***	0.087	***
% w/own child (t, t+2)	0.025	+	–0.045		0.015		0.041		0.033		0.063	*
% BA+ (t, t+2)	0.062	***	0.087	**	0.100	**	0.064	*	0.021		0.056	*
% Minority (at t)	0.001		0.015		–0.007		0.016		–0.018	*	–0.005	
% BA+ (at t)	0.021	**	0.040	+	0.034	+	–0.005		0.003		0.025	
% Migrant (t+2)	–0.059	**	–0.090	+	–0.104	*	–0.084	+	–0.011		–0.040	
Metro characteristics												
Emp. growth (t, t+2)	–0.002	**	0.004		–0.001		–0.005		–0.004		–0.003	
Past emp. growth (t-2, t)	0.000		0.016	**	–0.005		0.001		–0.001		0.006	
Past SF bdg pmt (t-2, t)	–0.002		–0.020	***	0.020	*	–0.030		0.008		0.009	
Past MF bdg pmt (t-2, t)	–0.015	*	–0.082	**	–0.028		0.006		0.029		–0.052	*
Past % HPI chg. (t-2, t)	–0.001		–0.001		0.022		0.022		–0.003		0.011	
PTI ratio, 25-39 (at t)	–0.113	***	–0.190	***	0.013		–0.025		–0.050		–0.131	*
Period FEs (Ref: 2006–08)												
2008–10	–0.720	**										
2010–12	–1.050	***										
2012–14	–0.795	**										
2014–16	–0.424	*										
Constant	0.829	*	1.036		–0.400		–0.519		0.582		0.265	
Number of obs	5,000		1,000		1,000		1,000		1,000		1,000	
Adj R-squared	0.173		0.170		0.232		0.129		0.156		0.152	

Note: + = p < 0.10, * = p < 0.05, ** = p < 0.01, *** = p < 0.001.

Age Stratified Estimates of Cohort Transitions into Homeownership

As an alternative to estimating separate models stratified by period, here we present models stratified by 4-year age groupings to depict the different effects on net transitions into homeownership over different stages of the housing career.[15] We first run the regression models with period fixed-effects only, then introduce metropolitan area characteristics and cohort-specific characteristics.

[15] Each 4-year age grouping represents a specific cohort age transition. For example, the 20 to 23 age grouping in the second column of Table 6 represents the transition from age 20-21 at time t to age 22-23 at time t+2.

Period only. The first column of Table 6, which contains results for a model pooled across age groups with age and period dummies only, shows the general homeownership attainment pattern over a life-course. (This pooled model is identical to the pooled model in the first column of Table 3.) The net transition into homeownership, from either non-heads or renting, grows rapidly until the mid-20s, with the inflows then gradually slowing down, as demonstrated earlier in Figure 1b. As seen by examining the period fixed effects (FEs) in the first column of Table 6, transitions into homeownership were particularly slow in the recession and housing bust periods of 2008–10 and 2010-12, when compared to the 2006–08 period.

Table 6. Age Stratified Estimates of Cohort Transitions into Homeownership (period only)

	all ages		20 to 23		24 to 27		28 to 31		32 to 35		36 to 39	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age of cohort (at t, ref: 20 to 21; earlier two years for age-stratified regressions)												
22 to 23	1.470	***	1.470	***								
24 to 25	2.654	***										
26 to 27	1.710	***			–0.944	***						
28 to 29	0.969	***										
30 to 31	0.874	***					–0.095					
32 to 33	–0.654	**										
34 to 35	–0.336								0.318			
36 to 37	–0.461	*										
38 to 39	–1.374	***									–0.913	**
Period FEs (Ref: 2006–08)												
2008–10	–1.032	***	0.109		–0.982	**	–0.864	+	–1.793	***	–1.627	***
2010–12	–1.177	***	–0.796	***	–1.853	***	–1.039	*	–1.018	*	–1.180	*
2012–14	–0.400	*	–0.957	***	–0.940	*	0.986	*	–0.664		–0.426	
2014–16	0.248		–0.613	**	–0.368		1.074	**	1.091	*	0.056	
Constant	2.052	***	2.031	***	5.062	***	2.517	***	1.402	***	1.754	***
Number of obs	5,000		1,000		1,000		1,000		1,000		1,000	
Adj R-squared	0.100		0.138		0.046		0.041		0.041		0.025	

Note: + = p < 0.10, * = p < 0.05, ** = p < 0.01, *** = p < 0.001.

The second to sixth columns show how these period fixed-effects differ across the ages. Net transitions into homeownership among those in their mid-20s and 30s were slowed down right after the financial crisis (2008–10), and slowed even more for those in their 20s between 2010 and 2012. Cohorts under age 28 also decelerated their flows into homeownership, compared with the 2006-08 reference period, during the recovery periods after 2012. For these youngest adults, the slowdown of the ascent into homeownership up to 2014 is significant and strongly negative. Most recently, from 2014-16, the pace of the transitions rebounded: the slowdowns moderated among cohorts under age 28, while from ages 28 to 35 the transition into homeownership increased to a full percentage point higher than the baseline of 2006-08.

Period + Metro characteristics. Next we assess how much of the variations in the net transition into homeownership across age groups are explained by local labor and housing market characteristics (Table 7). Among the metro characteristics, the area price-to-income (PTI) ratio, a proxy for home purchase affordability, is most strongly associated with the net transition into homeownership. As expected, the association is negative, although it is weak or insignificant for

cohorts between ages 28 and 35. The rate of house price change in the prior period had no effect in any age group, nor did the rate of past or current employment growth.

Table 7. Age Stratified Estimates of Cohort Transitions into Homeownership (period and metro characteristics)

	all ages		20 to 23		24 to 27		28 to 31		32 to 35		36 to 39	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age of cohort (at t, ref: 20 to 21; earlier two years for age-stratified regressions)												
22 to 23	1.470	***	1.470	***								
24 to 25	2.654	***										
26 to 27	1.710	***			–0.944	***						
28 to 29	0.969	***										
30 to 31	0.874	***					–0.095					
32 to 33	–0.654	**										
34 to 35	–0.336								0.318			
36 to 37	–0.461	*										
38 to 39	–1.374	***									–0.913	**
Metro characteristics												
Emp. growth (t, t+2)	–0.001		–0.001		–0.002		–0.001		–0.001		–0.000	
Past emp. growth (t-2, t)	0.001		0.000		0.001		0.000		0.001		0.003	
Past SF bdg pmt (t-2, t)	–0.012	***	0.010	*	–0.014	*	–0.013	+	–0.024	**	–0.019	*
Past MF bdg pmt (t-2, t)	0.008		–0.040	***	–0.010		0.020		0.040	*	0.030	*
Past % HPI chg. (t-2, t)	0.000		0.000		0.001		0.006		–0.002		–0.005	
PTI ratio, 25-39 (at t)	–0.115	***	–0.182	***	–0.200	***	–0.076	+	0.003		–0.122	**
Period FEs (Ref: 2006–08)												
2008–10	–1.231	***	–0.001		–1.282	**	–0.919		–2.018	***	–1.937	**
2010–12	–1.413	***	–0.894	*	–2.243	***	–1.065		–1.323	+	–1.541	*
2012–14	–0.727	**	–1.169	***	–1.451	**	0.901		–0.975		–0.941	
2014–16	–0.025		–0.661	**	–0.746	+	0.906	+	0.755		–0.379	
Constant	3.204	***	3.517	***	7.052	***	3.208	***	1.728	**	3.021	***
Number of obs	5,000		1,000		1,000		1,000		1,000		1,000	
Adj R-squared	0.108		0.223		0.080		0.038		0.038		0.026	

Note: + = p < 0.10, * = p < 0.05, ** = p < 0.01, *** = p < 0.001.

Of the remaining metro characteristics, only the variables representing rates of homebuilding of apartments and single-family homes were significant. However, the associations were weak, and the signs of the coefficients differed between the youngest and oldest age groups. Interpretation of this homebuilding effect is advanced in the next section where we examine models that introduce characteristics of the cohorts.

Period + Metro + Cohort characteristics. Lastly, we introduce cohort characteristics into our age-stratified models. The regression results indicate that cohort characteristics are generally more closely related to cohort transitions into homeownership than are the metropolitan characteristics. Among these cohort characteristics, life events (e.g. getting married, having children) and economic resources (e.g. income and education) are found to be important in predicting the net transition into homeownership of a cohort. Among metro attributes, only housing affordability and the rate of home building are found to be of any importance.

Examining first the cohort characteristics (Table 8), income and marital effects are fairly consistent across the age groups, with one notable exception. Among young adults in their late 30s, the marital effect drops away and a strong effect of children's presence emerges that is not observed for other ages. The importance of children at this age is consistent with an interpretation of growing family pressure that incentivizes home buying, married or not.

A second set of cohort characteristics involves minority status, education, and migration. The share of the cohort that is other than non-Hispanic white has no effect on cohort advance into homeownership except in the youngest age range, 20 to 23, where it is significantly negative. In contrast, the growing share with a bachelor's degree has little effect until after age 24. This growth could be influenced by in migration of better educated cohort members, but that effect should be controlled by the indicator for migration, which has little effect until age 36 to 39, when it is negative. At this age when migration is substantially less likely than in the 20s, a higher share of migrants is disruptive of established housing careers and at least temporarily depresses the likelihood of advancing into homeownership. That is contrasted with the growth in BA share, which has its strongest, positive association with home buying in the 30s.

Net of these controls for cohort characteristics, we now examine the association of metro characteristics with the advance into homeownership in different age ranges. As seen in the previous models for separate periods, the price-to-income ratio has a consistent, negative effect suppressing the transition to homeownership across most of the young-adult age spectrum.

A second metro factor is the volume of homebuilding in the previous two years relative to the volume of employment growth in the earlier or current interval. In fact, the relative rate of supply increase shows little influence on the subsequent rate of advancement into homeownership in age groups 28 and older. However, in the younger age range, the rate of single-family building has a very slight, significant positive association, while the rate of multifamily building has a stronger, but negative association. Given that adults in their 20s have a much higher likelihood than those in their 30s of renting apartments, one interpretation of the significant negative relationship on current home buying is that a greater supply of new apartments relative to job growth induces young adults to remain renters longer, delaying their otherwise expected transition to homeownership. One possible channel by which the ample supply of new apartments might suppress home buying is by generous rent concessions and amenities offered by new projects, as well as greater length of stay discounts in existing rentals. Further research is needed in regard to this multifamily effect on the rate at which young adults advance into homeownership.

Table 8. Age Stratified Estimates of Cohort Transitions into Homeownership (all variables)

	All Ages		20 to 23		24 to 27		28 to 31		32 to 35		36 to 39	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Age of cohort (at t, ref: 20 to 21; earlier two years for age-stratified regressions)												
22 to 23	1.029	***	1.269	***								
24 to 25	2.638	***										
26 to 27	2.087	***			–0.544	*						
28 to 29	1.704	***										
30 to 31	1.871	***					0.135					

32 to 33	0.582										
34 to 35	0.892	*						0.238			
36 to 37	0.991	**									
38 to 39	0.282									–0.609	*
Cohort characteristics											
Med. Inc. (t, t+2)	0.177	***	0.084	*	0.167	***	0.171	***	0.192	***	0.165	***
% married (t, t+2)	0.098	***	0.095	***	0.140	***	0.051	*	0.096	***	0.043	
% w/own child (t, t+2)	0.025	+	–0.003		0.024		–0.027		–0.002		0.096	*
% BA+ (t, t+2)	0.062	***	–0.013		0.062	*	0.102	**	0.135	***	0.102	**
% Minority (at t)	0.001		–0.017	***	–0.003		0.000		0.011		0.011	
% BA+ (at t)	0.021	**	–0.015		0.025		0.029		0.038	+	0.041	*
% Migrant (t+2)	–0.059	**	–0.006		–0.077	+	–0.039		–0.064		–0.168	*
Metro characteristics												
Emp. growth (t, t+2)	–0.002	**	–0.000		–0.002	+	–0.003	+	–0.002		–0.003	
Past emp. growth (t-2, t)	0.000		0.000		0.000		–0.001		–0.000		0.003	
Past SF bdg pmt (t-2, t)	–0.002		0.015	***	0.000		–0.002		–0.018	*	–0.012	
Past MF bdg pmt (t-2, t)	–0.015	*	–0.034	***	–0.039	**	–0.005		0.016		0.007	
Past % HPI chg. (t-2, t)	–0.001		–0.004		–0.001		0.003		0.001		0.002	
PTI ratio, 25-39 (at t)	–0.113	***	–0.120	***	–0.178	***	–0.102	*	–0.044		–0.161	**
Period FEs (Ref: 2006–08)												
2008–10	–0.720	**	0.253		–0.708	+	–0.660		–1.230	*	–1.528	**
2010–12	–1.050	***	–0.465		–1.829	***	–0.818		–1.103		–1.092	
2012–14	–0.795	**	–0.784	**	–1.485	**	0.647		–1.239	+	–1.257	*
2014–16	–0.424	*	–0.311		–1.192	**	0.444		–0.161		–0.862	
Constant	0.829	*	2.773	***	4.311	***	1.943	*	0.112		1.836	*
Number of obs	5,000		1,000		1,000		1,000		1,000		1,000	
Adj R-squared	0.173		0.276		0.189		0.089		0.129		0.088	

Note: + = p < 0.10, * = p < 0.05, ** = p < 0.01, *** = p < 0.001.

Summary and Discussion

The period effects revealed above are important because of the sharp differences between recession and recovery years. It is worth revisiting how the transition into homeownership has unfolded over time and assessing how these period effects vary with introduction of successive statistical controls. Here we examine cohorts in the 4-year age range, 24-27, as they advance to ages 26-29. We examine a sequence of cohorts passing through this key age range for movement into homeownership for two-year periods from 2008 to 2016. The homeownership rate gain in each period is compared to the homeownership gain of 2006-08, the final years of the boom before the full effects of the recession and housing bust took hold.

Results are summarized in Figure 4. The simplest view is derived from the gross national trends, as described in the cohort transitions of Figure 1b. Transition into homeownership was reduced by 0.91 percentage points in 2008-10, the recession years, compared with the 2006-08 baseline, but it kept falling to a reduction of 1.38 percentage points in 2010-12, the low point before housing recovery began. In 2012-14, the cohort transition improved substantially but remained 0.55 percentage points below the baseline period. Finally, in 2014-16, recovery improved to near parity with the baseline period, falling only 0.11 points behind.

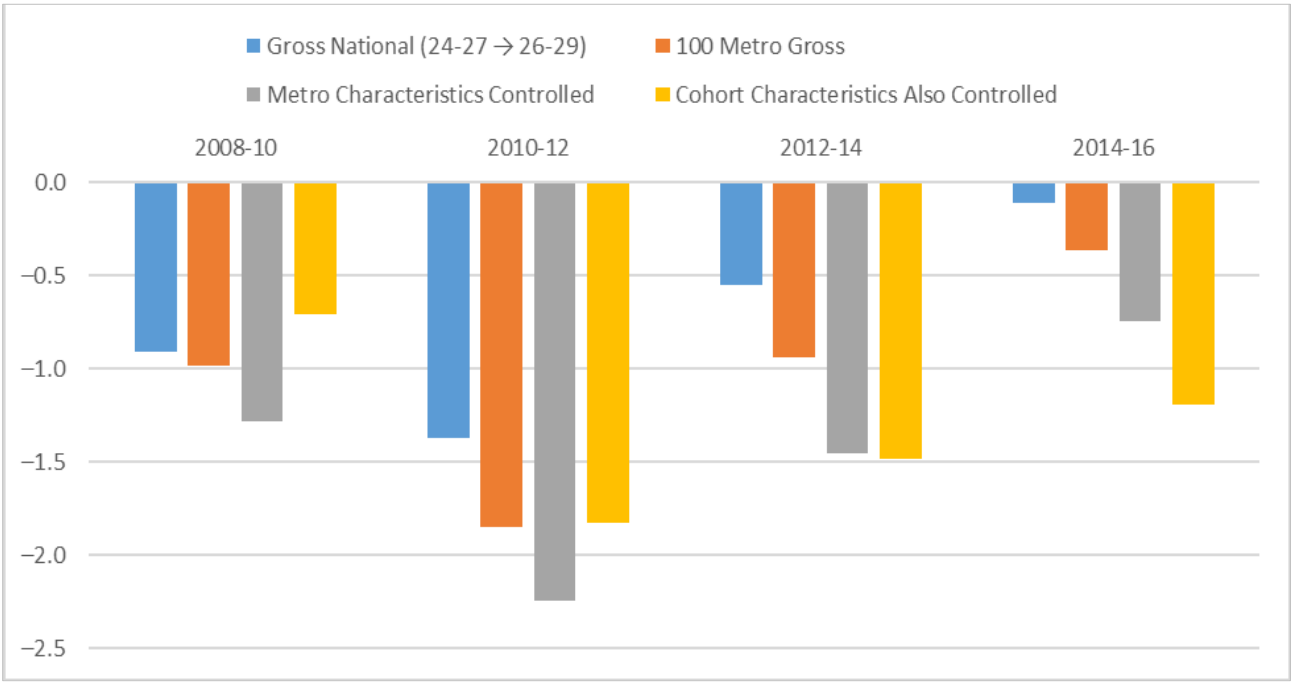
The transition into homeownership in our sample of 100 large metropolitan areas was more severely impacted by the recession than in the nation as a whole, but the time pattern of gross impact is very similar. The deepest reduction was in 2010-12 (an advance into homeownership of 1.8 percentage points less than in 2006-08), and a substantially complete recovery was registered by 2014-16 (0.3 percentage points less than in 2006-08).

Once we adjust for metropolitan characteristics, holding constant employment growth and housing prices, among other things, the temporal pattern of recovery is shifted. The rate of transition into homeownership relative to the 2006-08 baseline is slowed even more severely in 2010-12 (–2.25 percentage points). Even in 2014-16, after substantial economic recovery has been achieved, the rate of transition into homeownership remains 0.75 percentage points below the 2006-08 baseline after controlling for metro characteristics.

When cohort characteristics are added to the models, including income and demographics, the temporal pattern of recovery is further shifted. The effects of those controls are to moderate the degree of downturn in the recession years, with the rate of advance into homeownership falling only by a maximum of –1.8 percentage points in 2010-12 relative to the 2006-08 baseline. However, the same controls also moderate the extent of the recovery. By 2014-16, the pace of transition into homeownership remains 1.2 points below the baseline. The reason that this statistically estimated recovery is so much less than the uncontrolled recovery for our 100 metros is that the substantial upturns in income, education and employment are forced to be constant.

A different way of summarizing these effects is to say that even with all factors held constant, there was a sharp downturn, followed by substantial upswing, in the pace of young adults' transition into homeownership over the last decade. Even after accounting for differences between metropolitan areas and differences between cohort characteristics, the cyclical trend persists.

Figure 4. Homeownership transition rates in recession and recovery: the difference from 2006–08 under alternative estimates, 24 to 27 cohort



Source: American Community Survey, 2008-2016.

RANKING METROS ON THE STRENGTH OF HOMEOWNER TRANSITION IN THE RECOVERY

How do metropolitan areas rank on the pace at which cohorts ascended into homeownership during the recovery? We examine this question for Millennials and also for the youngest members of Gen X, who together accounted for all adults younger than age 40 in 2012. We focus on the 2012-2016 period, when flows into homeownership began to recover for our 100 metropolitan areas (see the gross flows of Figure 4).

Alternative rankings are produced for all adults under age 40, as well as for Millennials and Gen Xers. Some broad commentary is offered about how the pattern of rankings differs by region of the country, size of metro, housing affordability, and other factors. For this analysis, we aggregate the cohorts into broader age groupings for more stable estimation in smaller metros and also to make it easier to comprehend results for 100 individual metros. The first grouping, which corresponds to younger Millennials, is age 20-27 in 2012 and age 24-31 in 2016. The second grouping, which represents the older portion of the Millennial generation, traverses the age range from 28-31 in 2012 to 32-35 in 2016. Finally, the age grouping that is 32-39 in 2012 and 36-43 in 2016 represents the younger half of the Gen Xers.

Ranking the Metros

Each metropolitan area is ranked from 1 to 100 (where 1 is the strongest) on the degree of inflow into homeownership during the 2012-16 recovery period. Rankings are prepared

according to four alternative objectives. The first ranking, "strongest overall," is based on summing the cohort homeownership gains for all the cohorts initially aged between 20 and 39 in 2012. The second ranking is for the strongest gains among Millennials initially in their 20s (20 to 27). A third ranking pertains to the older Millennials, initially aged 28 to 31, while the fourth ranking pertains to younger Gen Xers, initially aged 32 to 39 in 2012. Table 9, arrayed alphabetically, lists each of these rankings for each metro and also reports the underlying estimated flows into homeownership for each cohort. Also reported in the last column is the Housing Opportunity Index (HOI) maintained by the National Association of Home Builders (NAHB). The HOI for a given area is defined as the share of homes sold in that area that would have been affordable to a family earning the local median income, based on standard mortgage underwriting criteria.[16]

[16] The calculation assumes a 10% downpayment and a 28% payment to income ratio, with expenses including mortgage payments plus property taxes and insurance.

Table 9. Cohort Inflows into Homeownership: Metropolitan Areas Ranked by Strongest Gains

		Ranking (1=best)				Percentage Point Increases in Homeownership in Age Span During Recovery Years (2012-16)				
Region	Metro Name	Overall Gains Under	20s Millenn ial	Older Millenn ial	Best Gen X Gains	20-27 -> 24-31 20s Millennials	28-31 -> 32-35 Older Millennials	32-39 -> 36-43 Young Gen X	Total Gains All Ages Under 40	NAHB HOI
Midwest	Akron, OH Metro Area	44	40	24	75	14.5	8.4	2.4	25.3	85.3
Northeast	Albany-Schenectady-Troy, NY Metro	60	75	18	70	10.9	8.9	2.9	22.7	81.3
West	Albuquerque, NM Metro Area	89	37	90	97	14.9	2.9	–2.3	15.5	73.6
Northeast	Allentown-Bethlehem-Easton, PA-NJ	62	35	40	84	15.0	6.6	1.1	22.7	75.9
South	Atlanta-Sandy Springs-Marietta, GA I	57	57	63	43	12.0	4.9	6.0	22.9	72.1
South	Augusta-Richmond County, GA-SC M	50	43	79	35	13.7	3.9	6.8	24.3	
South	Austin-Round Rock-San Marcos, TX M	65	66	93	28	11.3	2.4	8.6	22.3	60
West	Bakersfield-Delano, CA Metro Area	87	79	75	73	10.2	4.1	2.7	17.1	58.6
South	Baltimore-Towson, MD Metro Area	41	71	17	42	11.1	9.0	6.1	26.2	77.6
South	Baton Rouge, LA Metro Area	40	15	81	49	17.2	3.7	5.4	26.4	
South	Birmingham-Hoover, AL Metro Area	81	63	59	79	11.5	5.1	2.1	18.8	92.4
West	Boise City-Nampa, ID Metro Area	2	7	10	13	18.7	10.3	10.2	39.2	65
Northeast	Boston-Cambridge-Quincy, MA-NH M	24	62	11	25	11.6	9.9	8.9	30.3	52
Northeast	Bridgeport-Stamford-Norwalk, CT Me	21	88	13	6	8.9	9.5	12.3	30.7	50.1
Northeast	Buffalo-Niagara Falls, NY Metro Area	14	9	56	15	18.2	5.3	10.0	33.5	84.6
South	Cape Coral-Fort Myers, FL Metro Are	100	82	97	92	9.8	0.5	–0.2	10.1	64.3
South	Charleston-North Charleston-Summe	9	68	1	27	11.3	15.0	8.7	35.0	63.8
South	Charlotte-Gastonia-Rock Hill, NC-SC I	70	19	53	96	16.7	5.4	–2.0	20.2	70.2
South	Chattanooga, TN-GA Metro Area	4	21	26	5	16.6	8.2	12.8	37.5	78
Midwest	Chicago-Joliet-Naperville, IL-IN-WI M	46	53	38	46	12.4	6.8	5.7	24.9	64
Midwest	Cincinnati-Middletown, OH-KY-IN Me	17	12	80	11	17.6	3.8	10.7	32.2	85.4
Midwest	Cleveland-Elyria-Mentor, OH Metro A	3	18	4	23	16.9	12.5	9.0	38.4	83.9
West	Colorado Springs, CO Metro Area	8	3	5	71	19.9	12.4	2.9	35.2	76.1
South	Columbia, SC Metro Area	68	74	34	66	10.9	7.4	3.1	21.4	85.5
Midwest	Columbus, OH Metro Area	64	16	95	67	17.1	2.2	3.0	22.3	74.7
South	Dallas-Fort Worth-Arlington, TX Metr	56	73	49	41	11.0	5.8	6.2	23.0	58
Midwest	Dayton, OH Metro Area	29	54	25	19	12.3	8.2	9.3	29.8	85.5
West	Denver-Aurora-Broomfield, CO Metr	19	31	29	30	15.7	7.9	7.7	31.3	60.4
Midwest	Des Moines-West Des Moines, IA Me	16	89	3	7	8.3	12.7	11.6	32.6	
Midwest	Detroit-Warren-Livonia, MI Metro Ar	12	14	35	18	17.4	7.3	9.4	34.1	78
South	El Paso, TX Metro Area	94	92	83	82	7.5	3.4	1.6	12.5	64.7
West	Fresno, CA Metro Area	53	76	72	22	10.5	4.4	9.1	24.0	48.5
Midwest	Grand Rapids-Wyoming, MI Metro A	6	1	66	16	21.5	4.7	9.8	36.0	84.3
South	Greensboro-High Point, NC Metro Ar	67	30	85	69	15.8	3.3	2.9	22.0	76.6
South	Greenville-Mauldin-Easley, SC Metro	7	13	64	4	17.5	4.9	13.6	36.0	79.1
Northeast	Harrisburg-Carlisle, PA Metro Area	26	61	20	17	11.6	8.8	9.7	30.1	86.4
Northeast	Hartford-West Hartford-East Hartfor	47	26	47	77	16.2	6.1	2.3	24.6	80.5
West	Honolulu, HI Metro Area	99	98	44	93	4.7	6.2	–0.5	10.5	
South	Houston-Sugar Land-Baytown, TX Me	54	55	41	59	12.3	6.5	4.5	23.3	59.6
Midwest	Indianapolis-Carmel, IN Metro Area	69	60	12	95	11.7	9.9	–0.7	20.9	86.4
South	Jackson, MS Metro Area	25	50	86	2	12.7	3.2	14.3	30.2	
South	Jacksonville, FL Metro Area	83	78	100	21	10.3	–0.8	9.1	18.6	74.8
Midwest	Kansas City, MO-KS Metro Area	42	28	58	53	16.0	5.2	4.9	26.1	74
South	Knoxville, TN Metro Area	82	34	96	83	15.1	2.2	1.3	18.6	79.9
South	Lakeland-Winter Haven, FL Metro Ar	85	41	78	90	14.3	3.9	–0.1	18.1	81.7
Northeast	Lancaster, PA Metro Area	23	44	91	3	13.5	2.8	14.1	30.3	84.2
West	Las Vegas-Paradise, NV Metro Area	80	90	55	51	8.3	5.4	5.2	18.9	63.9
South	Little Rock-North Little Rock-Conway	66	72	77	34	11.1	4.0	7.1	22.2	
West	Los Angeles-Long Beach-Santa Ana, C	91	99	69	44	4.5	4.6	5.8	15.0	16
South	Louisville/Jefferson County, KY-IN Me	45	23	21	91	16.4	8.8	–0.2	25.0	81.1
Midwest	Madison, WI Metro Area	1	29	9	1	15.9	11.0	20.4	47.3	75.7
South	McAllen-Edinburg-Mission, TX Metro	61	58	46	58	12.0	6.2	4.6	22.7	58.6
South	Memphis, TN-MS-AR Metro Area	98	39	99	98	14.6	–0.6	–3.2	10.9	73.9
South	Miami-Fort Lauderdale-Pompano Bea	97	94	89	88	7.2	3.0	0.8	11.0	50
Midwest	Milwaukee-Waukesha-West Allis, WI	33	45	14	54	13.4	9.2	4.9	27.5	76.8
Midwest	Minneapolis-St. Paul-Bloomington, M	15	4	37	40	19.8	6.8	6.3	33.0	79.3
West	Modesto, CA Metro Area	52	59	32	56	11.9	7.5	4.6	24.0	49.2
South	Nashville-Davidson--Murfreesboro--I	5	24	15	9	16.3	9.2	11.2	36.7	
Northeast	New Haven-Milford, CT Metro Area	76	67	6	99	11.3	12.1	–3.8	19.5	79.9
South	New Orleans-Metairie-Kenner, LA M	72	48	87	64	13.0	3.1	3.8	19.9	

continued…..

Table 9. Cohort Inflows into Homeownership: Metropolitan Areas Ranked by Strongest Gains (continued)

Northeast	New York-Northern New Jersey-Long	86	96	70	37		6.7	4.5	6.6	17.9	29
South	North Port-Bradenton-Sarasota, FL M	95	70	43	100		11.1	6.3	−4.9	12.5	63.8
West	Ogden-Clearfield, UT Metro Area	28	10	31	57		17.9	7.5	4.6	30.0	81.9
South	Oklahoma City, OK Metro Area	39	36	61	38		14.9	5.0	6.6	26.4	78.6
Midwest	Omaha-Council Bluffs, NE-IA Metro A	10	17	16	26		17.0	9.1	8.8	34.9	
South	Orlando-Kissimmee-Sanford, FL Metr	96	87	84	94		9.5	3.3	−0.5	12.2	68
West	Oxnard-Thousand Oaks-Ventura, CA	93	93	54	86		7.5	5.4	0.9	13.8	30.1
South	Palm Bay-Melbourne-Titusville, FL M	18	22	2	80		16.5	13.4	2.1	32.0	77.4
Northeast	Philadelphia-Camden-Wilmington, PA	58	47	22	87		13.2	8.7	0.9	22.8	72
West	Phoenix-Mesa-Glendale, AZ Metro Ar	59	77	39	45		10.3	6.7	5.8	22.8	67.9
Northeast	Pittsburgh, PA Metro Area	22	5	57	39		19.0	5.2	6.5	30.7	82.7
West	Portland-Vancouver-Hillsboro, OR-W	32	42	48	31		14.2	6.0	7.5	27.7	79.1
Northeast	Poughkeepsie-Newburgh-Middletow	92	84	82	89		9.8	3.4	0.6	13.9	79.2
Northeast	Providence-New Bedford-Fall River, I	84	46	76	85		13.3	4.0	0.9	18.3	72.5
West	Provo-Orem, UT Metro Area	55	2	98	78		20.8	0.1	2.1	23.1	65.3
South	Raleigh-Cary, NC Metro Area	74	49	71	76		12.9	4.4	2.4	19.7	71.4
South	Richmond, VA Metro Area	48	56	52	36		12.1	5.6	6.7	24.4	76.9
West	Riverside-San Bernardino-Ontario, CA	78	81	60	62		10.0	5.1	4.0	19.1	43.6
Northeast	Rochester, NY Metro Area	27	32	36	32		15.6	7.0	7.3	30.0	83.9
West	Sacramento--Arden-Arcade--Rosevill	71	80	73	47		10.2	4.2	5.6	20.1	47.2
Midwest	St. Louis, MO-IL Metro Area	31	8	51	61		18.3	5.6	4.1	28.1	84.1
West	Salt Lake City, UT Metro Area	43	27	74	48		16.0	4.2	5.5	25.7	69.3
South	San Antonio-New Braunfels, TX Metr	90	86	94	65		9.8	2.3	3.2	15.2	62.7
West	San Diego-Carlsbad-San Marcos, CA M	88	95	67	52		6.8	4.7	5.1	16.6	23.7
West	San Francisco-Oakland-Fremont, CA	75	91	68	33		7.8	4.6	7.2	19.6	22
West	San Jose-Sunnyvale-Santa Clara, CA M	79	97	27	55		6.4	8.0	4.7	19.1	20.4
Northeast	Scranton--Wilkes-Barre, PA Metro Ar	37	85	45	12		9.8	6.2	10.5	26.5	87.1
West	Seattle-Tacoma-Bellevue, WA Metro	35	69	50	14		11.2	5.8	10.1	27.1	54
Northeast	Springfield, MA Metro Area	34	52	7	74		12.5	12.1	2.6	27.1	79.9
Midwest	Stockton, CA Metro Area	77	100	42	20		3.6	6.4	9.2	19.2	44.1
Northeast	Syracuse, NY Metro Area	20	25	8	68		16.3	11.7	2.9	31.0	91.1
South	Tampa-St. Petersburg-Clearwater, FL	73	83	65	50		9.8	4.8	5.2	19.8	73.5
Midwest	Toledo, OH Metro Area	36	20	23	81		16.6	8.6	1.8	27.0	85.9
West	Tucson, AZ Metro Area	63	65	88	29		11.3	3.1	8.0	22.4	76.3
South	Tulsa, OK Metro Area	38	6	62	72		18.7	5.0	2.8	26.4	77.6
South	Virginia Beach-Norfolk-Newport New	51	11	92	63		17.7	2.6	4.0	24.3	78.1
South	Washington-Arlington-Alexandria, DC	49	51	33	60		12.5	7.4	4.4	24.4	68
Midwest	Wichita, KS Metro Area	11	33	28	8		15.6	7.9	11.2	34.8	82.5
Northeast	Worcester, MA Metro Area	13	38	30	10		14.7	7.8	11.1	33.6	80
Midwest	Youngstown-Warren-Boardman, OH-	30	64	19	24		11.4	8.8	8.9	29.1	88.9

Source: American Community Survey, 2012-2016.

Linkage to Housing Affordability

Among the observations that stand out, not surprisingly, is that areas with more affordable housing, as measured by the HOI, generally have stronger inflows into homeownership. The correlation between the HOI and homeownership rate gains summed for all cohorts younger than 40 at the beginning of the period is 0.41. However, the correlation with the HOI differs sharply by the age range of the cohorts involved. Among the Gen Xers in their late 30s, the cohort homeownership gains are not correlated at all with the HOI (r=0.01). Among the older Millennials (late 20s and early 30s), the correlation is also very slight (r=0.17). However, among the Millennials in their 20s, the HOI is strongly correlated (0.64) with their rate of inflow into homeownership in a metro. Thus the local price of housing and prevailing incomes strongly shape the launch of young people's housing careers. This finding is also supported by the results in Table 7, the regressions stratified by age group that do not include cohort characteristics such as income, marriage and children present. Coefficients on the ratio of price to young adult incomes in the metro area were strongest for those under age 28. When cohort characteristics were added in Table 8, the price-income ratio remained strongly significant for these age groups.

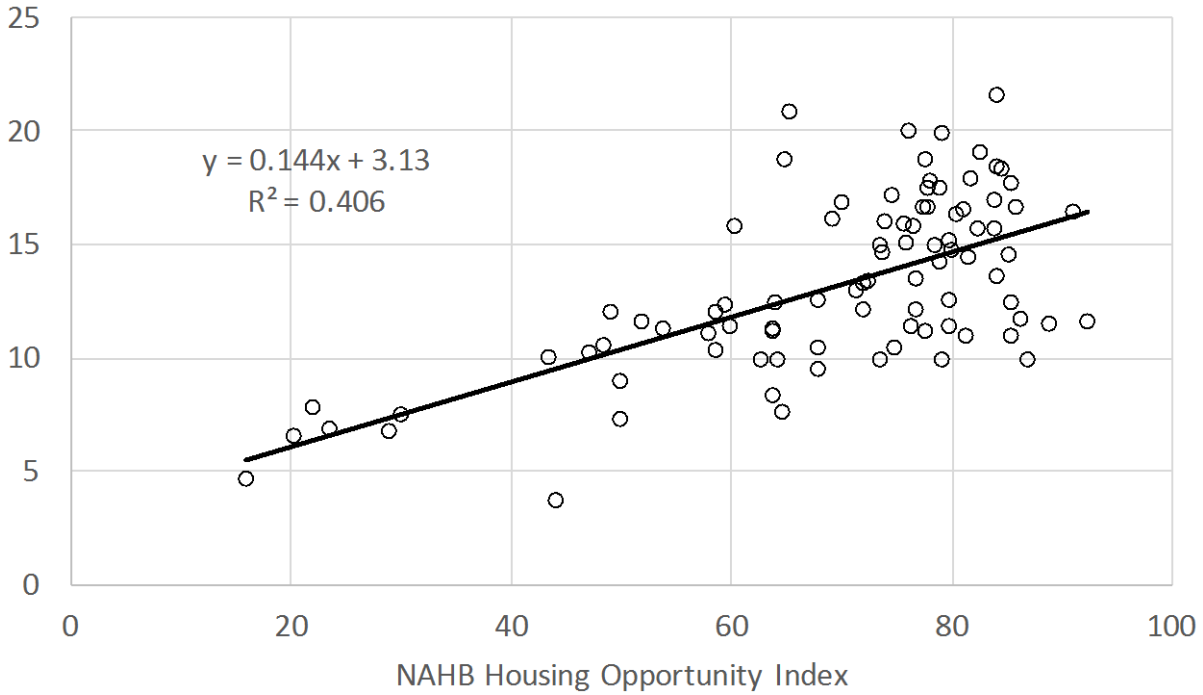
Figure 5 presents the distribution of younger Millennial homeownership inflow rates by the degree of housing affordability (higher HOI is better) for all 100 metropolitan areas. The California metros are clustered at the far left, with one low outlier (HOI of 44 but inflow of 4) that is Stockton, an exurban residential destination inland from the much more expensive San Francisco-Oakland Bay Area.

The smaller metros in our top 100 offer generally stronger opportunities for homeownership due to their lower cost of housing relative to average incomes in their area. Discussion below will focus, however, only on distinctions among the larger metros.

The larger metros tend to have higher housing costs and also attract upwardly mobile careerists, many of whom might not be interested in home buying in their 20s. The Los Angeles and New York metros are near last in the rate of inflow to homeownership among Millennials in their 20s, 99th and 96th, respectively. The California metros are special cases of exceptionally high housing costs, with LA's extremely low HOI of 16 and San Francisco's HOI of 22. (This compares to an average index score of 70 for the top 100 metros that have reported scores.) In fact, all of the coastal metros in California rate very poorly on affordability.

Figure 5. Millennial Inflow into Homeownership, 2012 to 2016

Cohort net change in homeownership rate: 2012-2016 (percentage points)



Source: U.S. Census Bureau, American Community Survey, 2012-2016; National Association of Home Builders, Housing Opportunity Index.

The opposite situation is found in the large Midwestern metros. Among the 20 metros with the strongest inflows into homeownership among Millennials in their 20s are Cleveland, Detroit, St. Louis, Cincinnati and Minneapolis, all with very favorable HOI scores between 78 and

85. Chicago was more average, only ranking 53rd in Millennial homeownership gains and with an HOI somewhat less favorable than the others, 64. Similarly, in the Northeast, some of the larger non-coastal metros offered strong opportunities for Millennial homeownership, including Pittsburgh (5th), Buffalo (9th), and Syracuse (25th). Their HOIs range from 83 to 91.

In contrast, the booming large sunbelt metros of Dallas-Ft. Worth, Houston, Austin and Atlanta afforded much less opportunity for homeownership by younger Millennials. Their inflows ranked between 55th and 73rd. Housing affordability was only slightly below average in the Texas cities (HOIs between 58 and 60), and Atlanta was just above average (72). The worst of the sunbelt areas were the Florida metros, whose Millennial homeownership gains were ranked very low, including Miami (94th), Orlando (87th), Tampa (83rd) and Jacksonville (78th). Housing affordability does not seem to be the explanation for sub-par Millennial homeownership gains in the Florida metros. Only Miami had below average affordability (50) and the others ranged from 68 to 78. Something else must be discouraging home buying in Florida, such as a greater than average hangover from the deep housing crash in that state. Similar patterns of slow Millennial homeownership gains, but reasonable HOI scores, were found in Phoenix and Las Vegas, two regions that were also hard-hit by the housing bust.

Finally, we observe an emerging pattern underway in the high-tech, information-based, "creative-class" cities of Boston and Seattle. Although these metros are often cited for high housing prices, their HOI scores are only somewhat below average, 52 and 54, because of the compensating high incomes earned in those regions. The inflows of younger Millennials into homeownership are fairly low in these metros, which are ranked only 62th and 69th, respectively. However, among the Gen Xers who are in their late 30s, the inflow ranking improves substantially to 25th and 14th. This is consistent with a lifestyle of delayed family formation while advanced educations are pursued and careers are built. Homeownership is only secured later. As the nation's economy continues to evolve, more metros might begin to follow the Boston and Seattle model of delayed homeownership attainment.

CONCLUSIONS

This study has highlighted key dimensions of Millennials' participation in the evolving housing recovery from the deepest recession in more than 70 years. An encouraging finding is that young adults' participation in the housing recovery is substantially stronger than generally assumed by housing analysts. Reliance on a traditional age-group analysis of homeownership rates has disguised evidence of rebounding homeownership, leading some to draw misguided conclusions about continued preferences for homeownership.

Evidence at the national level makes clear that the declining or flat homeownership rates at each age are not reflecting the reality of rising inflows into homeownership. The findings from analyzing cohort transitions into homeownership clearly deviate from the understated implications of age group analysis, as reported in prior studies (Simmons 2016, Simmons and Myers 2017). In this report, we have shown that the findings from the cohort method provide

early evidence of a turning point in young-adult homeownership demand and demonstrated that these findings are more consistent with the upturn in home sales than those from traditional age group analysis.

This report also showed how traditional age group analysis can substantially lag behind current trends because if measures the cumulative homeownership rate as of a given age. For example, we showed how the homeownership rate of 28-29 year olds today is built from accruals of homeownership, not only in the last few years of recovery, but also from housing choices extending back into the depths of the Great Recession. In contrast, the cohort transition method, when applied using the very large annual sample of the American Community Survey, can be used to highlight only the most recent accruals of homeownership preceding each reference date, thereby allowing us to distinguish the pace of homeownership attainment during the recovery from that during the downturn.

How widespread is the homeownership recovery across the nation's metropolitan areas, and what factors help explain larger increases in some places than others? Models of the pace of recovery in the 100 largest metropolitan areas show how widespread is the upturn in the net inflow into homeownership for young adults. The launch of young people into adulthood and the labor market creates an underlying trajectory of household formation and the beginnings of homeownership attainment. This common factor is a relentless force in every metropolitan area, with its strongest impacts in the mid-20s and lesser influence by the mid-30s. The share of the young population at each age that has advanced into homeownership is accelerated when a larger share has become married and also when children are added to the household. Rising incomes are important for translating this burgeoning demographic pressure into effective home buying.

Only a few metropolitan factors alter this underlying, common trajectory of transition into homeownership, with home purchase affordability being a clear standout among local market characteristics. Metros with greater home purchase affordability boost the Millennial inflow into homeownership, although this is most true for cohorts younger than 28.

When we ranked the metros by the size of their cohort inflows into homeownership, we found that affordability was a key factor for the Millennials younger than age 28, but not for older cohorts. The coastal metros generally offered the least opportunity for homeownership gains, especially the California metros and New York. In contrast the highest ranked metros included most of the larger metros in the Midwest (and to a lesser degree, Chicago), as well as a few non-coastal metros in the northeast (Buffalo and Pittsburgh). What might be surprising is that rapidly growing Sunbelt cities, particularly Atlanta and those in Texas, showed only average rates of advance into homeownership. Especially slow inflows into homeownership were found in all of the Florida cities. Cohort inflows in Phoenix and Las Vegas also were very stunted, like Florida, suggesting that the aftermath of the financial crisis could be still hampering current inflows in all those metros.

In sum, this study has demonstrated the analytic value of adopting a cohort transition approach to understanding the current homeownership behavior of young adults. We have explicitly analyzed the inflows into homeownership, but this research deserves to be extended to examine net inflows to major types of rental housing as well.

Finally, this report has implications for housing and mortgage markets. More starter home construction might be needed in housing markets with more rapid home buying activity by Millennials, or where affordability pressures have suppressed advances into homeownership. The recent, tentative signs of declining new home size point to a supply-side response that is already under way as a result of the changing demand dynamics. Home builders and lenders might begin to build even greater confidence in the need for their efforts to expand purchase opportunities for young adults when they absorb the new statistical lessons this report provides for a more bullish outlook on Millennial home buying.

REFERENCES

Campbell, Burnham O. 1966. *Population Change and Building Cycles*. Urbana, IL: Bureau of Economic and Business Research, University of Illinois.

Haurin, Donald R., and Stuart S. Rosenthal. 2007. "The Influence of Household Formation on Homeownership Rates Across Time and Race." *Real Estate Economics*, 35(4), 411–450.

Lee, Kwan Ok, and Gary Painter. 2013. "What Happens to Household Formation in a Recession?" *Journal of Urban Economics*, 76, 93–109.

Myers, Dowell, 1999. "Cohort Longitudinal Estimation of Housing Careers," *Housing Studies* 14 (4): 473-90.

Myers, Dowell and Hyojung Lee. 2016. "Cohort Momentum and Future Homeownership: The Outlook to 2050", *Cityscape: A Journal of Policy Development and Research* (18, 1): 131-143.

Myers, Dowell, Gary Painter, Julie Zissimopoulos, Hyojung Lee, and Johanna Thunell. 2017. "Simulation of Young Adult Homeownership Change through 2035: Effects of Growing Diversity and Rising Educational Attainment." *Fannie Mae Working Paper*, June 20.

Pitkin, John and George S. Masnick. 1980. "Projections of Housing in the U.S., 1980 to 2000, by a Cohort Method," Annual Housing Survey Studies No. 9, U.S. Department of Housing and Urban Development, and

Pitkin, John and Dowell Myers. 1994. "The Specification of Demographic Effects on Housing Demand: Avoiding the Age-Cohort Fallacy," *Journal of Housing Economics* (3, 4): 240-250.

Simmons, Patrick, 2016. "Millennials Have Begun to Play Homeownership Catch-Up," *Fannie Mae Housing Insights*, August 10.

Simmons, Patrick and Dowell Myers, 2017. "The Awakening of Millennial Homeownership Demand." *Fannie Mae Perspectives*, Nov. 29.

Yu, Zhou and Dowell Myers, 2010. "Misleading Comparisons of Homeownership Rates When the Variable Effect of Household Formation is Omitted," *Urban Studies* 47 (November): 2615-2640.