Waking Up from the American Dream: On the Experience of Young Americans During the Housing Boom of the 2000s*

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Abstract

We exploit regional variations in house price fluctuations in the United States during the early to mid-2000s to study the impact of the housing boom on young Americans' choices related to home ownership, household formation, and fertility. We also introduce a novel instrument for changes in house prices based on the predetermined industrial structure of the local economy. We find that in MSAs which experienced large increase in house prices between 2001 and 2006, the youngest households were substantially less likely to purchase residential property, to start a family, and to have a child, both in 2006 and in 2011.

JEL classification: E32, G21, J10, R21.

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"The aspiration [that each family may pass their days in the home which they own] penetrates the heart of our national well-being. It makes for happier married life, it makes for better children, it makes for confidence and security, it makes for courage to meet the battle of life, it makes for better citizenship."

Herbert Hoover, 1931

1 Introduction

The idea that home ownership is the fulfillment of the American Dream, and that the lasting value of family life is the exclusive privilege of the home owner, has a long tradition in U.S. political discourse, culminating with President George W. Bush's push for an "Ownership Society" during the 2000s.[1] Hardly any other social objective has so consistently been held under the aegis of public policy. Collins (2002) lists 19 home ownership promotion programs enacted during the post-Depression years, with ten of those still in place in 2002. Various authors have argued that such policies – coupled with low interest rates and with a decline in mortgage lending standards – may be among the root causes of the unprecedented housing boom that took place in the United States during the late 1990s and early-to-mid 2000s.[2]

We argue that while the objective of public policy is to promote home ownership, episodes of rapid increases in house prices that sometimes occur can have the exact opposite effect on young individuals who are the marginal first-time buyers. The life cycle of the demand for housing is well-understood: individuals tend to rent while young, then purchase a starter home when they get a job and start a family, and finally upgrade to a larger, trade-up home when the number and age of children increases. With a concave age-earnings profile, implying that earnings potential grows with

[1] Halfway through his first term, President Bush famously set a target of 5.5 million more homeowners that the U.S. government wanted by 2010 (Speech to HUD Employees on National Homeownership Month, June 18, 2002).

[2] See, e.g., Bhutta (2011, 2012) and Moulton (2014). In 2011, the authors of the "Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States" argued that "[T]he sine qua non of the financial crisis was U.S. government housing policy, which led to the creation of 27 million subprime and other risky loans – half of all mortgages in the United States – which were ready to default as soon as the massive 1997–2007 housing bubble began to deflate. If the U.S. government had not chosen this policy path – fostering the growth of a bubble of unprecedented size and an equally unprecedented number of weak and high risk residential mortgages – the great financial crisis of 2008 would never have occurred."

age (e.g., Ben-Porath, 1967; Heckman, 1976), the life cycle of home ownership can be distorted by capital market imperfections which restrict the ability of young households to borrow. Even in the deepest and most liquid mortgage markets, a substantial down-payment up front is required which limits the ability of some households to purchase a home. This has important implications for the effect of income shocks on housing market fluctuations (Muellbauer and Murphy, 1997; Lamont and Stein, 1999; Malpezzi, 1999; Ortalo-Magne and Rady, 1999). Overall, rapid swings in house prices can have two separate negative effects on young households. First, rising house prices tighten credit constraints, which could price the marginal first-time buyers out of the market. Second, by erasing home equity gains, a housing bust can result in a substantial increase in debt overhang for those young households who purchased a (first) home at the height of the boom in order to live the American Dream.

In this paper, we study the economic and social consequences of the recent U.S. housing boom and bust for the cohort of young Americans. We exploit the enormous spatial heterogeneity in housing price growth during the housing boom. While nationally real home prices rose by more than 50% between 2001 and 2006 (Shiller, 2007), there were large regional variations: for example, over the same period house prices only increased by 8% in Kokomo, IN, but almost doubled in Miami-Hialeah, FL. We first look at how past changes in local house prices (or more precisely, house prices growing faster than income) affect the propensity of young households to purchase a home. Rising house prices tighten credit constraints for first-time buyers by increasing the amount of the down-payment, which is usually a fixed percentage of the value of the home. This should make it more difficult for younger households to buy residential property. For comparison, the overall effect for older households that are existing home owners is ambiguous: on the one hand, rising house prices increase home owners' housing wealth, making it easier for them to pay off their existing mortgage and move up the property ladder, but on the other hand, rising house prices also raise the size of the required down-payment on a trade-up home. We next examine the economic and social consequences of home ownership in the presence of credit constraints. Specifically, we study the effect of past changes in house prices on the housing debt, home size, and fertility and marital choices, both in the short-run and during the subsequent housing bust.

Our main findings are as follows. First, in 2006 younger individuals were considerably less likely to purchase a home in MSAs where house prices increased substantially between 2001 and 2006. Moreover, we find that in such MSAs, younger individuals were still relatively more constrained in their ability to enter the housing market in 2011, at the through of the housing boom-bust cycle. Second, we find that younger individuals who did buy a home in MSAs with an above-average house price increase between 2001 and 2006 accumulated substantially higher housing debt per unit of housing, relative to young first-time buyers in MSAs with a below-average house price increase. When we compare these effects to the experience of households at later stages of the life cycle, we find that older home buyers were more likely to purchase a home, and this home was likely to be larger (in terms of number of bedrooms), in MSAs where house prices increased substantially between 2001 and 2006. This suggests that the increase in home equity driven by the increase in house prices relaxed credit constraints for individuals who were already home owners when the housing boom started and allowed them to move more easily up the property ladder. Third, we detect a complementarity between home ownership, on the one hand, and household formation and fertility decisions, on the other hand. In particular, both in 2006 and in 2011, young households in general were considerably less likely be married and to have a child in MSAs where house prices increase substantially between 2001 and 2006. Our results thus imply that a housing boom can impose not just an economic cost on young families by shutting them out of the housing market, but a social cost, too, by distorting the natural demographic dynamics.

There are non-trivial endogeneity concerns related to the differential impact of credit constraints induced by rising house prices on home ownership across age groups. For example, the areas with the highest increase in house prices tend to also be the ones where the supply of housing is most inelastic, such as coastal cities, and so the housing supply adjusts on the price margin in response to a U.S.-wide shock to housing demand. Because new housing units are difficult to build, individuals in these areas will be less likely to purchase a home than similar individuals in areas with elastic housing supply. This effect will be stronger for younger households who are the marginal first-time buyers. Additionally, individuals in such areas may be different from the rest in ways that matter for the demand for housing. For example, if such areas also have booming economies, then the

opportunity cost of having children for young individuals residing in those areas will be higher, weakening their incentives to buy a home. While we control for current and expected income, as well as for a wide range of demographic characteristics, such as gender, education, race, and marital status that may influence the demand for housing, controling even for the most exhaustive set of demographic and income variables cannot fully rule out concerns related to omitted variable bias.

In order to deal with this issue, we employ a novel instrument, namely, the local industrial structure, to extract the exogenous component of changes in credit constraints following house price movements. In particular, we argue that the MSA's share of the working population employed in manufacturing at the start of the period is a good predictor of subsequent MSA-level changes in house prices. Between 1999 and 2007, the U.S. economy lost 4 million manufacturing jobs (Charles, Hurst, and Notowingo, 2013), an unprecedented decline in manufacturing driven by a rise of low-wage manufacturing in emerging markets (mostly in China). We argue that the U.S.-wide increase in the demand for housing, which coincided with the manufacturing decline, was likely to result in a higher increase in local house prices in MSAs where a smaller share of the working population was employed in manufacturing in the early stages of the boom, i.e., where a smaller share of the workforce was at the risk of becoming unemployed due to the decline in manufacturing. We use this instrument together with the other instrument that is common in the literature, the MSA's topological elasticity of housing supply from Saiz (2010). The later is based on the idea that an increase in the economy-wide demand for housing will increase house prices, and this effect should be stronger in MSAs with less elastic housing supply where the adjustment in response to aggregate demand shocks takes place on the price margin. Each of these instruments explains about one-third of the variation in MSA-level house price changes between 2001 and 2006, and that the two instruments together explain 51% of this variation. Crucially, our main results continue to obtain when we employ this alternative empirical specification.

Our results are consistent with theoretical mechanisms highlighting the role credit market imperfections play in housing market dynamics. An early example of this line of research is Stein (1995) who demonstrates how extreme credit distress, captured by very high housing debt, can result in lower house prices and fewer transactions because negative equity prevents some house-

holds from moving. With many households burdened by too much debt to meet the down-payment requirement on their current homes, equilibrium house prices and the number of transactions in housing markets are low. Our results have their closest theoretical counterpart in the model in Ortalo-Magne and Rady (2006) who link the credit constraints faced by first-time buyers to housing price dynamics. Their model argues that by affecting the ability of potential first-time buyers to enter the housing market, credit constraints can have a strong effect on housing market dynamics. In particular, the down-payment constraint can affect the transmission of income shocks to housing transaction. Our main results provide evidence on the link between credit constraints and the propensity of first-time buyers to purchase residential property, and we also detect in the data a pattern whereby a rise in existing home owners' housing wealth can affect their propensity to move up the property ladder.

Our work complements and expands along a number of dimensions existing empirical studies on the economic and social effects of fluctuations in housing markets. One strand of this literature has linked the U.S. housing boom of the late 1990s and early-to-mid 2000s to household portfolio and labor choices and to changes in the U.S. industrial structure. Mian and Sufi (2011) provide evidence on how home equity-based borrowing during the U.S. housing boom of the 1990s and 2000s was responsible for the large observed increase in housing debt among U.S. households. Chetty and Szeidl (2012) show that increases in home equity wealth tend to raise share holdings by U.S. households. Charles, Hurst, and Notowidigdo (2013) show that the housing boom allowed for a reallocation of unskilled workers from manufacturing to construction sectors, masking the overall unemployment effect of the U.S. manufacturing decline. Corradin and Popov (2015) show that the rise in home owners' home equity brought about by the housing boom increased the rate of creation of business start-ups. We extend this literature by demonstrating the effect of changes in credit constraints driven by increases in house prices on home ownership choices. We furthermore show how this effect varies over the life cycle. Another strand of the literature has studied the effect of home ownership and house prices on social phenomena such as fertility choices and martial stability (Farnham, Schmidt, and Sevak, 2011; Lovenheim and Mumford, 2013; Detling and Kearney, 2014; Milosch, 2014). Relative to these papers, we show how fertility choices vary with credit constraints

over the life cycle. Our results also relate to the literature on the economic effects of changes in lending standards. This literature has generally found that the substantial rise in mortgage lending which fuelled the housing boom was preceded by a large decline in lending standards and by a dramatic increase in securitization (e.g., Mian and Sufi, 2009; Demyanyk and Van Hemert, 2011; Dell'Ariccia, Igan, and Laeven, 2012), although there is little evidence that individual financiers were aware of the macroeconomic consequences of their actions (Cheng, Raina, and Xiong, 2014). More generally, our results on young households ending up with more mortgage debt in boom areas speak to the literature on the role of overoptimism in (housing market) boom-bust cycles (see e.g. Burnside, Eichenbaum, and Rebelo, 2011; Barron and Xiong, 2013). Finally, by incorporating home ownership in the analysis, we contribute to the recent literature that has attempted to link demography to business cycle fluctuations and wealth inequality (Jaimovic and Siu, 2009; Beaudry, Green, and Sand, 2014; Liang, Wang, and Lazear, 2014; Wolff, 2014).

The rest of the paper is organized as follows. Section 2 describes the data and some stylized facts. Section 3 introduces the empirical strategy. Section 4 describes the main results. Section 5 discusses some extensions. Section 6 concludes.

2 Data

The main part of the empirical analysis spans uses individual-level data for 2006, which co-incides with the peak of the U.S. housing boom of the late 1990s and early to mid-2000s. In addition, we use data on 2011, which co-incides with the trough of the housing boom-bust cycle. We use data from the American Community Survey (ACS) individual-level and household-level extracts from the Integrated Public Use Microsamples (IPUMS) database (Ruggles et al., 2004). We restrict our attention to households residing in MSAs which can also be uniquely matched to MSA-level data on house prices. This yields a total of 3,109,818 households in 254 MSAs.[3]

In terms of individual housing choices, we use the question on whether the household bought

[3] We considered using alternative sources of household surveys with information on household finances and expenditures, including the Amercian Housing Survey (AHS), the Survey of Income and Program Participation (SIPP), and the Panel Study of Income Dynamics (PSID) database, but these all have drawbacks compared to the ACS. The AHS covers too few MSAs (only 47), the SIPP data does not cover the post-boom period (no data for the year 2011), and the PSID covers too few households (only 6,000).

residential property in the previous year. We also use the provided information on the value of the purchased home, on the size of the monthly mortgage payment, and on the number of rooms and bedrooms in the newly acquired housing unit.[4] In terms of demographics, we use data on age, gender, marital status, education, and race. We also use data on whether the household had a child in the past year. The latter is only available during the bust phase of the housing market. In terms of financials, we use data on the household's total labor income, employment status, and sector of employment. These variables have been shown in previous studies to matter for home ownership choices in the US.[5] Regarding employment, we focus on whether the household head is employed as real estate agent or mortgage broker. Such professional occupation signals both inside knowledge of the housing market and high expected wealth in booming areas. Moreover, owning a home may be a viewed as a must for such individuals to signal success to prospective clients. Finally, we drop 881 households that reported negative monthly labor income.

We compute local house prices using data from the Federal Housing Finance Agency (FHFA), which is a repeat-sales housing price index with data for most metropolitan areas.[6] We map the FHFA metro areas to the Census/ACS metro areas by hand. To mirror the Census and the ACS data, we construct house price growth as the change in MSA-level house prices between 2001 and the average of house price in the first quarter in 2006.

Turning to our instruments, we use the IPUMS to calculate the share of the workforce employed in manufacturing in 2001. We take the sample of households who reported their industry of employment, and we calculate the proportion of those who reported their industry of employment to be between 1997 NAICS codes 3111 and 3399, which span the universe of manufacturing industries. Next, in order to compute estimates of elasticity-adjusted changes in house prices, we use information on housing supply elasticities from the extant literature. The MSA specific housing supply elasticity measures are from Saiz (2010), who constructs them using detailed information on the topography of the MSA. The MSA-level topological elasticity of the housing supply has emerged as the instrument of choice when extracting the exogenous component of house price increases, for

[4] We are naturally limited here by the information contained in the ACS survey. For example, there is no information on the amount of mortgage debt but there is information on the monthly mortgage payment.

[5] See, for example, Gyourko and Linneman (1996) and Gyourko, Linneman, and Wachter (1999).

[6] We compute house prices at the MSA level because our instruments for house prices are at the MSA level.

two reasons. First, being computed at the MSA level, this variable exhibits substantial variation. Second, it is conceptually appealing to argue that the effect an increase in the economy-wide demand for housing has on house prices is stronger in MSAs with less elastic housing supply where the adjustment in response to aggregate demand shocks takes place on the price margin.

Table 1 reports summary statistics of housing choices, demographics, fertility choices, financials, and MSA-wide changes in house prices. It also summarizes data on the beginning-of-period share of the workforce employed in manufacturing and on the topological elasticity of housing supply, both of which we later use as instruments for changes in house prices. Data are for the 254 MSAs with non-missing data on individual characteristics, house prices, industrial occupations, and topological elasticities. It shows that on average, over the period 2001-2006, house prices in our sample of MSAs increased by 50%, which is consistent with the US-wide developments reported in Shiller (2007). In addition to that, there are vast regional variations: for example, over the same period house prices only increased by 8% in Kokomo, IN, but almost doubled in Miami-Hialeah, FL. However, the overall increase is not driven by a few outlier MSAs: In 121 MSAs, house prices increased by more than 50% between 2001 and 2006, and in 40 MSAs they increased by more than 75%. Moreover the increases in house prices tended to significantly outpace increases in income: MSA-level average income growth (defined as the change in average household income at the MSA level between 2001 and 2006, from the IPUMS) averaged only 21% over the same period.

About 5% of the households in the sample purchased a home in 2006. The average new home in the sample had 6 rooms and 3 bedrooms and cost $310,000. The distribution of residential home prices is very skewed, however, with median price at $220,000. New home owners on average paid $735 in mortgage payments monthly, which constitutes about 11% of disposable income. The table also reports that the average interviewee in the sample is female, married, white, and has at most a high school degree. Only 2% of the population is employed as real estate agents and mortgage brokers, and 4% of household heads are on average unemployed.

Turning to our two instrumental variables, we find that on average 10% of the workforce is employed in manufacturing over the sample period. Once again, there are large regional differences: only 2% of the workforce is employed in the manufacturing industry in Anchorage, AK, while 35%

is in Elkhart-Goshen, IN. The topological elasticity of the housing supply varies enormously across geographical regions, too, with a value of 0.6 in Miami-Hialeah, FL (very inelastic housing supply) and a value of 12.15 in Pine Bluff, AR (very elastic supply).

3 Empirical model

Our goal is to explore how changes in credit constraints affect the probability of purchasing a home for young individuals, the majority of whom do not already own residential property, relative to older individuals who are substantially more likely to already be home owners. The main source of credit constraints in the housing market is the amount of cash the household needs to pay up-front (the down-payment) to obtain a mortgage loan. We use changes in house prices in the past 5 years to proxy for changes in the size of the down-payment.[7] An increase in house prices, holding the loan-to-value ratio and income constant, will increase the down-payment, raising credit constraints for all potential home buyers. At the same time, an increase in house prices raises housing wealth for existing home owners. Therefore, we expect changes in house prices to affect differentially households in earlier and in later stages of the life-cycle, depending on their age.

We model the probability of household i in MSA m purchasing a home in 2006 as follows:

$$\begin{aligned} Home\ purchase_{im} = & \sum_{j=1}^{4} \beta_{1j} Age_{imj} + \sum_{j=1}^{4} \beta_{2j} Age_{imj} \times \Delta Home\ prices_{m}^{2001-2006} \\ & + \beta_3 X_{im} + \beta_4 \Psi_m + \varepsilon_{im} \end{aligned} \tag{1}$$

where $Age_{im1} = 1$ if the head of household i in MSA m is between 18 and 35 years old, $Age_{im2} = 1$ if the head of household i in MSA m is between 36 and 45 years old, $Age_{im3} = 1$ if the head of household i in MSA m is between 46 and 55 years old, and $Age_{im4} = 1$ if the head of household i in MSA m is between 56 and 65 years old. We use individuals older than 65 years as the control group. $\Delta Home\ prices_{m}^{2001-2006}$ denotes the change in average MSA-level house prices

[7] The assumption here is that the down-payment percentage does not vary with the mortgage amount. The ACS survey does not provide information on the down-payment or mortgage amount. However, Mian and Sufi (2009) provide evidence that lending standard declined more in MSAs that experienced a larger increase in house prices, a mechanism which makes it more difficult for us to detect a pattern going from an increase in house prices to a decline in home ownership through the channel of credit constraints.

between 2001 and 2006, for each individual MSA m. We focus on this period because it captures the sharpest and largest increase in house prices during the most recent U.S. housing boom (see Shiller, 2007). X_{im} is a vector of individual control variables; Ψ_m is a matrix of MSA-level fixed effects; and ε_{im} is an idiosyncratic error term. We do not include $\Delta Home\ prices_m^{2001-2006}$ on its own in the regression because its effect on the probability of household i in MSA m purchasing a home in 2006 is subsumed in Ψ_m. However, we do report regressions without MSA fixed effects which include $\Delta Home\ prices_m^{2001-2006}$.

A negative coefficient β_{1j} implies that individuals in age category j are systematically less likely to purchase a home, relative to the control group of individuals older than 65 years. Our main coefficient of interest is β_{21}. A negative coefficient β_{21} implies that households in age category 18-35 are systematically less likely to purchase a home if they reside in an MSA that experienced a larger increase in house prices between 2001 and 2006. To the degree that rising house prices capture a tightening of credit constraints because the size of the down-payment required goes up, a negative coefficient β_{21} implies that credit constraints have a negative effect on the probability to acquire a home for age category for the youngest American households. Because these households are the ones that are the most likely to not own a home yet, a negative coefficient β_{21} suggests that by tightening credit constraints for non-home owners, housing booms tend to shut them out of the housing market, distorting the life cycle of home ownership.

The propensity for home ownership is of course affected by a number of other factors besides credit constraints and age. Therefore, we make sure that we include an exhaustive set of personal characteristics in the vector X_{im}. In particular, X_{im} includes proxies for gender, marital status, education, and race. We also include proxies for both current and expected income, such as labor income, employment status, and whether the person works in real estate. In this way, our results are not contaminated by the fact that married individuals and individuals with high expected non-housing wealth are more likely to purchase a home. Finally, we also include MSA fixed effects. This enables us to control for systematic differences across geographic regions related to tastes for home ownership vs. renting, or to local changes in house prices.

While a negative coefficient β_{21} is consistent with the idea that credit constraints negatively

affect the ability of young renters to purchase a home, it could also be driven by other forces. For example, the areas with the highest increase in house prices tend to also be the ones where the supply of housing is most inelastic, such as coastal cities. Because new housing units are difficult to build, individuals in these areas will be less likely to purchase a home than similar individuals in areas with elastic housing supply. Alternatively, if such areas also have booming economies, then the opportunity cost of having children for young individuals residing in those areas will be higher, weakening their incentives to buy a home. We address these issues by implementing an Instrumental Variables procedure whereby in a first stage, we regress the change in house prices between 2001 and 2006 on the share of the workforce employed in manufacturing in 2001, and on the local topological elasticity of housing supply from Saiz (2010). Then we use the predicted change in house prices in the second stage to evaluate the effect of credit constraints on the propensity for home ownership. The idea behind this approach is twofold. First, we expect an increase in the economy-wide demand for housing to increase house prices, relatively less in areas with a high share of the population about to become unemployed due to an ongoing secular decline in U.S. manufacturing. Second, we expect a stronger increase in house prices in MSAs with less elastic housing supply where the adjustment in response to aggregate demand shocks takes place on the price margin. Finally, we also include interactions of the age dummies with our proxies for current and expected income, to control for the possibility that younger individuals' opportunity cost of time is higher in areas with higher house price changes, leading them to delay both fertility and home ownership decisions.

We also study short-run vs. long-run effects. Our results would be much more compelling if younger households were shut out of the housing market not only at the peak of the house price cycle in 2006, but also at its trough in 2011. This would imply that even when house prices revert to previous levels, they do not do so sufficiently in order to enable renewed entry into home ownership. To test for this possibility, in Section 4.4 we test Model (1) using data on demographics and on home purchases in 2011, while still using the change in house prices between 2001 and 2006.

Finally, we adapt our strategy to test for the economic and social impact of a mechanism whereby credit constraints distort the life cycle of home ownership. In particular, we also explore the effect

of past changes in house prices on household leverage of new home owners, testing for whether for a unit of housing, younger individuals who decide to buy a house in areas where house prices increased a lot in the past, are more likely to end up with higher housing debt. This would imply that credit constraints impose a two-pronged economic cost on young households: they shut out the housing market the marginal would-be home owner, and they increase the long-term indebtedness of those with the highest willingness to purchase residential property. We also test for the effect of changes in local house prices on non-economic choices, such as household formation and fertility, both in general and for new home owners. If, for example, we find that in 2006 younger individuals are less likely to have a child in areas which experienced a rapid increase in house prices between 2001 and 2006, this would imply that housing booms have not only negative economic, but also negative social implications for households at the bottom of the property ladder.

4 Empirical evidence

4.1 OLS results

Before we proceed to our parametric estimates of (1), we present the raw data. Figure 1 shows a simple scatter plot of the change in the FHFA house price index between 2001 and 2006 against the proportion of households aged 18-35 which purchased residential property in 2006, for the 254 MSAs in our sample. As seen from the scatter plot, there is a strong negative relationship between the share of young households who entered the housing market and the MSA-wide change in house prices. While only 5% of the households aged 18-35 purchased residential property in an MSA where house prices appreciated by 95% in the past 5 years, 7% of young households did so in an MSA where house prices appreciated by less than 10%. This may at first seem like a small difference but one should bear in mind that these are statistics for first-time home buyers (not owners) in a given year. The cumulative effect on home ownership for young households that one would obtain when estimating the effect over a longer period of time would be substantially higher.

Table 2 reports the OLS estimates of Model (1). In addition to our main model with MSA fixed effects, we also run regressions without MSA fixed effects, in order to be able to include the

variable capturing MSA-specific changes in house prices between 2001 and 2006, whose coefficient is of independent interest.

In columns (1) and (2), we report estimates from a parsimonious version of the model where we include the age dummies and their interaction with past house price changes, but without controls for individual demographic characteristics and income. We first establish that all households younger than 65+ are considerably more likely on average to purchase a house than household where the head is aged 65+. This is natural given that most demand shocks related to housing choices take place prior to retirement. Regarding the main variable of interest, the estimates strongly imply that past increases in house prices deter younger households (in particular in the age categories 18-35 and 36-45) from purchasing a house. The result is consistent with the idea that holding loan-to-value ratios constant, rising house prices increase the size of the down-payment necessary to pay up front, tightening credit constraints for home buyers. The increase in house prices on its own, in the specification without MSA fixed effects, is uncorrelated with the proportion of young households transitioning into home ownership (column (1)).

In columns (3) and (4), we add all remaining individual-level variables that control for demographic characteristics and for income and wealth. The estimates imply that all else equal, households where the head is female, single, poorly educated, black, and unemployed are less likely to have purchased a home in the past year. In addition, having a job in real estate is associated with a considerably higher probability of purchasing a house. This is likely because a real estate job in a booming area is a proxy for higher expected income, because real estate agents have inside knowledge of the market and can cherry pick, or because a real estate agent is expected to own a home to signal success to clients. Our main result still obtains in the richest empirical specification, with proxies for demographics and financials and with MSA fixed effects (column (4)): in areas that experienced a large house price increase in the past five years, younger households (age category 18-35) are considerably less likely to purchase a home. The effect is economically meaningful, too. The estimate in column (4) implies that relative to the control group of 65+ years of age, a household whose head is in the 18-35 age category, residing in an MSA at the 75th percentile of house price increases between 2001 and 2006, is 0.9 percentage points less likely to have purchased a home

in the previous year than a similar household at the 25th percentile. Given a 6 percentage point rate of transition into home ownership in the sample by households in the 18-35 age category, this implies a 15% decline in the probability of entering the housing market for the youngest households brought about by the housing boom.

Moreover, older households (age category 56-65) are considerably more likely to do so. As such households are unlikely to be first-time buyers, the latter effect is consistent with the idea of households extracting the additional home equity from their existing home and investing in a trade-up home. Overall, our results suggest that the tightening of credit constraints brought about by an increase in the down-payment required has different effects on the propensity to acquire residential property, depending on whether the household has experienced an increase in housing wealth on its existing property. Because the specification includes MSA fixed effects, we are confident that the main effect holds independent of any region-wide differences in economic conditions or housing supply that affect all agents equally.

4.2 2SLS results

While the estimates reported in Table 2 support the idea that credit constraints negatively affect the ability of households to purchase a home, this effect could be driven by a number of other factors. For example, the supply of housing tends to be most inelastic in areas which experience large house prices increases (such as Miami or San Francisco), both due to land scarcity and to more stringent regulations on construction. Because the supply of new houses adjusts slowly to positive shocks to housing demand, individuals in such areas will be less likely to purchase a home than similar individuals in areas with more elastic housing supply. The estimates we reported can be contaminated by such omitted variable bias.

We address this issue by implementing an Instrumental Variables procedure whereby in the first stage, we regress the change in house prices between 2001 and 2006 on the local (MSA-level) share of the workforce employed in manufacturing, and on the local (MSA-level) topological elasticity of housing supply from Saiz (2010). Then we use the predicted change in house prices in the second stage. We expect that that an economy-wide shock to the demand for housing should have a

weaker impact on house prices in depressed manufacturing areas. We also expect that such a shock should increase house prices more in MSAs with less elastic housing supply where the adjustment in response to aggregate demand shocks takes place on the price margin, while in flat areas with abundant land (elastic housing supply) the adjustment will take place on the quantity margin.

Table 3 reports the estimates from this alternative model. We begin by reporting, in columns (1)–(3), the coefficients from the first stage. The estimate on the variable of interest strongly supports the notion that both the share of the workforce employed in manufacturing in the beginning of the period (column (1), and the elasticity of the housing supply (column (2), exert a negative effect on house price growth. The two instruments are jointly significant at the 1% statistical level, too (column (3)). Numerically, moving from an MSA at the 75th percentile to an MSA at the 25th percentile of relative manufacturing employment increases house price growth between 2001 and 2006 by 0.25, or by one standard deviations. Analogously, moving from an MSA at the 75th percentile (very elastic) to one at the 25th percentile (very inelastic) increases house price growth by 0.17, or by 0.71 standard deviations. The value of the first-stage Wald Statistics, reported as "Wald F -statistics", is strictly higher than the critical value for the IV regression to have no more than 10% of the bias of the OLS estimate (see Stock and Yogo, 2005).

Columns (4) and (5) report the estimates from the second stage. To facilitate comparison with the OLS case, we again report estimates from a regression without MSA fixed effects which includes the MSA-wide change in house prices between 2001 and 2005, and estimates from a regression with MSA fixed effects. In the former case (column (4)), we this time find that households in general were less likely to purchase a house in areas where house prices appreciated substantially in the past 5 years, relative to areas where they did not. Our main results continue to hold: younger households are considerably less likely to purchase residential property if they reside in MSAs which experienced a large increase in house prices in the past 5 years. In our preferred specification with demographics, financials, and MSA fixed effects (column (5)), this effect obtains only for the youngest households (age 18-35). The magnitude of the estimate is similar to the one reported in Table 2, suggesting that in this case, omitted variable bias is not a serious econometric issue. However, we no longer find a differential effect, across MSAs, for the group of old households (age

category 56-65).

4.3 Controlling for income effects

While the specification so far allows us to control for income effects, it does not allow us to control for income effects that vary across age groups or MSAs. For example, it is possible that younger households have higher incomes in areas with booming housing markets, raising their opportunity cost of child rearing. This may in turn weaken their incentives to enter the housing market. It is therefore important to test a specification where both current and expected incomes are allowed to have a differential effect on various age groups. Finally, it is possible that younger households are more risk averse investors, and so they are more likely to postpone the purchase of a house when prices are high, even though they are not credit constrained.

Table 4 reports the estimates from this augmented version of Model (1). In column (1), we control for interactions between the age dummies and the average increase in rents on a 2-bedroom apartment (the median apartment of choice for first-time buyers in the age category 18-35). The difference between changes in house prices and changes in rents captures the change in investment opportunities for a durable good that generates a flow of income, in addition to providing housing services. Therefore, this test directly controls for the possibility that we are capturing the differential effect of a decline in the incentive to invest in a durable good, rather than a pricing of young households out of the market. We find no evidence for the investment channel of changes in house prices. However, we still find strong evidence that the youngest households are less likely, and older households are more likely, to purchase a home in MSAs with a large increase in house prices between 2001 and 2006, pointing to the role of credit constraints in the life cycle of home ownership.

Next, we interact the age dummies with the average growth in MSA-level income between 2001 and 2006. This is a direct test of the hypothesis that there are credit constraints in effect which limit the ability of young households to enter the housing market. As we do not observe the amount of the down-payment, we can test for whether the growth in house prices is providing a binding constraint for home ownership, controlling for growth in income. Column (2) suggests that households in the age group 36-45 are more likely to purchase a house in an MSA where house

prices appreciated rapidly in the past 5 years. Crucially, the evidence suggests that controlling for the rate of income growth, young households (age groups 18-35 and 36-45) are less likely to purchase residential properties in such MSAs. In addition, older ones (age group 56-65) are more likely to purchase a home, suggesting wealth effects for home owners of rising house prices.

We next interact each age group with current labor income. Column (3) reports that younger households (in age categories 18-35 and 36-45) are more likely to purchase residential property if they have higher labor income, while the same is not the case for older households. This does suggest that higher levels of disposable income help alleviate the credit constraints that younger households face in housing markets. Crucially, the effect of credit constraints (proxied by past increases in house prices) on young households' propensity to buy a home is still negative and significant at the 1% statistical level.

In column (4), we include an interaction of each age category with a dummy variable equal to 1 if the household head is a real estate agent or a mortgage broker. Apart from signalling high expected income in a booming area, being in the real estate business may facilitate acquiring residential property. The estimates imply that indeed, young households (age 18-35) employed in real estate are considerably more likely to purchase a home if they reside in booming areas. Even controlling for this effect though, young households face significantly higher constraints to home ownership in such areas, while older households are considerably more likely to buy a home. The interaction with the real estate dummy is only significant in the case of the youngest households (age 18-35), suggesting that they are the ones for which higher disposable income or liquid wealth is most relevant in overcoming home ownership constraints.

In column (5), we interact all age categories with a dummy equal to 1 if the household head has a college degree or more. In this case, higher education proxies for both higher current income and higher future income because skilled agents tend to have higher lifetime earnings and face more stable income streams. We confirm that individuals of all age categories are more likely to buy residential property if they have at least a college degree. Importantly, the effect of past changes in house prices on housing choices by the youngest households survives the inclusion of these control variables.

The last two columns of Table 4 report the estimates from a horse race regression where we include the interactions of all empirical proxies for investment opportunities and for current and future income with the age categories. We continue to observe a strong negative association for young households between past increases in house prices and propensity to enter home ownership. This is true both in the OLS regression (column (6)) and in the IV regression (column (7)). In both specifications, the differential effect across MSAs is also observed in the case of age category 36-45, implying that credit constraints brought about by an increase in the down-payment requirement can deter home ownership until later stages of the home ownership cycle, too.[8]

4.4 Long-run effects

Are the effects of credit constraints related to down-payment requirements long lasting? In particular, even at the trough of the housing bust in 2011, house prices remained substantially above their levels before the crisis. This raises the possibility that housing booms can lead to situations whereby young households are shut out of housing markets long after the housing boom is over. Evidence already suggests that areas which experienced the largest run-up of house prices also experienced the deepest recessions and the largest increases in unemployment (Midrigan and Philippon, 2011), an effect largely attributed to leverage accumulated through home equity borrowing. If the results we have found so far extend to 2011, this would suggest that housing booms have a long-lasting negative effect even on groups of individuals (young households) who did not increase their housing debt during the boom in order to finance increased consumption.

We test for this possibility in Table 5. We once again estimate Model (1), but we do so for a representative sample of households in 2011. We still interact all age categories with the MSA-wide increase in house prices between 2001 and 2006 (the peak of the housing cycle), but we look at housing choices in 2011 (the trough of the cycle) instead of 2006. We confirm a strong effect of the degree to which effective credit constraints tightened until 2006 on the probability of purchasing a house in 2011 for young households. This is the case both in the OLS (column (1)) and in the IV (column (2)) specification. Tellingly, the effect is quantitatively similar to the one registered in the

[8] The main results are qualitatively unaffected when we include on the right hand side interactions of age and race and of race and house price changes. Results available upon request.

2006 sample of households. Our results thus suggest that housing booms can impose a long-lasting externality on agents who do not benefit directly from the booms.

5 Extensions

In this section we look at the consequences of credit constraints across age groups for households who purchased a home in the previous year. We first examine whether for agents who become home owners, credit constraints affect the characteristics of the housing unit purchased. Then we study the economic implications of home ownership in the presence of credit constraints in terms of the amount of housing debt of the household. Finally, we look at the social implications of home ownership under credit constraints by examining the marital and fertility choices of young households in booming areas.

5.1 Home ownership, house value and housing size

We first address the question of whether credit constraints affect the value and the size of residential units purchased by young households. The model by Ortalo-Magne and Rady (2006) does not have a prediction on the equilibrium size of start-up homes, rather imposing as an assumption that start-up homes and trade-up homes are of a different size. Recent empirical work has uncovered a causal link between the cost of housing and the size of purchased housing units. For example, Hanson (2012) finds a large effect of the mortgage interest deduction on the size of purchased home (the intensive margin), albeit the data provide no evidence that mortgage deductions affect the rate of home ownership (the extensive margin). We hypothesize that credit constraints driven by an effective increase in the down-payment due to a rise in house prices can affect either the value of the purchased home, if households choose to economize in the price dimension, the size of the purchased home, if households choose to economize in the quantity dimension, or both.

Table 6 reports the estimates from a version of Model (1) run on the sample of new home owners only. Moreover, rather than estimating the probability of purchasing a house, we test for the effect of age and credit constraints on a range of housing characteristics. Namely, we examine

the heterogeneous impact of credit constraints on the value and on the size of the purchased home, where size is proxied by the number of room and by the number of bedrooms in the residential unit.[9] We present evidence from OLS estimation in Panel A, and from an IV procedure in Panel B.

Column (1) reports that in areas which experienced a large increase in house prices in the first half of the 2000s, new home owners of all age groups were more likely to purchase a more expensive house than in areas where house prices increased by less. While the average effect is natural given the difference in equilibrium house prices, we also find that this effect is substantially stronger for younger households (age category 18-35) than for older ones (age category 56-65). This suggests that while younger households are more constrained than older ones in areas where house prices increased considerably, actual transactions (conditional on buying a home) are associated with relatively higher house values. Alternatively, the results suggest that otherwise identical households, in terms of demographics and income, end up purchasing substantially more expensive residential units in areas with large past house price appreciations.

The next two columns of Table 6 test for the effect of credit constraints on housing unit size. The evidence suggests that for the youngest households (age 18-35), credit constraints have no impact on the intensive margin of home ownership. In particular, relative to young households in areas where house prices did not increase by much, young households in areas where house prices increased substantially do not acquire a larger house, as proxied by the number of rooms (column (2)) and the number of bedrooms (column (3)). The effect of past changes in house prices on housing value for first-time home owners is thus observed only in the price dimension. This suggests that first-time home owners in boom areas tend to purchase more expensive homes per unit of housing. At the same time, households in the age categories 35-45 and 46-55 acquire residential property with strictly more bedrooms relative to similar households in control areas (column (3)). This result obtains both when we estimate the model using OLS (Panel A) and when we estimate it using IV (Panel B). To the extent that such households are unlikely to be first-time home owners, the evidence suggests that housing booms increase home owners' housing wealth and make it easier

[9] We do not have information on the square footage of each home.

for them to climb up the property ladder.

5.2 Home ownership and housing leverage

We next examine the implications of rising house prices for the resulting household leverage of young households. It is reasonable to hypothesize that the youngest households with the highest willingness to purchase residential property will end up with higher household leverage in areas with rapidly rising house prices. At the same time, because booming areas are characterized by more dynamic local economies and, as a result, by higher average incomes (Mian and Sufi, 2009), the predicted effect of house price changes on household debt relative to household income is unclear.

In Table 7, we report evidence related to this particular consequence of home ownership. The sample is restricted to households observed in 2011 who bought a home at the height of the boom, i.e., between 2004 and 2006. Column (1) suggests that in areas with high past house price growth, actual home purchase transactions also resulted in substantially higher household leverage. This is particularly true for the youngest households (age 18-35 and 36-45). This result obtains both when we estimate the model using OLS (Panel A) and when we estimate it using IV (Panel B). The effect of house prices on the mortgage amount declines with age, and is statistically insignificant for the older age groups (age category 46-55 and 56-65) in the IV case, suggesting that those households have enough own resources (potentially home equity extracted from a previous residential property) as to not need a mortgage.

In column (2), we test for the heterogeneous impact of past house price increases on the ratio of housing debt to home value. The evidence suggests that after transitioning to home ownership, younger households (age 18-35 and 36-45) are more likely to make higher housing debt-to-home value payments in areas with large past increases in house prices. However, this result only obtains in the OLS and not in the IV case, suggesting that part of the effect may be explained by a factor correlated both with house prices and with mortgage levels, such as local credit standards.

Finally, in column (3) we test for the heterogeneous impact of past house price increases on the ratio of housing debt to income. Once again, the evidence is not consistent across the OLS and the IV specification, suggesting no statistical difference between households of different ages within the

same MSA, or between households in the same age category across different MSAs.

Overall, the evidence in Tables 6 and 7 is consistent with the idea that credit constraints restrict the share of young first-time home owners to those wwith the highest willingness to pay for a unit of housing. Such households end up accumulating substantial amounts of mortgage debt, too, even though their equilibrium housing debt is not higher relative to house values or incomes. At the same time, our results also suggest that an increase in house prices provides existing home owners with additional housing wealth that can be extracted in order to switch from a start-up to a trade-up home, where a trade-up home is proxied by a residential unit with a higher number of bedrooms than the previous home. For such households, the positive income effect of additional home equity seems to dominate the negative effect of tightening credit constraints on new homes.

5.3 Social implications of home ownership during a housing boom

We now turn to the social implications of acquiring a home during a housing boom. Specifically, in Table 8 we study the differential effect across age groups of credit constraints, proxied by past increased in house prices, on households' fertility and marital choices. Recent research has provided compelling evidence that positive shocks to the value of the residential property raise home-owners' probability of having a child, consistent with the idea that children are a "normal good" (Lovenheim and Mumford, 2013; Dettling and Kearney, 2014). There is no evidence so far, however, on the effect of house prices on the fertility of non-home owners by age groups. In addition, recent evidence has suggested that positive shocks to house prices tend to increase marital stability (Milosch, 2014). Farnham, Schmidt, and Sevak (2011) qualify this result by arguing that the effect is asymmetric across age categories, which they argue is a proxy for home ownership. In comparison, our data allow us to actually focus on a sample of home owners and examine the effect of shocks to house prices in terms of marital stability.

As before, we complement an OLS analysis (Panel A) with an analysis where we use the beginning-of-period MSA-level share of manufacturing employment and the MSA-level elasticity of housing supply as instruments for changes in house prices (Panel B). Column (1) of Table 8 suggests that the youngest households are considerably less likely to be married in 2006 if they

reside in MSAs that experienced a large increase in house prices between 2001 and 2006. Crucially, we find the same for 2011, the trough of the housing cycle (column (2)). This negative effect of rising house prices on household formation is fully consistent with the idea that home ownership and marriage are complementary choices, and so by detering entry into the housing market, credit constraints lead households to postpone household formation, too. We note that the evidence is equally strong in the statistical sense when we use an OLS analysis (Panel A) and when we use an IV analysis (Panel B), even though the magnitude of the effect declines by half in the IV tests.

Turning to fertility choices, column (3) of Panel A suggests that in 2006, households in age categories 36-45 and 46-55 were more likely to have a child if they reside in areas that saw large house price increase in the past five years, relative to identical households residing in areas that did not experience large recent house price appreciations. This is consistent with prior evidence as such households are likely to already own a property. However, the opposite is true for households aged 18-35. As such households are likely to be the marginal first-time home owners, the evidence suggests that credit constraints affect negatively the joint choice of purchasing residential property and having a child. Completing the story, column (4) suggests that younger households reside in MSAs that experienced a large increase in house prices between 2001 and 2006 were less likely to have a child in 2011, five years after the peak of the housing boom. The numerical effect is if anything considerably larger than the one for 2006. We do note, however, that the OLS and the IV evidence is only consistent for the 2011 sample, suggesting that the long-term implications of tightening credit constraints can be more binding than the short-run one.

6 Conclusion

We study the effect of credit constraints in housing markets on the life cycle of home ownership, as well as on household formation and fertility choices, differentiating by age. Past increases in house prices tighten credit constraints by increasing the amount of cash that one needs to pay up front in order to buy a home. For 1.5 million households in the United States in 2006 (the peak of the housing boom), we evaluate the effect of past shocks to local house prices at different stages

of the household's life cycle. We focus on the youngest households (age 18-35) because they are the most likely ones to be the marginal first-time buyers. We test whether housing booms distort home ownership choices for these households, as well as whether they have negative consequences in terms of debt levels and whether they distort the demographic dynamics.

We also introduce a novel instrument for house prices changes based on the predetermined local industrial structure. In particular, we use the beginning-of-period local share of manufacturing employment to extract the exogenous component of subsequent local changes in house prices. We argue that the U.S.-wide increase in the demand for housing, which coincided with the manufacturing decline of the 2000s, was likely to result in a higher increase in local house prices in MSAs where a smaller share of the working population was employed in manufacturing in the early stages of the boom, i.e., where a smaller share of the workforce was at the risk of becoming unemployed due to the decline in manufacturing. We use this instrument together with the other instrument that is common in the literature, the MSA's topological elasticity of housing supply from Saiz (2010).

Our evidence suggests that higher prices on residential property reduce the probability of becoming a first-time home owner, proxied by a lower propensity to purchase a home among the youngest households (age category 18-35). This result is not driven by investment opportunities, by income effects, or by demographic characteristics. The effect still obtains when we use the local industrial structure and the local elasticity of housing supply as instruments for changes in house prices. The effect is long-lasting, in that young households residing in areas that experienced a large-scale house price boom between 2001 and 2006 were relatively more likely to be deterred from purchasing residential property as late as 2011 (the trough of the house price boom-bust cycle). We also find that young households that decided to acquire a home at the peak of the housing boom in areas with rapidly increasing house prices ended up with higher mortgage debt per unit of housing, but not with a larger property. Finally, young households in booming areas were on average also less likely to start a family and to have a child, suggesting that credit constraints to young households brought about by rising house prices have implications beyond home ownership. At the same time older households, likely already home owners when the boom started, were more likely to purchase a home, and this home was on average larger than in non-booming areas, suggesting

a positive income effect, through increased home equity, to home owners wishing to move up the property ladder.

Our results paint a moderately dark picture of the "American Dream" in the presence of housing boom-bust cycles, in the case of young individuals. It suggests that housing booms tend to distort the life cycle of home ownership by pricing out young households from the housing market. By making it difficult to transition from renting to owning, house price booms also distort young individuals' household formation and fertility choices. Finally, the young households with the highest willingness to purchase a home end up with substantially higher debt during the bust phase of housing cycles. Given the crucial role public policy and financial sector imperfections play in determining individual home ownership incentives, systematic analysis of the macroeconomic implications of housing boom-bust episodes is needed. We leave these important questions for future research.

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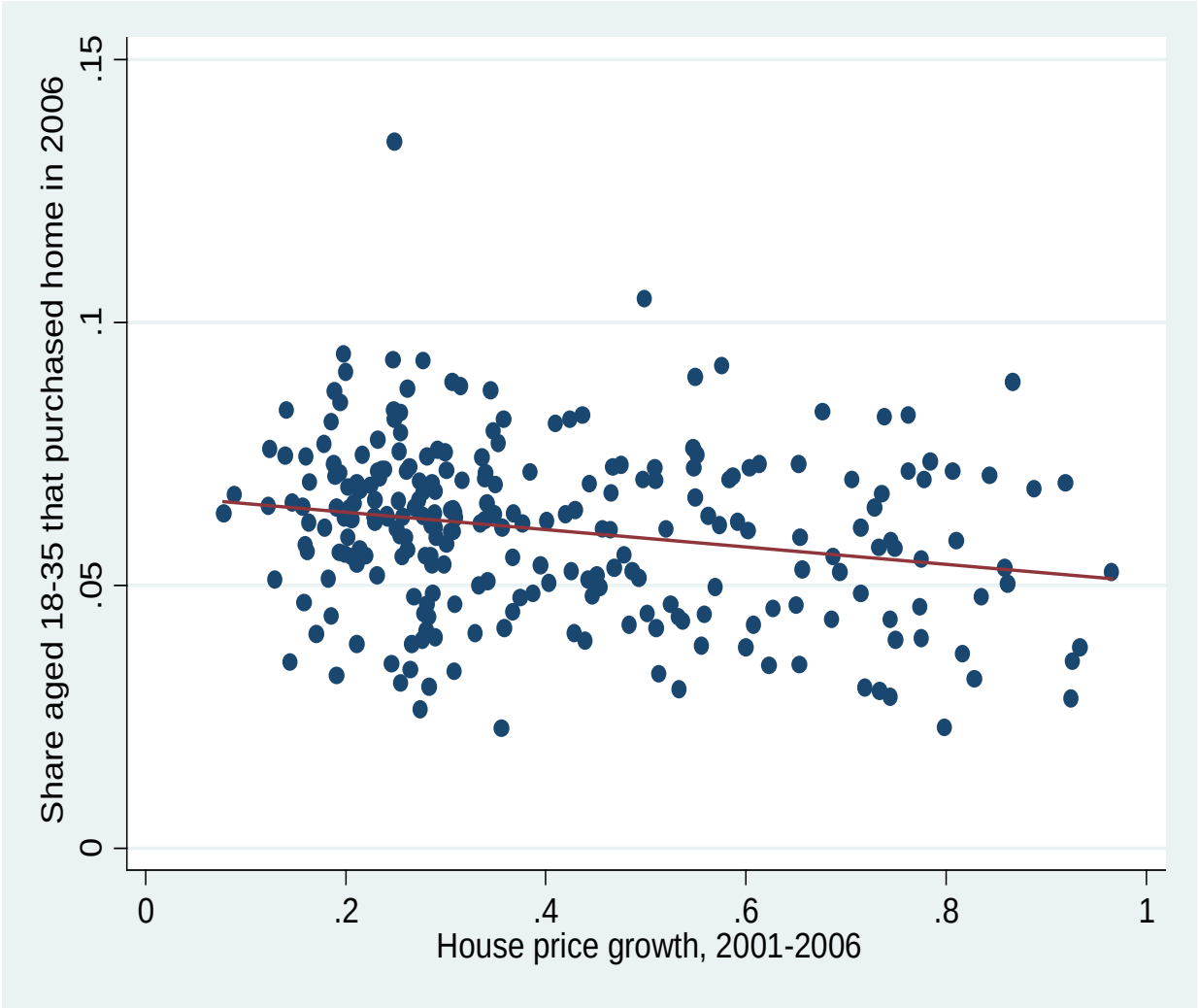
Figure1. House price growth over 2001-2006 and the share of young households that purchased a home in 2006



Note: This figure shows house price growth over the period 2001-2006 and the share of the population with ages between 18 and 35 that purchased a home in 2006, both calculated at the MSA level.

Table 1. Summary statistics

Variable	Observations	Mean	Median	St. dev	Min	Max
Purchased a home last year	1,509,674	0.05	0	0.21	0	1
Age 18-35	1,509,674	0.29	0	0.45	0	1
Age 36-45	1,509,674	0.19	0	0.39	0	1
Age 46-55	1,509,674	0.20	0	0.40	0	1
Age 56-65	1,509,674	0.15	0	0.35	0	1
Age 66+	1,509,674	0.17	0	0.38	0	1
Female	1,509,674	0.53	1	0.50	0	1
Single	1,509,674	0.24	0	0.43	0	1
Married	1,509,674	0.57	1	0.50	0	1
Divorced	1,509,674	0.13	0	0.33	0	1
College or more	1,509,674	0.29	0	0.45	0	1
College drop-out	1,509,674	0.07	0	0.26	0	1
High school	1,509,674	0.64	1	0.48	0	1
White	1,509,674	0.76	1	0.43	0	1
Black	1,509,674	0.11	0	0.31	0	1
Asian	1,509,674	0.06	0	0.23	0	1
Income	1,461,565	80,702.97	62,000.00	77,740.66	0	2,094,000
Unemployed	1,509,674	0.04	0	0.19	0	1
Real estate job	1,509,674	0.02	0	0.12	0	1
Home value	1,093,801	310,904.60	220,000.00	246,719.00	5,000	1,000,000
Mortgage payment	1,509,674	734.58	330.00	1007.73	0	13,600
No. rooms	1,461,565	5.98	6	1.84	1	9
No. bedrooms	1,461,565	2.95	3	1.01	0	5
Child born last year	452,522	0.06	0	0.23	0	1
Δ5-year house prices	1,509,674	0.50	0.47	0.24	0.08	0.97
Δ5-year house rents	1,509,545	0.21	0.18	0.12	-0.11	0.54
Δ5-year MSA income	1,509,545	0.21	0.21	0.06	0.03	0.44
Share manufacturing in 2001	1,509,545	0.10	0.10	0.04	0.02	0.35
MSA elasticity	1,425,146	1.72	1.61	1.04	0.60	12.15

Note: This table presents summary statistics for the main variables used in the empirical tests. 'Purchased a home last year' is a dummy equal to 1 if the household purchased a house in the previous year. 'Age 18-35' is a dummy variable equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy variable equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy variable equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy variable equal to 1 if the household head is between 56 and 65 years old. 'Age 65+' is a dummy variable equal to 1 if the household head is over 65 years old. 'Female' is a dummy variable equal to 1 if the household head is a female. 'Single' is a dummy variable equal to 1 if the household head is single. 'Divorced' is a dummy variable equal to 1 if the household head is divorced. 'College or more' is a dummy variable equal to 1 if the household head has at least a college degree. 'College drop-out' is a dummy variable equal to 1 if the household head dropped out from college. 'White' is a dummy variable equal to 1 if the household head is white. 'Black' is a dummy variable equal to 1 if the household head is black. 'Asian' is a dummy variable equal to 1 if the household head is Asian. 'Income' is the total household income. 'Unemployed' is a dummy variable equal to 1 if the household head is unemployed. 'Real estate job' is a dummy variable equal to 1 if the household head is employed in real estate. 'House value' is the total value of the house. 'Mortgage payment' is the value of the monthly payment on the household's mortgage. 'No. rooms' is the total number of rooms in the household's home. 'No. bedrooms' is the total number of bedrooms in the household's home. 'Child born last year' is a dummy variable equal to 1 if the household had a child born in the previous year. Data are from IPUMS, for 2006. 'Δ5-year house prices' is the percentage change in MSA-wide house prices between 2001 and 2006. 'Δ5-year rents' is the percentage change in MSA-wide rents on a 2-bedroom apartment between 2001 and 2006. Data are from the FHFA, for 2001-2006. 'Δ5-year MSA income' is the percentage change in average MSA-wide total household income between 2001 and 2006. 'Share manufacturing in 2001' is the MSA-specific share of working population employed in manufacturing in 2001. 'MSA elasticity' is the MSA-level topological elasticity of housing supply, from Saiz (2010).

Table 2. House prices and home ownership over the life cycle: OLS

	(1)	(2)	(3)	(4)
Age 18-35 ×Δ5-year house prices	-0.0314***	-0.0232***	-0.0264***	-0.0194***
	(0.0064)	(0.0057)	(0.0061)	(0.0058)
Age 36-45 ×Δ5-year house prices	-0.0171***	-0.0100**	-0.0108**	-0.0044
	(0.0054)	(0.0046)	(0.0050)	(0.0045)
Age 46-55 ×Δ5-year house prices	-0.0068***	-0.0014	-0.0028	0.0022
	(0.0030)	(0.0027)	(0.0032)	(0.0030)
Age 56-65 ×Δ5-year house prices	0.0049	0.0076	0.0067	0.0092**
	(0.0045)	(0.0046)	(0.0044)	(0.0047)
Age 18-35	0.0499***	0.0459***	0.0642***	0.0589***
	(0.0028)	(0.0026)	(0.0027)	(0.0026)
Age 35-45	0.0452***	0.0418***	0.0393***	0.0354***
	(0.0024)	(0.0020)	(0.0023)	(0.0020)
Age 45-55	0.0206***	0.0180***	0.0132***	0.0102***
	(0.0015)	(0.0014)	(0.0016)	(0.0015)
Age 55-65	0.0109***	0.0093***	0.0035***	0.0017***
	(0.0018)	(0.0018)	(0.0018)	(0.0019)
Δ5-year house prices	0.0044		0.0005	
	(0.0075)		(0.0070)	
Female			-0.0235***	-0.0232***
			(0.0015)	(0.0015)
Single			-0.0300***	-0.0278***
			(0.0010)	(0.0011)
Divorced			0.0185***	0.0184***
			0.0012)	0.0012)
College or more			0.0365***	0.0373***
			(0.0019)	(0.0017)
College drop-out			0.0174***	0.0176***
			(0.0010)	(0.0011)
White			0.0088***	0.0042***
			(0.0012)	(0.0009)
Black			-0.0034**	-0.0080***
			(0.0014)	(0.0012)
Log (Income)			-0.0012**	-0.0005
			(0.0005)	(0.0005)
Unemployed			-0.0163***	-0.0154***
			(0.0010)	(0.0010)
Real estate job			0.0224***	0.0214***
			(0.0027)	(0.0025)
MSA fixed effects	No	Yes	No	Yes
No. Observations	1,509,674	1,509,674	1,509,674	1,509,674
R-squared	0.01	0.01	0.02	0.02

Note: The dependent variable is a dummy equal to 1 if the household purchased a home in the previous year. 'Age 18-35' is a dummy equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy equal to 1 if the household head is between 56 and 65 years old. 'Δ5-year house prices' is the percentage change in MSA-wide house prices between 2001 and 2006. 'Female' is a dummy equal to 1 if the household head is a female. 'Single' is a dummy equal to 1 if the household head is single. 'Divorced' is a dummy equal to 1 if the household head is divorced. 'College or more' is a dummy equal to 1 if the household head has at least a college degree. 'College drop-out' is a dummy equal to 1 if the household head dropped out from college. 'White' is a dummy equal to 1 if the household head is white. 'Black' is a dummy equal to 1 if the household head is black. 'Log (Income)' is the natural logarithm of total household income. 'Unemployed' is a dummy equal to 1 if the household head is unemployed. 'Real estate job' is a dummy equal to 1 if the household head is employed in real estate. Data are from IPUMS, for 2006. Standard errors clustered by MSA are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 3. House prices and home ownership over the life cycle: IV

	First stage			Second stage	
	(1)	(2)	(3)	(4)	(5)
Share manufacturing in 2001	-3.0841***		-2.4080***		
	(0.4191)		(0.5151)		
MSA elasticity		-0.1372***	-0.1106***		
		(0.0196)	(0.0251)		
Age 18-35 ×Δ5-year house prices				-0.0278***	-0.0208***
				(0.0075)	(0.0073)
Age 36-45 ×Δ5-year house prices				-0.0084	-0.0016
				(0.0067)	(0.0064)
Age 46-55 ×Δ5-year house prices				-0.0050	-0.0001
				(0.0045)	(0.0047)
Age 56-65 ×Δ5-year house prices				0.0058	0.0081
				(0.0054)	(0.0059)
Age 18-35				0.0648***	0.0597***
				(0.0031)	(0.0030)
Age 36-45				0.0383***	0.0342***
				(0.0029)	(0.0027)
Age 46-55				0.0144***	0.0115***
				(0.0021)	(0.0021)
Age 56-65				0.0038*	0.0021
				(0.0023)	(0.0024)
Δ5-year house prices				-0.0021	
				(0.0082)	
Household controls	Yes	Yes	Yes	Yes	Yes
MSA fixed effects	No	No	Yes	No	Yes
Wald F-statistics	22.94	12.15	19.55		
No. Observations	1,453,798	1,373,067	1,373,067	1,373,067	1,373,067
R-squared	0.30	0.37	0.51	0.02	0.02

Note: The dependent variable is a dummy equal to 1 if the household purchased a house in the previous year. 'Share manufacturing in 2001' is the MSA-specific share of working population employed in manufacturing in 2001. 'MSA elasticity' is the MSA-specific topological elasticity of housing supply, from Saiz (2010). 'Age 18-35' is a dummy equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy equal to 1 if the household head is between 56 and 65 years old. 'Δ5-year house price' is the percentage change in MSA-wide house prices between 2001 and 2006. All remaining household controls and interactions from Table 2 are included in the regressions. In columns (4) and (5), 'Δ5-year house prices' is instrumented using 'Share manufacturing in 2001' and 'MSA elasticity'. Data are from IPUMS, for 2006. Standard errors clustered by MSA are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 4. House prices and home ownership over the life cycle: Controlling for income effects

	OLS	OLS	OLS	OLS	OLS	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age 18-35 ×Δ5-year house prices	-0.0218***	-0.0147**	-0.0232***	-0.0197***	-0.0229***	-0.0195***	-0.0363***
	(0.0060)	(0.0066)	(0.0057)	(0.0058)	(0.0052)	(0.0068)	(0.0134)
Age 36-45 ×Δ5-year house prices	-0.0078	-0.0118**	-0.0064	-0.0044	-0.0070	-0.0154***	-0.0196*
	(0.0049)	(0.0049)	(0.0043)	(0.0049)	(0.0041)	(0.0053)	(0.0109)
Age 46-55 ×Δ5-year house prices	0.0006	-0.0114	0.0018	0.0021	0.0011	-0.0035	-0.0089
	(0.0042)	(0.0048)	(0.0030)	(0.0030)	(0.0029)	(0.0049)	(0.0084)
Age 56-65 ×Δ5-year house prices	0.0129**	0.0151***	0.0096**	0.0092**	0.0086*	0.0166***	0.0125
	(0.0052)	(0.0064)	(0.0046)	(0.0047)	(0.0046)	(0.0061)	(0.0105)
Age 18-35 ×Δ5-year rents	0.0088					0.0090	0.0209
	(0.0144)					(0.0142)	(0.0170)
Age 36-45 ×Δ5-year rents	0.0128					0.0085	0.0121
	(0.0110)					(0.0097)	(0.0126)
Age 46-55 ×Δ5-year rents	0.0060					0.0047	0.0111
	(0.0070)					(0.0068)	(0.0076)
Age 56-65 ×Δ5-year rents	-0.0141					-0.0107	-0.0076
	(0.0095)					(0.0095)	(0.0119)
Age 18-35 ×Δ5-year MSA income		-0.0295				-0.0460*	-0.0072
		(0.0307)				(0.0257)	(0.0371)
Age 36-45 ×Δ5-year MSA income		0.0460*				0.0333	0.0437
		(0.0259)				(0.0223)	(0.0333)
Age 46-55 ×Δ5-year MSA income		0.0215				0.0192	0.0261
		(0.0194)				(0.0186)	(0.0263)
Age 56-65 ×Δ5-year MSA income		-0.0365				-0.0305	-0.0246
		(0.0226)				(0.0224)	(0.0292)
Age 18-35 ×Log (Income)			0.0114***			0.0046***	0.0049***
			(0.0007)			(0.0007)	(0.0008)
Age 36-45 ×Log (Income)			0.0071***			0.0042***	0.0045***
			(0.0008)			(0.0008)	(0.0009)
Age 46-55 ×Log (Income)			0.0001			0.0001	0.0001
			(0.0006)			(0.0006)	(0.0006)
Age 56-65 ×Log (Income)			-0.0011*			-0.0014**	-0.0011*
			(0.0006)			(0.0006)	(0.0006)
Age 18-35 ×Real estate job				0.0311***		0.0256***	0.0258***
				(0.0055)		(0.0054)	(0.0054)
Age 36-45 ×Real estate job				-0.0002		-0.0034	-0.0025
				(0.0056)		(0.0057)	(0.0056)

Age 46-55 × Real estate job				0.0076		0.0055	0.0050
				(0.0056)		(0.0056)	(0.0057)
Age 56-65 × Real estate job				0.0036		0.0024	0.0016
				(0.0061)		(0.0061)	(0.0061)
Age 18-35 × College or more					0.0618***	0.0594***	0.0594***
					(0.0033)	(0.0034)	(0.0036)
Age 36-45 × College or more					0.0282***	0.0254***	0.0254***
					(0.0016)	(0.0016)	(0.0016)
Age 46-55 × College or more					0.0074***	0.0072***	0.0070***
					(0.0013)	(0.0012)	(0.0012)
Age 56-65 × College or more					0.0065***	0.0075***	0.0072***
					(0.0013)	(0.0013)	(0.0013)
Age 18-35	0.0582***	0.0628***	-0.0617***	0.0586***	0.0432***	0.0003	-0.0052
	(0.0031)	(0.0050)	(0.0080)	(0.0026)	(0.0027)	(0.0082)	(0.0087)
Age 36-45	0.0343	0.0295***	-0.0406	0.0354***	0.0294***	-0.0195**	-0.0241***
	(0.0023)	(0.0041)	(0.0087)	(0.0020)	(0.0018)	(0.0088)	(0.0091)
Age 46-55	0.0097***	0.0075***	0.0127*	0.0102***	0.0106***	0.0085	0.0090
	(0.0013)	(0.0024)	(0.0071)	(0.0015)	(0.0014)	(0.0068)	(0.0072)
Age 56-65	0.0028	0.0063**	0.0158**	0.0017	0.0021	0.0221***	0.0197***
	(0.0019)	(0.0030)	(0.0069)	(0.0019)	(0.0018)	(0.0069)	(0.0072)
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	1,453,798	1,453,798	1,453,798	1,453,798	1,453,798	1,453,798	1,373,067
R-squared	0.02	0.02	0.02	0.02	0.02	0.03	0.03

Note: The dependent variable is a dummy equal to 1 if the household purchased a house in the previous year. 'Age 18-35' is a dummy equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy equal to 1 if the household head is between 56 and 65 years old. 'Δ5-year house prices' is the percentage change in MSA-wide house prices between 2001 and 2006. 'Δ5-year rents' is the percentage change in MSA-wide rents on a 2-bedroom apartment between 2001 and 2006. 'Δ5-year MSA income' is the percentage change in average MSA-wide total household income between 2001 and 2006. 'Log (Income)' is the natural logarithm of total household income. 'Real estate job' is a dummy equal to 1 if the household head is employed in real estate. 'College or more' is a dummy equal to 1 if the household head has at least a college degree. All remaining household controls and interactions from Table 2 are included in the regressions. In column (7), 'Δ5-year house price' is instrumented using 'Share manufacturing in 2001' and 'MSA elasticity' (see Table 3 for details). Data are from IPUMS, for 2006. Standard errors clustered by MSA are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 5. House prices and home ownership over the life cycle: Long-term effects

	OLS	IV
	(1)	(2)
Age 18-35 ×Δ5-year house prices	-0.0164***	-0.0197***
	(0.0032)	(0.0047)
Age 36-45 ×Δ5-year house prices	-0.0039	-0.0025
	(0.0033)	(0.0039)
Age 46-55 ×Δ5-year house prices	-0.0029	-0.0014
	(0.0021)	(0.0031)
Age 56-65 ×Δ5-year house prices	0.0017	0.0010
	(0.0021)	(0.0030)
Age 18-35	0.0374***	0.0387***
	(0.0015)	(0.0020)
Age 36-45	0.0230***	0.0223***
	(0.0016)	(0.0018)
Age 46-55	0.0104***	0.0095***
	(0.0011)	(0.0014)
Age 56-65	0.0034***	0.0037***
	(0.0010)	(0.0014)
Household controls	Yes	Yes
MSA fixed effects	Yes	Yes
No. Observations	1,491,409	1,410,198
R-squared	0.01	0.01

Note: The dependent variable is a dummy equal to 1 if the household purchased a house in the previous year. 'Age 18-35' is a dummy variable equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy variable equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy variable equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy variable equal to 1 if the household head is between 56 and 65 years old. 'Δ5-year house prices' is the percentage change in MSA-wide house prices between 2001 and 2006. All remaining household controls and interactions from Table 2 are included in the regressions. In Column (2), 'Δ5-year house price' is instrumented using 'Share manufacturing in 2001' and 'MSA elasticity' (see Table 3 for details). Data are from IPUMS, for 2011. Standard errors clustered by MSA are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 6. House prices and home ownership over the life cycle: House size and housing debt

Panel A. OLS

	(1)	(2)	(3)
Age 18-35 ×Δ5-year house prices	0.5944***	-0.1944	0.1064
	(0.0781)	(0.1769)	(0.1223)
Age 36-45 ×Δ5-year house prices	0.4849***	-0.1392	0.1963*
	(0.0754)	(0.1823)	(0.1062)
Age 46-55 ×Δ5-year house prices	0.4544***	0.1387	0.3392***
	(0.0728)	(0.1549)	(0.0830)
Age 56-65 ×Δ5-year house prices	0.3097***	0.0645	0.1520***
	(0.0601)	(0.1146)	(0.0587)
Age 18-35	-0.3564***	0.4381***	0.3084***
	(0.0367)	(0.0944)	(0.0521)
Age 36-45	-0.1748***	0.8344***	0.4718***
	(0.0358)	(0.1039)	(0.0505)
Age 46-55	-0.1737***	0.5452***	0.2386***
	(0.0336)	(0.0904)	(0.0433)
Age 56-65	-0.1191***	0.3647***	0.1453***
	(0.0320)	(0.0694)	(0.0320)
Household controls	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes
No. Observations	70,139	70,139	70,139
R-squared	0.48	0.24	0.22

Panel B. IV

	(1)	(2)	(3)
Age 18-35 ×Δ5-year house prices	0.5641***	-0.1055	-0.0427
	(0.0987)	(0.1684)	(0.1143)
Age 36-45 ×Δ5-year house prices	0.4648***	0.1781	0.2125**
	(0.0971)	(0.1621)	(0.0906)
Age 46-55 ×Δ5-year house prices	0.4516***	0.0237	0.4079***
	(0.0959)	(0.1259)	(0.0908)
Age 56-65 ×Δ5-year house prices	0.2617***	-0.1841	0.0863
	(0.0719)	(0.1607)	(0.0686)
Age 18-35	-0.3414***	0.4349***	0.3782***
	(0.0442)	(0.0837)	(0.0512)
Age 36-45	-0.1662***	0.8186***	0.4648***
	(0.0438)	(0.0912)	(0.0465)
Age 46-55	-0.1746***	0.5314***	0.2114***
	(0.0434)	(0.0859)	0.0444)
Age 56-65	-0.0994***	0.3909***	0.1834***
	(0.0362)	(0.0700)	(0.0371)
Household controls	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes
No. Observations	66,176	66,176	66,176
R-squared	0.48	0.24	0.22

Note: The dependent variable is the natural logarithm of the house value (column (1)); the number of rooms in the house (column (2)); and the number of bedrooms in the house (column (3)). The sample is restricted to households who purchased a home in the past year. 'Age 18-35' is a dummy equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy equal to 1 if the household head is between 56 and 65 years old. 'Δ5-year house prices' is the percentage change in MSA-wide house prices between 2001 and 2006. All remaining household controls and interactions from Table 2 are included in the regressions. In Panel B, 'Δ5-year house price' is instrumented using 'Share manufacturing in 2001' and 'MSA elasticity' (see Table 3 for details). Data are from IPUMS, for 2006. Standard errors clustered by MSA are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 7. House prices and home ownership over the life cycle: Economic implications

Panel A. OLS

	(1)	(2)	(3)
Age 18-35 ×Δ5-year house prices	0.2456***	0.0013*	0.1123
	(0.0609)	(0.0007)	(0.1577)
Age 36-45 ×Δ5-year house prices	0.1777***	0.0012**	0.5122*
	(0.0656)	(0.0006)	(0.2923)
Age 46-55 ×Δ5-year house prices	0.1501**	0.0006	-0.3299
	(0.0606)	(0.0006)	(0.3631)
Age 56-65 ×Δ5-year house prices	0.0415	0.0010**	2.2558
	(0.0651)	(0.0004)	(2.0669)
Age 18-35	0.1446***	0.0037***	1.1456*
	(0.0341)	(0.0003)	(0.6783)
Age 36-45	0.2423***	0.0033***	1.5018*
	(0.0345)	(0.0003)	(0.8861)
Age 46-55	0.1920***	0.0030***	1.8128*
	(0.0338)	(0.0003)	(1.0608)
Age 56-65	0.1136***	0.0018***	0.3606
	(0.0350)	(0.0002)	(0.2976)
Household controls	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes
No. Observations	59,295	108,922	108,922
R-squared	0.43	0.05	0.01

Panel B. IV

	(1)	(2)	(3)
Age 18-35 ×Δ5-year house prices	0.1414**	-0.0012	0.0180
	(0.0647)	(0.0014)	(0.3596)
Age 36-45 ×Δ5-year house prices	0.0829	-0.0014	-0.8699
	(0.0650)	(0.0009)	(0.6533)
Age 46-55 ×Δ5-year house prices	0.0624	-0.0008	0.7037
	(0.0722)	(0.0009)	(0.5862)
Age 56-65 ×Δ5-year house prices	0.0129	-0.0013*	-2.3234
	(0.0664)	(0.0008)	(2.1184)
Age 18-35	0.1878***	0.0041***	1.2168*
	(0.0357)	(0.0002)	(0.7434)
Age 36-45	0.2805***	0.0037***	1.6341
	(0.0353)	(0.0002)	(1.0011)
Age 46-55	0.2259***	0.0032***	1.7663*
	(0.0380)	(0.0002)	(1.0311)
Age 56-65	0.1240**	0.0021***	1.0892*
	(0.0359)	(0.0002)	(0.6477)
Household controls	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes
No. Observations	56,088	103,136	103,136
R-squared	0.43	0.05	0.01

Note: The dependent variable is the monthly mortgage payment (column (1)), the ratio of the monthly mortgage payment to home value (Column (2)) and the ratio of mortgage payments to income (Column (3)). 'Age 18-35' is a dummy equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy equal to 1 if the household head is between 56 and 65 years old. 'Δ5-year house prices' is the percentage change in MSA-wide house prices between 2001 and 2006. All remaining household controls and interactions from Table 2 are included in the regressions. In Panel B, 'Δ5-year house price' is instrumented using 'Share manufacturing in 2001' and 'MSA elasticity' (see Table 3 for details). Data are from IPUMS, for 2011. The sample is restricted to households who bought a home at the height of the boom. Standard errors clustered by MSA are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 8. House prices and home ownership over the life cycle: Social implications

Panel A. OLS

	Married		Had a child last year	
	2006	2011	2006	2011
	(1)	(2)	(3)	(4)
Age 18-35 ×Δ5-year house prices	-0.1872***	-0.1992***	-0.0294**	-0.3483***
	(0.0433)	(0.0425)	(0.0119)	(0.0124)
Age 36-45 ×Δ5-year house prices	-0.0306	0.0418	0.2241***	-0.0326
	(0.0388)	(0.0331)	(0.0363)	(0.0374)
Age 46-55 ×Δ5-year house prices	-0.0609	0.0322	0.1522**	-0.2220**
	(0.0415)	(0.0365)	(0.0768)	(0.0809)
Age 56-65 ×Δ5-year house prices	-0.1221***	-0.0139	-----	-----
	(0.0251)	(0.0219)		
Age 18-35	-0.5463***	-0.6336***	1.6765***	1.4055***
	(0.0259)	(0.0248)	(0.0456)	(0.0451)
Age 36-45	0.1216***	0.0600***	0.7987***	0.5489***
	(0.0175)	(0.0143)	(0.0469)	(0.0466)
Age 46-55	0.1419***	0.0864***	-----	-----
	(0.0150)	(0.0126)		
Age 56-65	0.2559***	0.1817***	-----	-----
	(0.0104)	(0.0094)		
Household controls	Yes	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes	Yes
No. Observations	1,453,798	1,491,409	439,302	415,252
R-squared	0.13	0.14	0.13	0.11

Panel B. IV

	Married		Had a child last year	
	2006	2011	2006	2011
	(1)	(2)	(3)	(4)
Age 18-35 ×Δ5-year house prices	-0.0905***	-0.0972***	0.0084**	-0.0432***
	(0.0189)	(0.0173)	(0.0042)	(0.0028)
Age 36-45 ×Δ5-year house prices	-0.0032	0.0142	0.0510***	0.0093
	(0.0176)	(0.0167)	(0.0060)	(0.0053)
Age 46-55 ×Δ5-year house prices	-0.0197	0.0190	0.0308***	-0.0231***
	(0.0184)	(0.0182)	(0.0033)	(0.0034)
Age 56-65 ×Δ5-year house prices	-0.0513***	-0.0124	-----	-----
	(0.0125)	(0.0107)		
Age 18-35	-0.1817***	-0.2108***	0.1312***	0.1241***
	(0.0094)	(0.0077)	(0.0034)	(0.0032)
Age 36-45	0.0399***	0.0252***	0.0178***	0.0120***
	(0.0070)	(0.0065)	(0.0023)	(0.0023)
Age 46-55	0.0513***	0.0294***	-----	-----
	(0.0066)	(0.0064)		
Age 56-65	0.0932***	0.0650***	-----	-----
	(0.0051)	(0.0037)		
Household controls	Yes	Yes	Yes	Yes
MSA fixed effects	Yes	Yes	Yes	Yes
No. Observations	1,373,067	1,410,198	415,901	393,294
R-squared	0.17	0.18	0.05	0.05

Note: The dependent variable is a dummy equal to 1 if the household's head is married (columns (1) and (2)) and a dummy equal to 1 if the household had a child in the past year (columns (3) and (4)). 'Age 18-35' is a dummy equal to 1 if the household head is between 18 and 35 years old. 'Age 36-45' is a dummy equal to 1 if the household head is between 36 and 45 years old. 'Age 46-55' is a dummy equal to 1 if the household head is between 46 and 55 years old. 'Age 56-65' is a dummy equal to 1 if the household head is between 56 and 65 years old. 'Δ5-year house prices' is the percentage change in MSA-wide house prices between 2001 and 2006. All remaining household controls and

interactions from Table 2 are included in the regressions. In Panel B, 'Δ5-year house price' is instrumented using 'Share manufacturing in 2001' and 'MSA elasticity' (see Table 3 for details). Data are from IPUMS, for 2006 (Columns (1) and (3)), and for 2011 (Columns (2) and (4)). Standard errors clustered by MSA are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.