Finance and Welfare: The Effect of Access to Credit on Family Structure

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There is a large debate over the welfare effects of the early 2000s housing boom and bust. One potentially important welfare effect is the impact of mortgage credit expansion on family structure. Exploiting pre-housing boom variation on the distribution of old homeowners who live alone and are older than 65, I conduct within-county analysis with zip code level data to causally identify the effect of access to credit on fertility outcomes through a channel associated with a more efficient reallocation of the existing housing stock among households. I examine two other housing channels, house wealth gains and new construction, and show that the most relevant channel is the reallocation, which allows young households to access space by either moving to larger homes or achieving homeownership earlier in their life-cycle. A one standard deviation increase in reallocation leads to a 6.4% increase in fertility from 2000 to 2006. The same increase in house prices leads to only a 2.7% increase, and in new construction leads to a 1.5% decline in fertility from 2000 to 2006. I estimate that approximately 500,000 babies were born between 2000 and 2006 because of the reallocation channel.

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I INTRODUCTION

The topic of access to finance and welfare has been studied in a number of dimensions. For example, studies have sought to quantify the impact of access to finance on welfare via its effects on intertemporal consumption smoothing (Jappelli and Pistaferri 2011; Gertler, Levine, and Moretti 2009), college enrollment (Levine and Rubinstein 2013), and job choices after graduation (Shu 2013). Others have studied the welfare impact of finance by documenting returns to finance jobs (Philippon and Reshef 2012; Kaplan and Rauh 2010), the elasticity of income with respect to financial output (Philippon and Reshef 2013), and borrower's behavior associated with distress finance (Melzer 2011; Karlan and Zinman 2010; Morse 2011).

In this paper, I introduce a new channel whereby access to credit can offer welfare improvements, namely in fertility outcomes.[1] Given that space and children are likely to be strong complements, the increase in the availability of mortgage credit during the U.S. housing boom, which is associated with a large increase in homeownership and home transactions, could have had a large impact on households' decisions to have children. This is because demographers have suggested that the transition from renting to homeownership is associated with an increase in fertility, arguably because households have access to more space (Felson and Solaun 1975; Kulu and Vikat 2007; Mulder and Billari 2010; Strom 2010). It is then possible that sizable changes in the number of births might have occurred due to the expansion of mortgage credit, allowing me to plausibly identify a causal effect of access to credit on fertility decisions. In short, the contribution of this paper is the identification and quantification of an effect of access to credit on fertility decisions through a channel associated with a more efficient reallocation of the existing housing stock among households, which creates access to space for young households who want to expand their families.

My identification relies on the ability to isolate a reallocation channel — associated with access to space — from other causes of fertility choices such as changes in household permanent income or changes in house wealth. I do this by laying out three channels by which the housing market could

[1] To make this argument, it must be assumed that fertility choices are, on average, welfare-improving. Beyond revealed preference demographers commonly link fertility and welfare, e.g., Thomson and Brandreth (1995); Kohler, Behrman, and Skytthe (2005); Margolis and Myrskyla (2011). I proceed under the assumption that having children is welfare-improving.

affect fertility: a wealth channel and two space channels. The house wealth channel helps households who are homeowners finance child rearing. Dettling and Kearney (2011) study the effect of house wealth on household fertility decisions; using Metropolitan Statistical Area level house prices from 1996 to 2006, they find that a $10,000 increase in house prices is associated with a 0.8% increase in fertility rates across homeowners (5%) and renters (-2.4%). The space channels, on the other hand, make it feasible to accommodate another house member in the dwelling, and are associated with access to larger homes or first-time homeownership. The two space channels through which access to credit impacts fertility are new construction and more efficient reallocation of the housing stock among households. My goal is to isolate the space channel associated with reallocation as a new causal channel between access to credit and fertility. To this end, I first estimate, after controlling for the observable determinants of fertility[2] and including county effects, the three housing channels in an ordinary least squares (OLS) framework. I proxy the intensity of reallocation with the change in per capita mortgage origination. However, some mortgage origination is not associated with reallocation. By choosing an appropriate instrument and using a two-stage least squares (2SLS) approach, I isolate the mortgage origination associated with reallocation and address endogeneity concerns from the OLS estimation.

Although the OLS estimates reveal that the reallocation is the relevant housing channel, the OLS estimates can be biased in both directions. For example, male permanent income shocks relax households' budget constraint allowing them to fund child rearing and simultaneously obtain more easily a mortgage loan. In this case, the OLS estimates are biased upwards if permanent income cannot be precisely controlled. Conversely, a shock to the female's level of education, or potential labor income, creates a negative bias, since the female's opportunity cost of child rearing increases, while the chance of qualifying for a mortgage loan increases. Therefore, to credibly identify the effect of access to credit on households' fertility decisions through a reallocation channel, I need an instrumental variable that correlates with fertility through the channel of interest — reallocation — and not through any other unobservable factor that drives fertility.

[2]Joseph Hotz et al. (1997) survey the fertility literature in developed economics and report the following variables as the most well identified determinants of fertility: income, unemployment, wealth, education, age structure, race, and ethnicity.

My empirical design is then defined by three features. First, I assume that the whole U.S. economy experienced an outward shift on supply of credit led by relaxation of credit standards (Mian and Sufi 2009; Keys, Mukherjee, Seru, and Vig 2010). Second, to control for geographical differences between cities, especially differences in labor and housing markets that could confound the identification, I include county effects in all estimations, hence only the zip code level variation within-county is used for identification. Third, I use zip code level variation in the fraction of homeowners who are older than 65 and live alone in 2000, henceforth *old homeowners*, to generate exogenous variation in the supply of houses that could easily be subject to reallocation. The source of variation of the instrument relies on the underlying motives that old households have to exit their houses. During the housing boom, old homeowners exited their houses because they could monetize their home values, could not afford to pay increasing property taxes, or suffered from age-related health adversities such as death or disability. I claim that the exit due to monetization and increasing property taxes is driven by the global increase in house prices that was caused the credit supply shock. Some old homeowners have a reservation price for their houses that credit constrained households can only pay when credit standards are loosened. Other old homeowners sell their houses and move out of their neighborhood when, due to increases in property assessments induced by the credit boom, property taxes rise to unaffordable levels relative to their income. The exit due to age-related health adversities is purely exogenous. Between 2000 and 2006 and within-county, the change in mortgage origination per capita is much larger in zip codes with high fraction of old homeowners relative to zip codes with low fraction of old homeowners, implying the that rank condition is met. Moreover, the increase in homeownership for young households (age<44) and decrease in homeownership for old households (age>65) is also larger in zip codes with high fraction of old homeowners. The instrument then captures the reallocation between young and old households. By projecting the change in mortgage origination per capita on the instrument defined as old homeowners, the first stage will pick up mortgage origination that is associated with reallocation.[3] The exclusion restriction is guaranteed by the assumption that the global increase in house prices in the beginning of the 2000s was not driven by an unobservable determinant of

[3]I assume that within-county houses are on average larger than apartments and thus suitable for young households to form and expand their families. I present anecdotal evidence in section III.a that supports this assumption.

fertility. Since the IV estimation controls for county effects, an alternative hypothesis has to drive all three variables - dependent, independent, and instrumental - in the average county in my sample. For example, if a permanent income shock is to confound the identification of the reallocation channel, it has to drive house prices and mortgage origination within the average county during the credit boom. However, Mian and Sufi (2009) show that between 2002 and 2005, and within-county, mortgage origination was disproportionally higher in zip codes with a high fraction of subprime borrowers despite their negative income growth.

One may still be concerned with the exclusion restriction of the aforementioned identification, particularly because unobservable income innovations could drive housing demand of credit constrained households and consequently cause the exit of old homeowners through monetization of high property taxes. Since the average life expectancy in the U.S. is 76 years for males and 81 years for females, I refine the above instrument by shifting the age limit to 75 years old, thus increasing the weight on the exit due to health-related reasons. The refined instrument is then the fraction of *homeowners who are older than 75 years old and live alone*, henceforth *75-homeowners*. Health adversities for people older than 75 are almost surely exogenous to possible unobservable income innovations that credit constrained households might have had during the credit boom. Although the nature of the instrument makes it unrelated to the credit shock, it generates exogenous variation in supply of housing that could be subject to reallocation during the housing boom. The first stage in the IV estimation in this second empirical exercise picks up more mortgage origination that is related with 'natural' reallocation. If the estimated coefficient is similar to the one estimated in the first empirical exercise, then it is plausible that the effect of credit supply induced reallocation on fertility is similar to the effect of 'natural' reallocation on fertility. I show that the two coefficients are indeed similar. Finally, one could be concerned that the reallocation identified during the credit boom happens any time, hence the estimated magnitude would be contaminated by the 'natural' shuffling between young and old households that constantly occurs in the economy. By examining the period from 1995 to 2000, right before the credit boom period, I show that the correlation between mortgage origination changes and fertility changes is zero at between counties and within-county at the zip code level. Since this period is characterized by strong economic growth, it is less

plausible that unobservable income innovations could confound my results.

To conduct my empirical analysis I construct a dataset of zip code level data that draws from a variety of data sources. I collect data on births from 10 Departments of Public Health: California, Idaho, Florida, Kansas, New York, Massachusetts, Oregon, South Carolina, Texas, and Wisconsin. I use individual loan data from Home Mortgage Disclosure Act (HMDA) to compute mortgage origination at the zip code level, and use income data from the Internal Revenue Service (IRS) to compute per capita income growth. I use data extracted from Zillow to compute zip code level house prices growth and use the Census and American Economic Survey to compute the demographic variables. The final dataset encompasses 2,753 zip codes, and covers approximately 70 million people in 2000, approximately 25% of the total U.S. population.

My estimates of the three housing channels show that during the housing boom the house wealth channel is not as large as estimated by Dettling and Kearney (2011). Using my zip code level dataset and the same regression specification as Dettling and Kearney (2011), I find that a \$10,000 increase in house prices is only associated with a net annual increase of 0.4% in fertility rates, instead of 0.8%. One possible explanation for this difference could rely on the heterogeneity of house price growth across metropolitan areas between 1996 and 2006, since in contrast with the early 2000s, house price growth from 1996 to 2000 happened mainly in geographies with high income growth (Glaeser, Gottlieb, and Tobio 2012; Ferreira and Gyourko 2011). Dettling and Kearney (2011)'s results could be drawing from the beginning of the sample, while mine draw from the second part of the time period they analyze.

According to my estimation, the house wealth and the new construction channel have modest effects on fertility. A one standard deviation increase in house prices growth leads to a 2.7% increase in fertility from 2000 to 2006. When measured by zip code level growth in the number of bedrooms, the space effect due to new construction is negative. A one standard deviation increase in new construction leads to a 1.5% decline in fertility from 2000 to 2006. The negative sign suggests that new construction is associated with older households who have passed the fertility age.

By contrast, the reallocation of the existing housing stock has a larger impact; a one standard deviation increase in reallocation leads to a 6.4% increase in fertility from 2000 to 2006, which

represents 28% of the standard deviation of fertility change. I then estimate the magnitude of the macroeconomic effect of the reallocation channel. For this purpose, I use county level data since my zip code level dataset only covers 10 states and the county-level sensitivity is remarkably similar to the zip code level sensitivity. I start by sorting the counties by the change in the per capita mortgage origination change from 2000 to 2006. Next, I create 20 equal size bins, and, using the estimated coefficient from the IV regression, I estimate the change in fertility and number of births from 2000 to 2006 for each bin. I assume that the bottom bin is the control group, while the other bins are subject to the treatment effect; consequently, I subtract the number of births in the control bin from the treatment bins and sum the effects across all bins. Using this methodology, I estimate that 136,000 new births in 2006 are associated to the reallocation channel, corresponding to 3% of the total children born in 2006. If I assume that the increase in fertility is linear from 2001 to 2006, which I will argue is plausible as figure 1 suggests, then in 2001 the number of reallocation-related births is equal to 23,000, and the sum of all the births from 2001 to 2006 is equal to approximately 500,000 new births.

A child born during a pre-bust period could increase the pressure on households to seek additional disposable income during the bust. Households would be more likely to increase labor participation in an environment of high unemployment and provide less optimal early childhood education, which can ultimately affect future child outcomes. In an attempt to understand if such effects could be present, I conclude the paper by presenting suggestive evidence that the change in fertility decisions due to the housing boom affected female labor participation during the financial crisis. Using individual records from the American Community Survey between 2007 and 2011, I show that women who had a child and lived in families who got a mortgage loan during the housing boom are more likely to be in the labor force during the financial crisis than similar women[4] who had a baby but rent in the same neighborhood (PUMA)[5]. They are however more likely to be unemployed than the average woman in the neighborhood, suggesting that they have a harder time obtaining a job because they stayed away from the labor force and chose to return during a time

[4] After controlling for head and wife's income, age, occupation, race, and education levels.

[5] Public Use Microdata Areas (PUMAs) are non-overlapping areas that partition each state into areas containing about 100,000 residents. PUMAs were developed to be the most detailed geographic area available in the Public Use Microdata Samples (PUMS).

of high unemployment rates.

The remainder of this section presents the literature related to this paper. The next section outlines the dataset used in this paper, its construction, and summary statistics. Section III presents the empirical methodology, namely the housing-related mechanisms. Section III also lays out the empirical design to explore the causal effect of access to finance on fertility decisions through the reallocation channel. OLS and IV results are in the first part of section IV. The second part of section IV presents robustness tests and the analysis of female participation in the labor force during the financial crisis. Finally, section V reports concluding remarks.

Related Literature. This paper relates to three strands of literature. Firstly, it relates to the literature that studies the implications of the mortgage credit expansion and its welfare effects. Mian and Sufi (2009) and Keys, Mukherjee, Seru, and Vig (2010) seminal works show that in the beginning of the 2000s the U.S. economy experienced an outward shift in the supply of credit. Mian and Sufi (2009) document that less creditworthy borrowers experienced easier access to mortgage credit despite their negative income growth. Keys, Mukherjee, Seru, and Vig (2010) suggest that existing securitization practices adversely affected the screening incentives of subprime lenders. Adelino et al. (2012) use exogenous changes in the conforming loan limit as an instrument for lower cost of financing and higher supply to show that easier access to credit significantly increases house prices. Motivated by these findings and the severity of the financial crisis, a subsequent literature started examining the welfare effects of the expansion of credit and the role of finance in the past decades. Greenwood and Scharfstein (2013) show that, starting in 1980, fees associated with residential mortgages became a sizable portion of the growth in the U.S. financial services industry, while Philippon and Reshef (2012) show that workers in finance earned an education-adjusted wage premium of 50% in 2006, despite no premium in 1990. Charles, Hurst, and Notowidigdo (2013) suggest that housing booms disguise unemployment growth as they reduce the likelihood that displaced manufacturing workers remain unemployed. Mian and Sufi (2012) find that geographical differences in household debt overhang explain the differences of cross-sectional unemployment in the non-tradable sector. Levine and Rubinstein (2013) present evidence that intrastate bank deregulation increases the probability to attend college for individuals with particular learning

abilities and family traits. Shu (2013) shows that careers in finance, especially at hedge funds and trading positions, attract students with high raw academic talent. This paper adds to this literature by highlighting another welfare dimension that was affected by the expansion of mortgage credit - the family structure.

Secondly, the current paper relates to the vast literature that studies the determinants of fertility. More than two centuries ago Malthus (1798) predicted a positive relation between income growth and population growth based on the hypothesis when people's incomes are higher they form families earlier and have more children. However, cross-national evidence over the last hundred years contradicts this prediction. As nations became industrialized and as their incomes increased, the fertility rate went down. Becker (1960), Becker and Lewis (1973) and Willis (1973) introduce the distinction between the quality and the number of children to explain the negative correlation between income and fertility. Angrist et al. (2010), however, show no evidence of a quantity-quality trade-off. Mincer (1963), Becker (1965), Willis (1973) and Schultz (1985) introduce women's time allocation decisions and emphasize the opportunity costs of women's time. Ermisch (1989) introduces market price of childcare to explain the impact of the mother's wage. Adsera (2005) suggests that the negative trend in fertility in developed countries is associated with constraints of the labor market where fertility decisions are taken. The cyclical behavior of fertility has received much attention since the work of Butz and Ward (1979). In most countries the fertility rate shows a negative response to unemployment along the business cycle, i.e., fertility is procyclical. Galor and Weil (1996) present a model where increases in women's wages lead to a decrease in fertility rates. Dettling and Kearney (2011) is the closest work to this paper. They use MSA house price variation to study the effect of house wealth effect on fertility decisions from 1996 to 2006. This paper reconciles their evidence with the other housing channels and highlights the importance of reallocation that stems from the relaxation of credit constraints.

Finally, this paper relates to the literature that studies the impact of fertility on other economic outcomes. The relationship between labor supply and fertility has been long studied. Angrist and Evans (1998) find substantial effects of fertility decisions on parents' labor supply. They show that female labor supply effects appear to be absent among more educated women, while there is no

relationship between wives' child-bearing and husbands' labor supply. Black et al. (2005) use a rich data set on the entire population of Norway and find a negative correlation between family size and children's education, but when they include indicators for birth order or use twin births as an instrument, family size effects become insignificant. Love (2009) presents a model in which marital status and children change savings behavior as well as portfolio choice. Bertocchi et al. (2011) study the join impact of gender and marital status on financial investments by testing the hypothesis that marriage represents, in a portfolio framework, a safe asset. They show that married individuals have higher propensity to invest in risky assets than single ones.

II DATA

II.a Macroeconomic Indicators

Before discussing the micro dataset that I use to study the causal relationship between access to credit and fertility, I show that, in the last 20 years, the relationship between mortgage origination and fertility is present in the aggregate data only during the housing boom. The top panel in figure 1 shows that the aggregate number of births in the U.S. started an uptrend in 1996 that lasted until the end of the housing boom. The middle panel shows that, over the same time period, the fertility rate[6] exhibited an uptrend between 2000 and 2007. Both time-series suggest a shift in fertility choices during the housing boom period. The bottom panel of figure 1 shows that the annual volume of mortgage origination for home purchase shifted to a higher level between 2000 and 2006. Figure 2 confirms that households used mortgage loans to purchase existing and newly constructed houses by showing that the number of home transactions increased faster between 2000 and 2006. Figure 2 also shows that the number of transactions of existing houses was significantly larger than the number of newly constructed houses. This difference suggests that during the housing boom households were more likely to move into an existing house than a newly constructed one. Figure 3, using county-level data, proceeds to investigate the potential relationship between access to

[6] According to the CDC, fertility rate is defined as the number of births divided by the number of women in child bearing age, assumed to be from 15 to 44 years old.

credit and fertility by showing that since 1995 mortgage origination and fertility are only positively correlated in changes between 2000 and 2006. The absence of correlation from 1995 to 2000, a period of strong economic growth, raises the bar for the permanent income hypothesis to be a credible alternative hypothesis. In order for permanent income to explain the positive correlation between fertility change and per capita mortgage origination change from 2000 to 2006 the correlation of income growth and per capita mortgage origination change would need to change from 1995-2000 to 2000-2006.

Lastly, I sort the counties on the per capita mortgage origination change from 2000 to 2006 and depict in figure 4 the time series of the fertility rate for the top and bottom quintiles between 1990 and 2010. Prior to 1996, fertility rates are not statistically different between the two groups. By 2000, the difference is small; however, between 2000 and 2006, fertility rates increased rapidly in high mortgage origination counties; yet, in low mortgage origination counties fertility rates remained fairly constant. In sum, the macro evidence suggests that access to finance was strongly associated with fertility decisions during the credit boom.

II.b Micro Data

I draw from a variety of data sources to construct the sample used in this paper. The sample consists of data on births, loans, income, house prices, employment, and demographics. Data on births is available by county and zip code, and was collected from the Department of Public Health (DPH) of each state. Birth statistics at the county level are available for 48 states from 2000 to 2006.[7]. Table 15 shows the years for which total births at the county level are available before 2000 and after 2006. Birth statistics at zip code level is available for 10 states: California, Idaho, Florida, Kansas, New York, Massachusetts, Oregon, South Carolina, Texas, and Wisconsin. For confidentiality reasons, in some states birth statistics are not available when the number of births is smaller than five in a given geography. Data at the zip code level is available for years 2000 and 2006.

Home Mortgage Disclosure Act (HMDA) provides loan level data from 1990 to 2011. Loan level

[7]The DPH of the state of Delaware and Louisiana did not make available their data at county level.

data is publicly available for lenders that meet a disclosure criteria defined by HMDA every year. Each loan application provides information on *year* of application, *lender*, *type of loan*, *loan amount*, *action taken* by the lender, *reason for denial*, in case the loan is denied, *race*, *sex* and *income* of the applicant and co-applicant, *census tract*, *county FIPS*, and *state FIPS* where the loan was originated, *owner occupancy*, and *purpose*. Loans have four types of purpose: *home purchase*, *home improvement*, *refinancing*, and *multifamily dwelling*. I only use loans that are originated for home purchase and are owner-occupied as principal dwelling.

I use the Internal Revenue Service (IRS) data to compute the zip code level income per capita. The IRS provides zip code level data for years 2001 and 2006. The provided income data includes adjusted gross income, number of returns, and wage income. Income per capita is defined as the ratio of the adjusted gross income to the number of returns.

Home prices are from Zillow. I extracted their sales-price-based price index for zip codes that have sufficient transaction level. Each Zillow Home Value Index (ZHVI) is a time series tracking the monthly median home value in a particular geographical region. In general, each ZHVI time series begins in April 1996. Instead of using a repeat sales methodology, Zillow uses the same underlying deed data as the Case-Shiller index but creates a hedonically adjusted price index. The Zillow index uses detailed information about the property, collected from public records, including the size of the house, the number of bedrooms, and the number of bathrooms. To the extent that the average measured characteristics of the home change over time, the Zillow index will capture such changes.[8] Guerrieri, Hartley, and Hurst (2013) show that the correlation between Case-Shiller Index and Zillow Index where the two samples overlap is equal to 94%. Monthly home prices are available from 1996 to 2012 for 10,187 zip codes.

Data on employment is from the County of Business Patterns (CBP) annual survey. CBP provides total employment for all establishments located in a given zip code. However, employment count from CBP is different from the employment for the zip code residents; therefore, I also use the employment data from the Decennial Census and the American Community Survey.

Finally, I use the public data from the Decennial Census and the American Economic Survey to

[8]More information about the computation methodology of the Zillow home price index can be found here: http://www.zillow.com/blog/research/2012/01/21/zillow-home-value-index-methodology/.

obtain zip code data on gender, race, ethnicity, type of household, educational attainment, housing tenure, and number of bedrooms. The 2000 Decennial Census provides zip code data directly. On the other hand, to access the zip code data from the ACS, one needs to use 5-year averages. I use the ACS's 5-year averages from 2005 to 2009.

The construction of the dataset proceeds as follows: I start by merging the births and the Zillow Price data. The merged data set covers 3,256 zip codes. I proceed to merge it with HMDA data, and the number of merged zip codes drops to 2,825. I then merge it with the IRS data and the CBP data, and as a result the number of zip codes drops to 2,793. Finally, after merging with the Census and ACS dataset the number of zip codes is 2,792. I then drop data points where births are missing in either 2000 or 2006, and repeat the same criteria for house prices and income data. The resulting dataset encompasses 2,753 zip codes, and covers 68.3 million people in 2000, approximately 25% of the total U.S. population.

Summary Statistics

Table 1 presents the summary statistics of the variables presented in this section. The change in per capita mortgage origination between 2000 and 2006 is equal to 4.7 per 1000 people on average, while the growth in house price during the same period is 106% in the average zip code, corresponding to annualized growth of 12.8%. For the 6 year period of analysis, the income growth is 22%, or in annualized terms 3.3%. Change in the female unemployment rate from 2000 to 2006 is 1.1%. Fertility changed by 3.37 per 1000 women in child bearing age from 2000 to 2006. The change in the zip code fraction of Hispanics and Blacks is on average 2.8% and 0.33%, respectively. The average population is 24,700 in 2000 and 26,700 in 2006. The average fraction of homeownership in 2000 is 65%. Finally, from 2000 to 2006 the average change in the fraction women with college degree is -1.7%.

III EMPIRICAL METHODOLOGY

III.a Mechanism

If households are credit constrained, an outward shift in the supply of mortgage credit induces them to adjust their housing consumption. As a result, households move within the existing housing stock as well as to newly constructed houses. They access more space as renters become first-time homeowners and homeowners move into larger or better quality houses. I assume that the transition from renting to homeownership provides households additional housing space.[9] The credit supply shock then provides households access to space that would have been unaccessible otherwise or would have only been reachable later in their life-cycle. As households access more space, they presumably change their consumption of complementary goods; specifically, if they have a cobb-douglas utility function for housing and children, as I present in the stylized model in section III.d, they may increase their fertility. A similar argument between space and fertility has been suggested by demographers (Felson and Solaun 1975; Kulu and Vikat 2007; Mulder and Billari 2010; Strom 2010). When a household moves into an existing house, I define it as reallocation. The credit supply shock can then affect the household's fertility decisions through two space channels: a reallocation and a new construction channel. Furthermore, since the credit shock causes an outward shift in housing demand it also impacts house prices. Increases in house prices create a wealth effect that relaxes homeowners' budget constraints, allowing better financing of child rearing, which increases the probability of having a child. The credit shock can then affect the household fertility decision through three channels: house wealth, new construction, and reallocation. The picture below outlines the three channels:

$$\begin{bmatrix} \text{Mortgage} \\ \text{Credit} \\ \text{Shock} \end{bmatrix} \rightarrow \begin{array}{c} \text{House Wealth} \\ \hline \text{Space: Reallocation} \\ \hline \text{Space: New Construction} \end{array} \begin{array}{l} \rightarrow \\ \rightarrow \\ \rightarrow \end{array} \begin{bmatrix} \text{Family} \\ \text{Formation} \\ \text{and Expansion} \end{bmatrix}$$

[9] I assume that the supply of apartments with more than two bedrooms is thin. Using 30 million Craigslist ads from 2008 to 2013, figure 5 presents suggestive evidence of thinness in the rental market. The price difference from a one to two bedroom is on average $390. By contrast, the price difference from a two to three bedroom apartment is $1100, and from a three to four bedroom is $2220. The higher relative increase in rent prices for larger apartments suggests short supply of large dwellings in the U.S. rental market.

Although reallocation could happen between any two households, in this paper I will stress the reallocation between young and old households. The reasoning goes as follows: young households are typically credit constrained and more prone to family formation and expansion. By contrast, old households are more likely to reduce their housing consumption, especially old householders who own a house and live alone.

III.b Measurement

In my empirical analysis, I study three housing channels that can link the expansion of credit and fertility decisions: wealth gains from house price increases, new construction, and more efficient reallocation of the existing housing stock among households. In this section, I describe how I measure each channel as well as the outcome variable — the fertility change.

III.b.1 House Wealth Channel

House prices impact family formation and expansion of homeowners and non-owners differently. An increase in house prices creates a wealth effect on homeowners, but tightens the budget constraint for renters since it increases the cost of housing. To distinguish the effect on homeowners and renters I interact the house price growth and the initial level of homeownership, since the house price effect is larger in zip codes where the level of homeownership is larger. The house price effect for a zip code i is:

$$\begin{aligned} \text{House Wealth Measure}_{\,2000\to2006,i} &= \lambda_1 \times \text{HP Growth}_{\,2000\to2006,i} \times \%\ \text{Homeownership}_{\,2000,i} \\ &+ \lambda_2 \times \text{HP Growth}_{\,2000\to2006,i} \end{aligned}$$

In the regression specification I control for the level of homeownership in 2000.

III.b.2 Construction Channel

An exogenous shock in new construction affects house prices and housing consumption. House prices are affected through a pure supply channel. The effects on housing consumption depend on the relative size and quality of new houses constructed. To capture the space effect created by new construction, either from new housing units or houses remodeled, I will use the growth in the total

number of bedrooms:

$$\text{Construction Measure}_{\,2000\to2006,i} = \frac{\#\text{House Units}_{\,2006,i} - \#\text{House Units}_{\,2000,i}}{\#\text{House Units}_{\,2000,i}}$$

III.b.3 Reallocation Channel

Credit constrained households have below optimal housing consumption. Inability to consume desired housing leads to lower demand and lower prices. A credit supply shock that lowers the lending standards facilitates the reallocation of housing resources. The ideal measure of reallocation quantifies the number of houses that are bought by credit constrained households from homeowners who were underutilizing their house. Since credit constrained households use the expansion of mortgage origination to buy a home, I proxy reallocation as the change in number of mortgages originated for home purchase per household defined as:

$$\begin{aligned}\text{Reallocation Measure}_{\,2000\to2006,i} &= \left[\frac{\#\text{ Mortgage Origination}}{\#\text{ Population}}\right]_{2006,i} \\ &- \left[\frac{\#\text{ Mortgage Origination}}{\#\text{ Population}}\right]_{2000,i}\end{aligned}$$

Although Mian and Sufi (2009)'s work suggest that the above measure captures the increase in mortgage origination for credit constrained households, it is not guaranteed that the change in mortgage origination is correlated with purchases of larger homes. This issue is addressed by the instrumental variable.

III.b.4 Fertility Change

To measure fertility rates at the zip code level, I compute the ratio of the number of births over the number of women in child bearing age, assumed by the Centers for Disease Control and Prevention to be women with ages between 15 and 44. The Fertility change from 2000 to 2006 is then defined as:

$$\text{Fertility Change}_{\,2000\to2006,i} = \left[\frac{\#\text{ Births}}{\#\text{ Women}_{15<\text{age}<44}}\right]_{2006,i} - \left[\frac{\#\text{ Births}}{\#\text{ Women}_{15<\text{age}<44}}\right]_{2000,i}$$

III.c Estimation Methodology

My identification relies on the ability to isolate a space effect, associated with a better reallocation of the housing stock, from other causes of fertility choices - notably household permanent income. I do this by laying out three channels by which the housing market could affect fertility: a wealth channel and two space channels. The wealth effect helps households finance child rearing, but is only relevant to homeowners. The other housing channels that can explain fertility choices relate to space. Space makes it feasible to accommodate another house member in the dwelling and is provided by access to larger homes and first-time homeownership. The two channels by which space impacts fertility are new construction and efficient reallocation of the housing stock. My goal is to isolate the space channel, associated with reallocation, as a new causal relationship between access to finance and fertility. I implement an empirical strategy in which the three effects are jointly estimated in an ordinary least squares framework. Then, using an instrumental variable approach, I isolate the space channel of interest and address issues related to endogeneity.

III.c.1 OLS

I first exploit zip code level variation with county effects to estimate the three housing effects that link access to finance with the change in fertility decisions. Since the regressors are likely to be endogenous, the estimates are potentially inconsistent. However, the direction of the coefficients and their magnitudes are informative about the potential economic significance of each channel. Furthermore, the comparison of the estimates with and without the other observable determinants of fertility is also informative about the stability of the coefficients and potential orthogonality of the effects with the error term. In all regression specifications, errors are robust and clustered at

the state level. The regression model for zip code i is:

$$\begin{aligned}\text{Fertility Change}_{\,2000\to2006,i} &= \beta_0 + \beta_1 \times \text{Reallocation}_{\,2000\to2006,i} \\ &+ \beta_2 \times \text{Construction}_{\,2000\to2006,i} \\ &+ \beta_3 \times \text{House Wealth}_{\,2000\to2006,i} \\ &+ \alpha \times X_i + \text{County Effects} + \varepsilon_i.\end{aligned}$$

The literature on the economics of the family identifies fertility as a function of male and female income, wealth, unemployment, and the female's cost of time, race and ethnicity (Joseph Hotz et al. 1997, Butz and Ward 1979, Schultz 1985, Adsera 2005). Positive male permanent income shocks are associated with higher total fertility. More permanent income relaxes the household's budget constraint and allows it to finance child rearing. Transitory female income and unemployment shocks are associated with changes in fertility timing. Women time their fertility decision for times when their opportunity cost is small (Schultz 1985). Based on these identified *traditional determinants*, X_i includes controls for: per capita income growth form 2001 to 2006[10]; per capita log income in 2001; level of homeownership in 2000; per capita CBP employment change from 2000 to 2006; change in unemployment for women with ages between 25 and 44 from Census and ACS; change in composition of race and ethnicity; level of fertility in 2000; and change in fraction of college educated women with ages between 25 and 44. X_i also includes changes and levels of the fraction of women of ages from 15 to 17 years, 18 to 24 years, 25 to 34 years, and 35 to 44 years.

III.c.2 Endogeneity Concerns and IV

The OLS estimates allow us to have a preliminary sense of what housing channels may have been relevant during the credit boom period. Although the OLS estimates suggest that the reallocation is the relevant channel to explain the effect of access to finance on fertility, they can be biased in both directions. For example, male permanent income shocks relax the household's budget constraints allowing it to fund child rearing and simultaneously more easily obtain a mortgage

[10]IRS income data is not available at the zip code level in 2000, only in 2001.

loan. In this case, if such a shocks are not appropriately controlled for, OLS estimates of the impact of reallocation on fertility is biased upwards. On the other hand, a shock to the female's level of education or potential labor income creates a negative bias since the female's opportunity cost of child rearing increases, but at the same time the chance of qualifying for a mortgage loan increase. To identify the effect of access to finance on the household's fertility decision, I need an instrumental variable that correlates with fertility through the channel of interest - reallocation - and not through any other unobservable factor that drives fertility.

The identification relies on three features. First, I assume that the whole U.S. economy experienced an outward shift on supply of credit led by relaxation of credit standards (Mian and Sufi 2009; Keys, Mukherjee, Seru, and Vig 2010). Second, I control for county effects to isolate geographical differences between cities, especially differences in labor and housing markets. Third, in order to instrument reallocation, I use zip code level variation in the fraction of homeowners who are older than 65 years old and live alone, henceforth *old homeowners*, and defined as:

$$\text{old homeowners} = \frac{\#\text{Homeowners Older than 65 years old and Living Alone }_{2000}}{\#\text{Households }_{2000}}.$$

During the housing boom, *old homeowners* exited their houses because they could monetize their home values, could not afford to pay increasing property taxes, or suffered from age-related health adversities such as death or disability. I claim that the exit due to monetization and property taxes is driven by the credit supply shock. Some *old homeowners* have a reservation price for their houses that credit constrained households can only pay when credit standards are loosened. Other *old homeowners* sell their houses and move out of their neighborhood when, due to increases in property assessments induced by the credit boom, property taxes rise to unaffordable levels relative to their income. The exit due to age-related health adversities is purely exogenous. I assume that within the same county houses are on average larger than apartments[11] and thus suitable for young households to form and expand their families. The exit of *old homeowners* then generates an exogenous variation in the supply of houses available for reallocation that is unrelated to other determinants of fertility. Since the IV estimation controls for county effects, an alternative

[11] I present anecdotal evidence in section III.a that supports this assumption.

hypothesis has to drive all three variables - dependent, independent, and instrumental - in the average county in my sample. For a permanent income shock to confound the identification of the reallocation channel, it has to drive house prices and mortgage origination within the average county during the credit boom. However, Mian and Sufi (2009) show that between 2002 and 2005, and within-county, mortgage origination was disproportionally higher in zip codes with a high fraction of subprime borrowers despite their negative income growth.

One may still be concerned with the exclusion restriction of the aforementioned identification, particularly because unobservable income innovations could drive housing demand of credit constrained households and consequently cause the exit of *old homeowners* through monetization of high property taxes. Since the average life expectancy in the U.S. is 76 years for males and 81 years for females, I refine the above instrument by shifting the age limit to 75 years old, thus increasing the weight on the exit due to health-related reasons. The refined instrument is then the fraction of *homeowners who are older than 75 years old and live alone*, henceforth *75-homeowners*, and defined as:

$$\text{75-homeowners} = \frac{\#\text{Homeowners Older than 75 years old and Living Alone }_{2000}}{\#\text{Households }_{2000}}.$$

Health adversities for people older than 75 are almost surely exogenous to possible unobservable income innovations that credit constrained households might have had during the credit boom. Though the nature of the instrument makes it unrelated to the credit shock, it generates exogenous variation in supply of housing during the housing boom, and therefore it allows me to identify the causal impact of access to finance (via reallocation channel) on fertility.

Lastly, one could raise doubts about the external validity of the results. Young credit constrained households can achieve space through reallocating by moving into to a vacant house, a house where the previous household was dissolved, a house where the current household upgrades to a larger house, or a house where the current household downsizes to a smaller house. Under these different options for reallocation, one should be concerned whether the treatment effect of reallocation on fertility produced by the variation of *old homeowners* is the same as the average treatment effect of all types of space increase on fertility (Angrist and Krueger 2001). The causal mechanism of

reallocation is that access to space causes family expansion. Therefore, it seems plausible to assume that as long as young households access more space they will expand their families, despite who the previous homeowners were or the conditions that led the previous household to leave the house. Under this assumption, that space is the key variable, I assume that the local treatment effect estimated equals average treatment effect.

Table 3 panel A reports the OLS regression coefficients of *old homeowners* on the change in homeownership for different age groups, after controlling for county effects. Table 3 shows that the instrument captures precisely the variation of interest. In zip codes with high fraction of old homeowners, the homeownership increased for households whose head age is between 25 and 34 as well as between 35 and 44. The regression coefficient is equal to 0.21 and 0.28, respectively, and statistically significant. On the other hand, the regression coefficient on the change in homeownership for households whose head age is between 65 and 74 is -0.21, and above 75 is -0.29. The regression coefficient on the change in homeownership for households whose head age is between 44 and 65 is almost zero and insignificant. These regression coefficients show that, from 2000 to 2006, in zip codes with high fraction of *old homeowners* there was a reallocation of the housing stock whereby old households sold their houses to younger households. Table 4 panel A shows that the same results hold for the *75-homeowners*.

I finish this section presenting the regression model that implements the instrumental variable approach using the aforementioned instrument. I repeat the same specification when the instrument is refined from *old homeowners* to *75-homeowners*. I use a 2SLS estimation where in the *first stage* I estimate:

$$\begin{aligned}
\text{Reallocation Measure}_{2000\rightarrow 2006,i} &= \theta_0 + \theta_1 \times \left[\frac{\#\text{Homeowners, age>65 and Living Alone}}{\#\text{Households}}\right]_{2000,i} \\
&+ \theta_2 \times \text{Construction Measure}_{\,2000\rightarrow 2006,i} \\
&+ \theta_3 \times \text{House Price Measure}_{\,2000\rightarrow 2006,i} \\
&+ \Theta \times X_i + \text{County Effects} + \eta_i,
\end{aligned}$$

and in the *second stage* I estimate:

$$\begin{aligned}\text{Fertility Change}_{\,2000\to2006,i} &= \beta_0 + \beta_1 \times \widehat{\text{Reallocation Measure}}_{\,2000\to2006,i} \\ &+ \beta_2 \times \text{Construction Measure}_{\,2000\to2006,i} \\ &+ \beta_3 \times \text{House Price Measure}_{\,2000\to2006,i} \\ &+ \alpha \times X_i + \text{County Effects} + \varepsilon_i.\end{aligned}$$

Vector X_i includes controls for: per capita income growth from 2001 to 2006, per capita log income in 2001, per capita employment change from County of Business Patterns, change in unemployment for women with ages between 25 and 44 from Census and ACS, change in composition of race and ethnicity, level of fertility in 2000, and change in fraction of college educated women with ages between 25 and 44. X_i also includes changes and levels of the fraction of women with ages from 15 to 17 years, 18 to 24 years, 25 to 34 years, and 35 to 44 years. The rationale for each control is presented above, in the OLS section.

III.d Stylized Model

The stylized model presented below formalizes the dynamics between housing consumption and demand for children when households are subject to a shock in access to credit. Credit constraints are modeled as a shock in downpayment requirements. Therefore, a shock in access to credit is modeled as a negative shock to downpayment requirements. Children are complements to housing. This simple framework delivers the empirical predictions of the mechanism described in III.a. When downpayment payment requirements fall, households increase their housing consumption as well as their demand for children - the balance between timing and permanent change in fertility varies with the model's parameters.

Consider a two period model where households consume housing, H, and children, C. Households have cobb-douglas preferences that makes them like more children when they have more housing. The price of housing consumption is given, equal to p, and priced in units of children consumption. Households choose their housing consumption at period $t = 0$, which is kept unchanged in $t = 1$,

and choose the amount of children in each period separately. They can borrow at $t = 0$, but need to meet the downpayment constraint of γ times the dollar amount of housing services. The interest rate is r and the mortgage that was originated at $t = 0$ needs to be paid in full at $t = 1$. Households earn a constant wage w. They maximize:

$$U(H, C_t) = \sum_{t=0}^{1} \beta^t \left(\alpha \log(H) + (1-\alpha)\log(C_t)\right)$$

subject to:

$$\gamma pH + C_0 \leq \omega \text{ at t=0, and}$$
$$(1-\gamma)pH(1+r) + C_1 \leq \omega \text{ at t=1.}$$

One can then show that under certain parameter conditions, C_0 is decreasing in γ. Particularly, when $1 + r = 1$ and $\beta = 1$ the closed form solution for derivative of C_0 with respect to γ is:

$$\frac{\partial C_0(\gamma)}{\partial \gamma} = \frac{2\alpha(2\gamma - 1)\omega}{(\gamma - 1)g(\gamma, \alpha)} - \omega \frac{1 + \alpha + g(\gamma, \alpha)}{4(\gamma - 1)^2}$$

where $g(\gamma, \alpha) = \sqrt{1 + \gamma^2 + 2\alpha(1 + 8(\gamma - 1)\gamma)}$. In this particular case C_0 decreases in γ when $\gamma < 1/2$. In other words, as long as the downpayment is smaller than 50% of the house price, households will choose to have more children early if they experience a negative shock in the downpayment requirements. Three predictions come out of the model when credit standards are relaxed for credit constrained households.

Prediction 1: $\partial H/\partial \gamma < 0$. Households demand more housing consumption when downpayment requirements decrease. This is the part of the model that delivers the housing boom. Downpayment requirements are one way by which credit standards were loosened. Relaxation of credit score requirements was likely the most common one. However, in the two period setting it is fairly tractable to implement downpayment requirements as it is above.

Prediction 2: $\partial C_0/\partial \gamma < 0$. Households demand more children in period $t = 0$ as credit standards are loosened. This is a feature of the cobb-douglas utility function, since the more housing

households consume the more children they prefer.

Prediction 3: Children consumption in period $t = 1$ varies with the parameter choice, but total consumption of children increases, $\partial C_T/\partial\gamma < 0$, where $C_T = C_0 + C_1$ is the total number of children that the household decides to have in both periods. Since total fertility, C_T, increases while C_1 might decrease, some of the increase in fertility during the housing boom is a matter of timing. Young households, because of easy access to credit, obtain homeownership earlier in their life-cycle and consequently form their families earlier as well.

IV RESULTS

Before reporting the main results of the paper at the zip code level, I show that the relation between changes in fertility and changes in mortgage origination per capita is similar at the county and zip code level. The similarity between zip code level and county level results is important to estimate the aggregate effect of access to credit on fertility changes. The zip code sample only covers 25% of the U.S. population, while the county level sample covers approximately 93% of the population.

IV.a OLS: County Level

Table 5 reports the OLS county level regression coefficients of the fertility rate change from 2000 to 2006 on traditional determinants and the housing channels.[12] From the baseline specification, without state effects and population weights, in column 1, the addition of the change in mortgage origination increases the R^2 from 13.7% to 19.9%, column 3. At the county level, mortgage origination explains an additional 45% of the variation relative to traditional determinants. The inclusion of state effects decreases the coefficient on mortgage origination from 0.41 to 0.35 in the model with controls, and the inclusion of population weights changes the coefficient on mortgage origination to 0.30. Lastly, column 8 and 10 provide interesting county-level evidence about the three housing channels. First, the coefficient on mortgage origination (0.30) does not change after including the

[12]To account for the mechanical changes in fertility rates that are caused by demographical migration between counties, I control for changes in and levels of age, race and ethnicity groups.

measures for the house wealth and new construction channel. Second, and surprisingly, the net effect of the house price growth is negative (-2.11) at the mean of U.S. homeownership (0.66). For a 10% increase in house price growth the number of births decreases by -0.211 per 1000 women in child bearing age from 2000 to 2006. Moreover, the magnitude is unchanged with the addition of mortgage origination in the regression model. This specification, since it includes state effects, differs from Dettling and Kearney (2011), who studied the effect of house price changes on fertility. The model with state effects suggests that the negative effect on fertility associated to renters outweighs the positive effect from wealth gains of homeowners. By contrast, the effect of per capita mortgage origination change on fertility change is equal to 0.30 and stable across specifications.

IV.b OLS: Zipcode Level

Traditional Determinants

The previous literature has identified various determinants that explain fertility, namely male and female income, wealth, unemployment, and the female's cost of time, race and ethnicity (Joseph Hotz, Klerman, and Willis 1997, Butz and Ward 1979, Schultz 1985, Adsera 2005). Since I can measure these determinants, I start by estimating them and comparing the signs and magnitudes to the ones previously found in the literature. Table 6 reports that the change in unemployment of males who live in the zip code correlates negatively with the change in fertility and is statistically significant. On the other hand, female unemployment is positively correlated with the fertility change, although not statistically significant. Male unemployment reduces household's fertility because of the large negative income shock and uncertainty associated with the loss of employment (Butz and Ward 1979). Given male unemployment, female unemployment is commonly associated with timing whereby women choose to have children when their opportunity cost of child rearing is low (Schultz 1985). The signs of the two unemployment coefficients match the ones found previously in the fertility literature. The growth in employment from the CBP survey measures the growth in employment from the businesses located in the zip code. CBP employment growth is positively correlated with fertility changes, capturing zip code level economic development, which potentially provides employment opportunities for residents. The level of income, measured by IRS

data, is negatively correlated with fertility changes. Lower income households are more likely to have more children (Galor and Weil 2000); for example, teenagers in low income families tend to have higher fertility rates than teenagers in high income families. The per capita income growth effect, measured with the IRS data, on fertility is positive, but not statistically significant. The lack of significance is likely to be related to either the strong significance of the employment growth, or to the fact that income levels have strong prediction power of the income growth rates. Finally, zip code changes in females' college level education, which proxies for the change in the opportunity cost of the average female in the zip code, is negatively correlated with changes in fertility, consistent with the literature that claims that as females's opportunity cost increases fertility decreases (Schultz 1985). Table 7 reports the coefficients on the age and demographic variables of the same regression. Consistent with the literature on fertility (Parrado and Morgan 2008), zip codes where the fraction of Hispanics increases experience an increase in fertility. Likewise, if the zip code experiences an increase in the fraction of blacks it also experiences an increase in fertility.

IV.c Discussion of the Housing Channels

I examine three housing channels that can link the expansion of credit and fertility decisions: wealth gains from house price increases, new construction, and more efficient reallocation of the existing housing stock among households. My goal is to isolate the space channel associated with reallocation as a new causal channel of access to credit on fertility. To that end, I first estimate, in an ordinary least squares framework, the three housing channels controlling for the traditional determinants of fertility. Then, using an instrumental variable approach, I isolate the mortgage origination associated with the reallocation channel and address endogeneity concerns that arise from the OLS estimation. I present the results of the IV estimation in the next section, while in this one, I discuss the OLS estimation based on the results reported in table 6. The OLS estimation allows the following three inferences.

First, I find that the house wealth channel during the credit boom is not as large as estimated by Dettling and Kearney (2011). Dettling and Kearney (2011) use MSA level house price variation to study the house wealth effect on fertility decisions from 1996 to 2006. They find that a $10,000

increase in house prices is associated with a 5% increase in births among homeowners and a 2.4% decrease among non-owners. At the mean of U.S. homeownership rate the net effect is 0.8%. Using my zip code level dataset and the same regression specification as Dettling and Kearney (2011), I find that a $10,000 increase in house prices is only associated with an annual increase of 0.4% in births, instead of 0.8%. One possible explanation for this difference relies on the heterogeneity of house price growth across metropolitan areas between 1996 and 2006, since in contrast with the early 2000s, house price growth from 1996 to 2000 happened mainly in high income growth areas (Glaeser, Gottlieb, and Tobio 2012; Ferreira and Gyourko 2011). Dettling and Kearney (2011)'s results could be drawing from the beginning of their sample, while mine draw from the second part of the time period they analyze. In the OLS framework, I estimate that, at the mean of the U.S. homeownership (0.66), a one standard deviation increase in house prices growth (0.54) leads to a 2.7% increase in the fertility from 2000 to 2006, which is 13% of a standard deviation increase in fertility change.

My second inference is that, when measured by zip code growth in the number of bedrooms, the space effect due to new construction channel is negative. A one standard deviation increase in growth in number of bedrooms (0.23) leads to a 1.5% decline in fertility from 2000 to 2006, which is a 6% of a standard deviation decrease in fertility change. The negative sign suggests that new construction is associated with older households who have passed the fertility age. Moreover, the negative sign corroborates an equilibrium where households move up, meaning mid-age households move up to new houses and young households move into existing houses. Under this view, the new construction channel is consistent with the reallocation channel.

Third, reallocation, as measured by the change in per capita mortgage origination after controlling for the other housing channels, correlates positively with the change in fertility. The coefficient without controls (0.31) is remarkably close to the one estimated at the county-level. After accounting for other traditional determinants the OLS coefficient decreases to 0.21. Since the coefficient can be biased in both directions, I proceed to instrument the variation of mortgage origination with the fraction of homeowners who live alone and are older than 65 (*old-homeowners*). The validity of the instrument is discussed in section III.c.2.

IV.d Instrumental Variable: old Homeowners

To eliminate the possible reallocation coefficient's bias in the OLS estimation, I use the fraction of homeowners who live alone and are older than 65, *old homeowners*, to generate variation in reallocation that is uncorrelated with other unobservable determinants of fertility rates. I discuss in section III.c.2 why the instrument is correlated with the measure of reallocation and why, conditional on controlling for reallocation, is likely to be uncorrelated with the other unobservable determinants of fertility.

In this section, I report the first-stage and the IV estimates of the second stage. Table 6 reports the first-stage together with the second-stage. In the first-stage, the estimated coefficient on old homeowners is 22.32 with a standard error of 4.34 and a F-statistic of 15.43.[13] The IV coefficient is 0.33 and statistically significant, with a t-statistic of 2.2. The instrumented reallocation measure implies that one standard deviation change in per capita mortgage origination change (12.0) leads to a 6.4% increase in fertility from 2000 to 2006, which is 28% of a standard deviation increase in fertility change. The estimated coefficients in the other two housing channels are almost unchanged, as well as the coefficients on the traditional determinants of fertility. The stability of the housing channels in the IV estimation relative to the OLS estimation makes it likely that the the reallocation measure is orthogonal to the house wealth and new construction measures. The IV coefficient (0.33) on the reallocation measure is almost equal to the OLS coefficient without controls (0.31), but 57% higher than the OLS with controls (0.21). Although measurement error is fairly plausible, an alternative explanation relies on the nature of the treatment associated with the instrument. The measure of reallocation, per capita mortgage origination, measures mortgage loans that were originated without the purpose of reallocation, for example, a mortgage originated to a single householder. Although the same could be claimed about the household who buys a house from a old homeowner, the estimated IV results suggest that it was more likely that the old homeowner was replaced by a couple who had a child around the time of purchase.

The IV results point out the importance of the reallocation channel and the lack of power of

[13] According to Staiger and Stock (1997), who formalized the definition of weak instruments, since the F-statistic exceeds 10, the instrument is sufficiently strong.

the other two housing channels to explain the variation of the fertility between 2000 and 2006. Since the house wealth has gained relevance in the fertility literature, I investigate furthermore the impact of this channel on fertility. Table 9 shows that the net effect of the house wealth on fertility is even weaker than my IV estimates if I change the regression specification. If one wants to estimate the net effect of the house prices on fertility the inclusion of only house price should suffice to capture the net effect. In column 7 of Table 9, I present the estimates of the OLS regression in which the reallocation channel and new contraction are included together with the house price growth. The estimated coefficient on house price growth is significant at the 5% level and equal to 2.05, implying that a one standard deviation increase in house prices growth (0.54) leads to a 1.8% increase in the fertility from 2000 to 2006, which is 7.9% of a standard deviation increase in fertility change. Moreover, in the IV estimations the coefficient drops to 1.66 and is only significant at the 10% level. Together, the evidence for the house wealth channel, suggests that between 2000 and 2006 the net impact is small. The increase in fertility of homeowners due to house wealth gains is cancelled out by the decrease in fertility of renters due to higher costs of housing.

IV.e Refinement: 75-Homeowners

When the instrument is refined to focus only on the older (age>75) population that is more likely to exit their house because of health related reasons rather than the monetization and the price out, the F-statistic of the first-stage equals 15.42. The instrumented coefficient is 0.33 and statistically significant with a t-statistic of 2.2. When the instrument relies more heavily on the the clearly exogenous part of the variation in reallocation the coefficient is still estimated with the same magnitude. This evidence, as discussed in section III.c.2, should alleviate concerns that the identification of the reallocation channel, presented in the previous section, is confounded by unobservable innovations in permanent income.

IV.f Economic Magnitude

As expansion of mortgage credit is associated with a large increase in homeownership and home reallocations, it is plausible that sizable changes in the number of births occurred due to the housing boom. To estimate the magnitude of the effect of the access to credit through the reallocation

channel, I first sort the counties by change in the per capita mortgage origination from 2000 to 2006. I use the whole sample of counties where I have data on births and loans from HMDA, that is 2091 counties that cover approximately 93% of the U.S. population. I use county level data since my zip code level dataset only covers 10 states and the county-level sensitivity of fertility to the reallocation channel is remarkably similar to the zip code level IV sensitivity. I create 20 equal size bins, and using the estimated coefficient from the IV regression, I estimate the change in fertility for each bin from 2000 to 2006. Then, using the change in fertility and number of women of child bearing age in each bin, I compute the number of births in 2006 in each bin due to the reallocation channel. Finally, I assume the bottom bin to be the 'control' bin and the others to be the 'treatment' bins. The estimate of births in 2006 is then equal to the sum of 'treatment' bins minus 'control' bin. Using this methodology and relying on the assumption that the bottom bin is a fair 'control' group, the estimated number of births is equal to 136,000 in 2006. If I assume that the growth in fertility is linear from 2001 to 2006, as figure 1 suggests, then in 2001 I estimate the number of births to be 22,800. The sum of all the reallocation-related births from 2001 to 2006 is equal to 478,000. About 3% of the children that were born in 2006 were due to the housing boom.

IV.g Female Participation in the Labor Force

According to the U.S. Department of Agriculture, it will cost, in 2012 dollars, approximately $248,000 for a middle-income family to raise a child for 18 years. A child born during a credit boom period could increase the pressure on a household to seek additional disposable income during the bust. The household would then be likely to increase their labor supply in an environment of high unemployment and potentially provide less optimal early childhood education to their children, which could ultimately affect future outcomes of their children.[14] According to this hypothesis, and assuming that the cost of owning is higher than renting, households who decide to have a child and get a mortgage loan during the housing boom period (*mortgage-baby* households) are more likely to experience financial distress during the crisis period than similar households who decided to be renters (*renter-baby* households). To test if women in mortgage-baby households are

[14] Leventhal and Newman (2010) suggest that residential mobility during the 2008 financial crisis is associated with deleterious effects on children's short-term academic performance.

more likely to be in the labor force during the bust, I use individual records from the American Community Survey. The American Community Survey surveys 3% U.S. households every year after 2005. The panel is cross-sectional and has no longitudinal dimension. However, ACS asks when the households move into their dwellings, as well as the type of housing tenure; and, in case of ownership, they ask if there is a mortgage loan. With this information, and assuming that the current mortgage existed since they moved in, I can back out the households who obtained a mortgage loan between 2000 and 2006, and compare them with similar households who moved into an apartment in the same neighborhood (PUMA).[15] The regression model for household h is:

$$\begin{aligned} \mathrm{Y}_h &= \beta_0 + \beta_1 \times \mathbb{1}_{\{Mortgage\ and\ Baby,h\}} \\ &+ \Gamma \times X_h + \text{PUMA Effects} + \text{Race Effects} + \varepsilon_h. \end{aligned}$$

where,

$$\mathbb{1}_{\{\text{Mortgage and Baby}\}} = \begin{cases} 1, \text{ if mortgage and baby between 2000 and 2006} \\ 0, \text{ if renter and baby between 2000 and 2006} \end{cases}$$

and Y_h is 1 if the female in the household is in the labor force and 0 otherwise. The controls include wife and husband's age, college indicator, and race. I also control for the number of bedrooms and the dwelling's year of construction. Since households decided to buy a house or be renters, there is a fair amount of selection bias in the above regression. Although I try to address the bias by controlling for observable characteristics that can reduce the selection bias, we should bear in mind the possible selection bias when interpreting the regression results. Table 14 shows the results of the aforementioned regression model. Between 2007 and 2011, females in mortgage-baby households are 14% more likely to be in the labor force than females in renter-baby households. The second column of table 14 presents the same regression model, but with two differences. First, the left-hand-side variable is 1 if the female is employed and 0 otherwise. Second, the right-hand-side

[15] Public Use Microdata Areas (PUMAs) are non-overlapping areas that partition each state into areas containing about 100,000 residents. PUMAs were developed to be the most detailed geographic area available in the Public Use Microdata Samples (PUMS).

variable is now:

$$\mathbb{1}_{\{\text{Mortgage and Baby}\}} = \begin{cases} 1, \text{ if mortgage and baby between 2000 and 2006} \\ 0, \text{ otherwise.} \end{cases}$$

Intuitively, this exercise compares the female in the *mortgage-baby* household with all other similar females in the neighborhood. The estimated coefficient shows that the female in the mortgage-baby household is more likely to be unemployed, suggesting that they have a harder time obtaining a job likely because they stayed away from the labor force and chose to return during a time of high unemployment.

V Concluding Remarks

This paper introduces a new welfare effect of access to finance whereby access to credit can offer welfare improvements, namely in fertility outcomes. I conduct within-county analysis with zip code level data to document that changes in mortgage origination are strongly associated with changes in fertility rates beyond traditional fertility determinants such as income and unemployment. I examine three housing channels that could explain this correlation: wealth gains from house price increases, new construction, and more efficient reallocation of the existing housing stock among households. I claim that after controlling for the house wealth and construction channel, mortgage origination measures the reallocation channel. The reallocation allows young households to move to larger homes or achieve homeownership earlier in their life-cycle, while older households can downsize their housing consumption. I exploit zip code level variation in fraction of homeowners older than 65 and living alone to causally identify the reallocation channel. During the housing boom, old homeowners exited their houses because they could monetize their home value, could not afford to pay increasing property taxes, or suffered from age-related health adversities such as death or disability. I claim that the exit due to monetization and property taxes is driven by the credit supply shock. Some old homeowners have a reservation price for their house that credit constrained households can only pay when credit standards are loosened. Other old homeowners sell their houses and move out of the neighborhood because property taxes raise to unaffordable

levels relative to their income, when property assessments increase induced by the credit boom. The exit due to age-related health adversities is purely exogenous. The variation generated by the instrument allows me estimate the causal effect of access to finance on fertility decisions through the reallocation channel. The IV estimates show that one standard deviation increase in reallocation leads to a 6.4% increase in fertility from 2000 to 2006, which represents 28% of the standard deviation of fertility change. The same increase in house prices leads to only a 2.7% increase in fertility from 2000 to 2006, and in new construction leads to a 1.5% decline in fertility from 2000 to 2006.

Such a large number of births could significantly affect other economic outcomes. According to the U.S. Department of Agriculture, it will cost, in 2012 dollars, approximately $248,000 for a middle-income family to raise a child for 18 years. A child born during a credit boom period could then increase the pressure on a household to seek additional disposable income during the bust that follows the boom. The household would then be likely to increase their labor supply in an environment of high unemployment and potentially provide less optimal early childhood education to their children, which could ultimately affect future outcomes of their children. I present suggestive evidence that the change in fertility decisions due to the housing boom affected female labor participation during the financial crisis. Using individual records from the American Community Survey between 2007 and 2011, I show that women who had a child and lived in families who got a mortgage loan during the housing boom are more likely to be in the labor force and unemployed during the financial crisis than similar women who had a baby but rent in the same neighborhood. Beyond the direct impact on utility and the impact on expenditures, fertility decisions produce significant changes at the aggregate level by affecting population growth and economic growth (Barro and Becker 1989 and Becker et al. 1990). Therefore, if the expansion of credit affected the fertility rate of U.S. households, it is relevant to estimate the magnitude of the aggregate effect. I estimate that approximately 500,000 babies were born between 2000 and 2006. In 2006 3% of the total number of births was due to the reallocation channel. This paper not only contributes to the literature on the welfare effects associated to the access to finance, but also points out a new determinant of fertility that was previously unidentified.

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Figure 1: Fertility Rate and Mortgage Origination in US from 1990 to 2010

The top panel shows the aggregate number of births (in millions) in the U.S. between 1990 and 2000. The mid panel presents the aggregate fertility rate for women in the U.S. in the same period. Fertility rate is defined as the total number of births divided by the number of women (in thousands) with ages between 15 and 44. The aggregate data on births is from the Centers for Disease Control and Prevention (`http://www.cdc.gov/nchs/births.htm`). The bottom panel shows the aggregate value in millions of dollars of originations for home purchase from HMDA between 1990 to 2010.

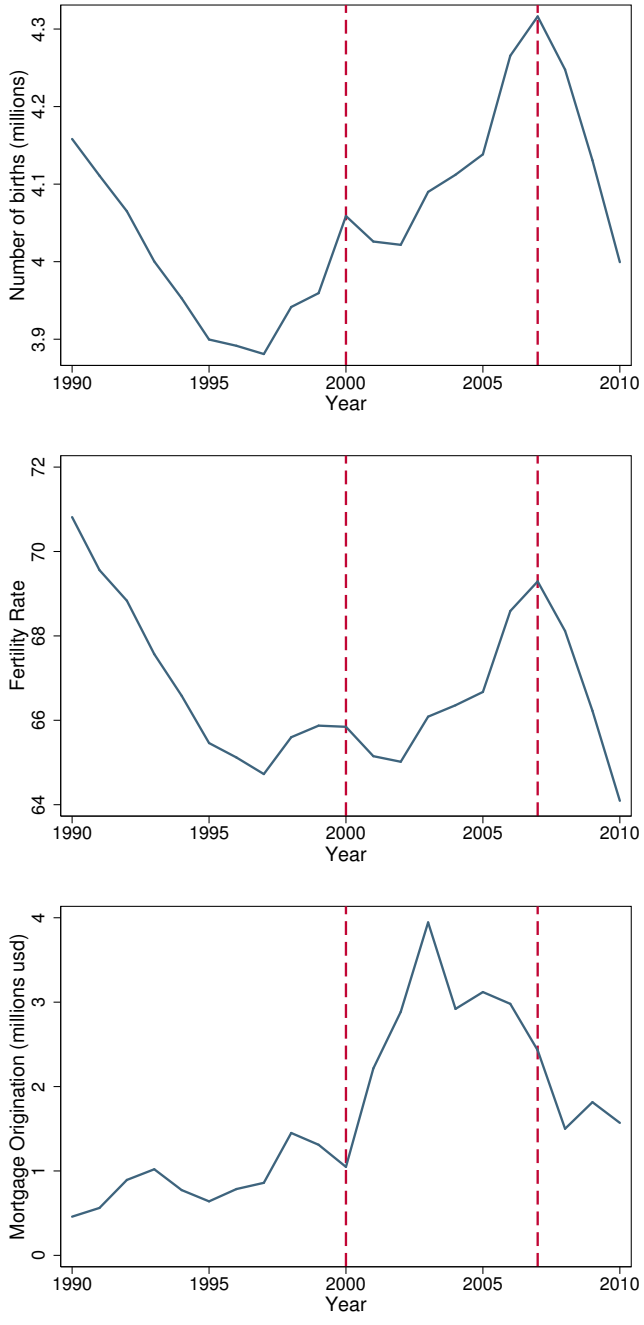

Figure 2: Annual Sales of Newly Constructed and Existing Homes in US

The top panel depicts the annual number of house transactions for newly constructed and the bottom panel reports the annual number of house transactions for existing homes. Both levels are presented in millions. Data was collected from the National Association of Realtors website.

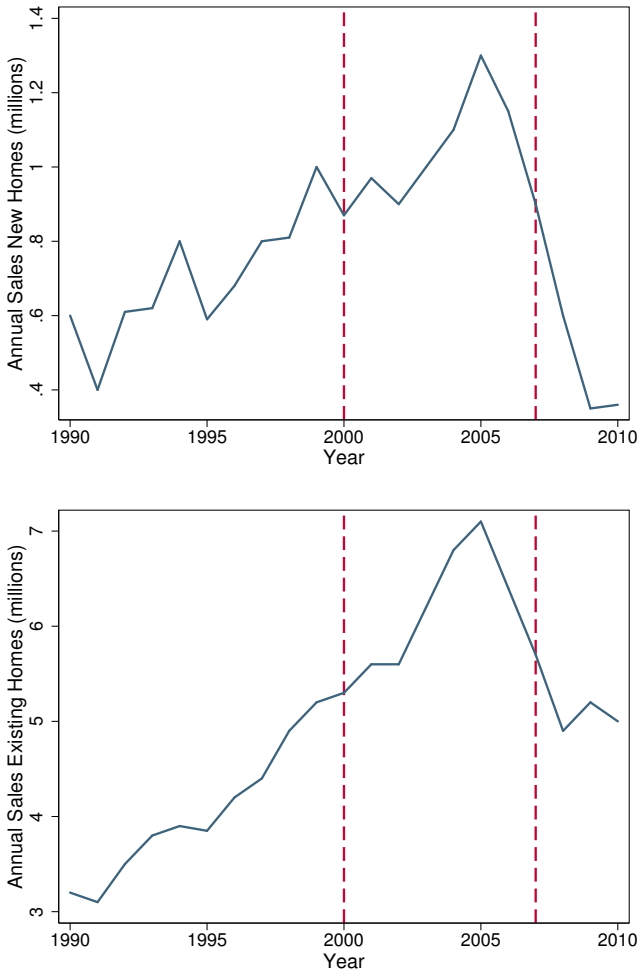

Figure 3: Fertility and Mortgage Origination in the Cross-Section: County-Level

The picture below shows the correlation between the fertility change and the per capita mortgage origination change. Fertility rate is defined as the number of births divided by the number of women (in thousands) of ages between 15 and 44. Per capita mortgage origination change is defined as the mortgage origination for home purchase divided by the population (in thousands) in the county. Each dot represents a county and the size is proportional to the size of the population in the county. Only counties with more than 100,000 people are plotted in the graph. The red line is the fitted regression line. The left panel depicts the relationship between mortgage origination and fertility rates from 1995 to 2000, the middle panel from 2000 to 2006 and the right panel from 2007 and 2010.

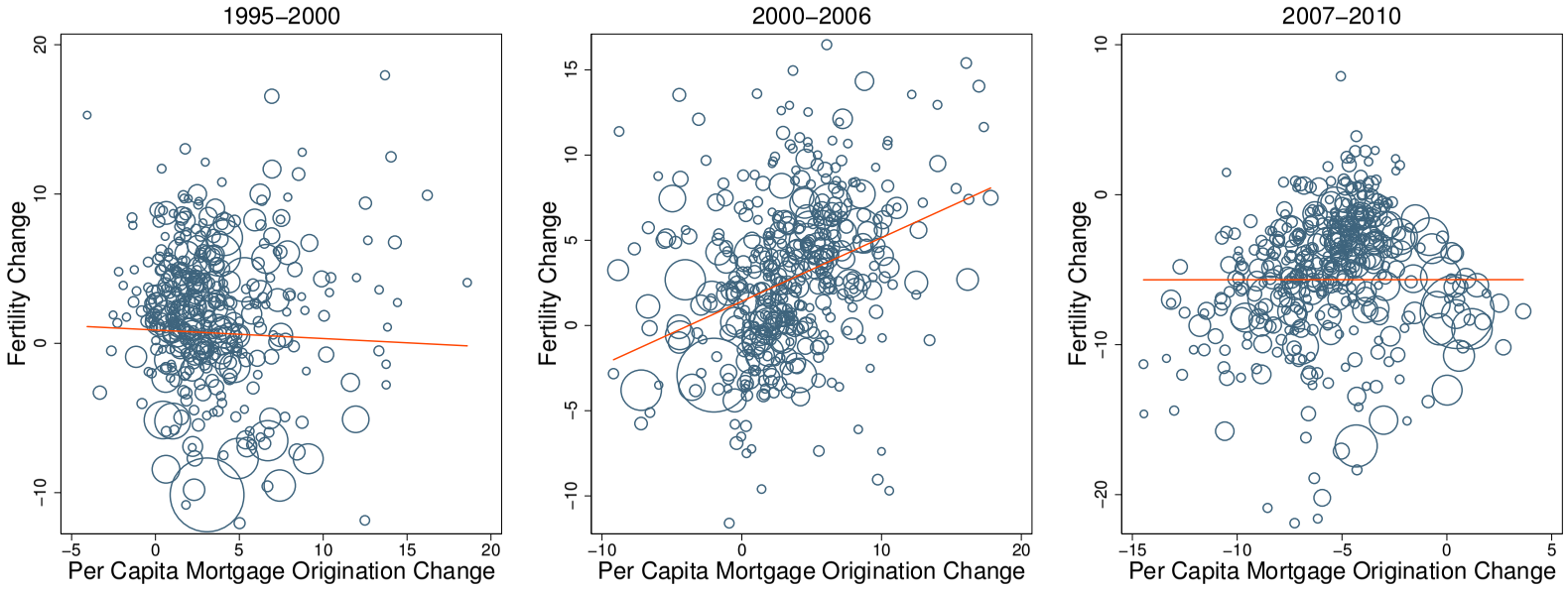

Figure 4: Fertility Rate in Top and Bottom Quintile of Credit Growth

This figure presents the fertility rates for two groups of counties. Counties were sorted by the change in per capita mortgage origination for home purchase. Mortgage credit origination comes from HMDA and is defined as the total number of mortgage loans originated for home purchase. The blue and green lines are the averages for the top and bottom quintiles, respectively. The red dashed lines are the bounds for the 95% confidence intervals. Fertility rate is defined as the total number of births divided by the number of women (in thousands) with ages between 15 and 44.

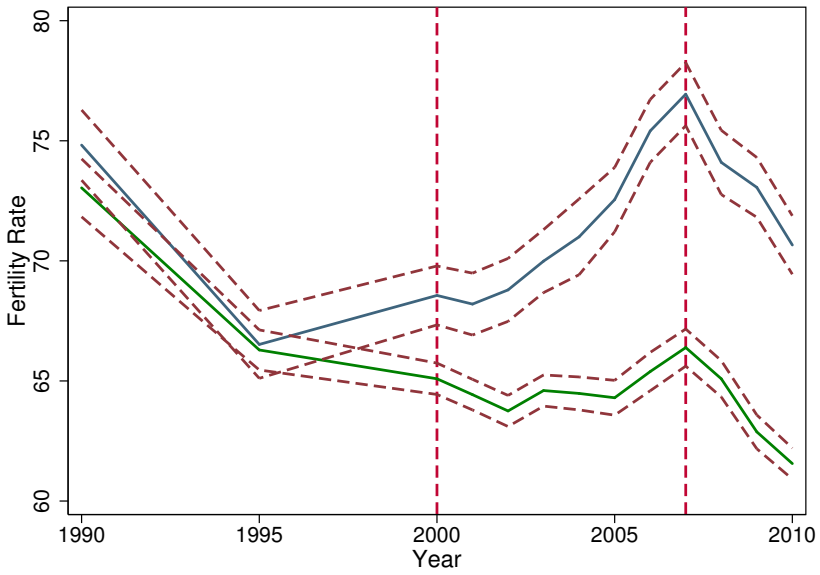

Figure 5: Rent Price by Apartment Size

The picture below shows the asked price per bedroom by apartment size. Apartment size is measured by the number of bedrooms. Asked prices are estimated from 30 million craigslist adds from 2008 to 2013 for all the cities where craigslist is present in the US.

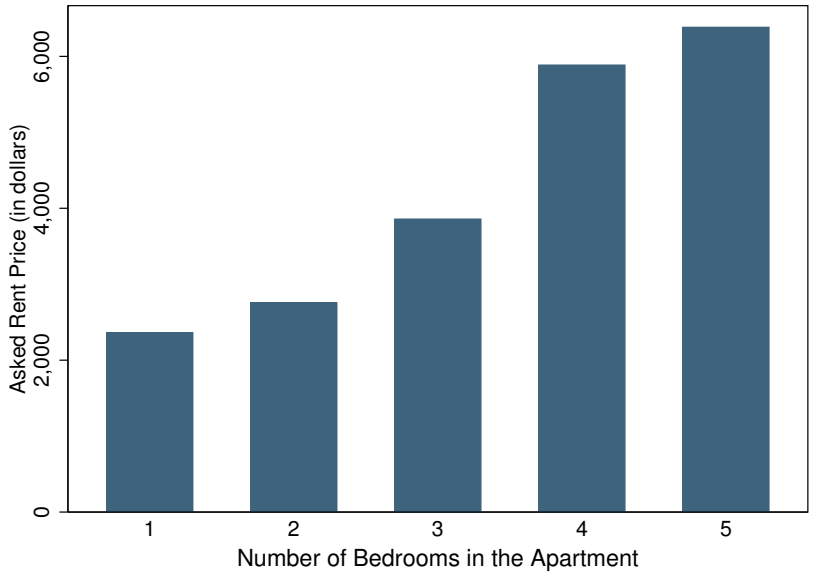

Figure 6: Changes in Homeownership Rate by Age Group during the Housing Boom

In the picture below each bar represents the change in percentage points of homeownership rate by age group. The blue bars report the changes from 2000 to 2005 and the light yellow the changes from 1990-1995. Homeownership rate is defined as the proportion of owner households to the total number of occupied households. The estimates are based on the Current Population Survey and Housing Vacancy Survey.

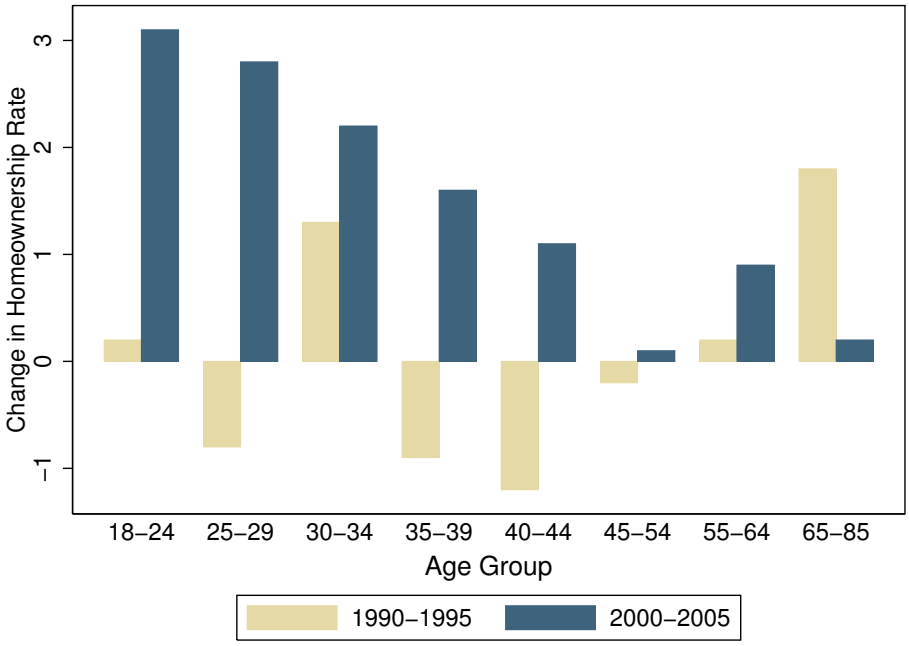

Table 1: Summary of Statistics: County Level

Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the county. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. Female College is the fraction of women in the county who have at least a bachelor's degree. Unemployment is from the BLS. Homeownership is from the Census. Construction is the number of new building permits for single homes from the Census. HP is the home price index from the FHFA.

	N	Mean	Std	10th	50th	90th
Per Cap Origination$_{\{00\to06\}}$	700	4.35	3.87	-0.44	4.20	8.99
HP$_{\{00\to06\}}$ × Ownership$_{\{00\}}$	700	0.38	0.26	0.14	0.25	0.75
HP growth$_{\{00\to06\}}$	700	0.57	0.39	0.21	0.39	1.14
Homeownership$_{\{2000\}}$	700	0.67	0.079	0.55	0.66	0.77
House Units Growth$_{\{00\to06\}}$	696	0.10	0.50	-0.48	0.069	0.69
Per Capita IRS Inc. Growth$_{\{00\to06\}}$	700	0.082	0.069	0.010	0.088	0.16
Per Capita IRS Inc.$_{\{2000\}}$	700	49.8	13.7	37.6	47.1	62.9
Unemployment$_{\{00\to06\}}$	700	0.83	1.08	-0.40	0.90	2.20
Female College$_{\{00\to06\}}$	700	0.043	0.015	0.025	0.043	0.060
Fertility$_{\{00\to06\}}$	700	3.40	4.40	-2.10	3.35	8.20
Fertility Change $_{\{95\to00\}}$	700	2.03	5.56	-4.92	2.35	8.01
Fertility Rate $_{\{2000\}}$	700	66.6	10.6	54.7	66.2	78.0

Table 2: Summary of Statistics: Zip Code Level

Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the zip code. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. Income and Capital Gains are reported in thousands of dollars. HP is house price growth from Zillow. Female College is the fraction of women in the zip code who have at least a bachelor's degree. Demographics and Unemployment are from the Census and the American Community Survey (ACS). Employment is computed using the data from the County of Business Patterns. House units growth is computed using the number of house units per zip code as reported by the Census and ACS. Old-Homeowners is the instrumental variable that measures fraction of homeowners who are older than 65 years-old and live alone, while 75-Homeowners measures the fraction of homeowners who are older than 75 years-old and live alone, both described and discussed in section III.c.2.

	N	Mean	Std	10th	50th	90th
$\text{Homeownership}_{\{2000\}}$	2753	0.65	0.19	0.36	0.69	0.86
$\text{HP Growth}_{\{00\to06\}}$	2753	1.06	0.54	0.35	1.06	1.78
$\text{House Units Growth}_{\{00\to06\}}$	2753	0.13	0.23	-0.014	0.066	0.31
$\text{Per Cap Origination}_{\{00\to06\}}$	2753	4.70	12.0	-4.96	3.10	15.9
$\text{Female Unemployment}_{\{00\to06\}}$	2753	0.011	0.036	-0.026	0.014	0.047
$\text{Female College}_{\text{25-44},\{00\to06\}}$	2753	-0.017	0.046	-0.075	-0.015	0.035
$\text{Employment Change}_{\{00\to06\}}$	2753	0.0021	0.19	-0.076	0.0088	0.089
$\text{Per Capita Inc. Growth}_{\{00\to06\}}$	2753	0.22	0.16	0.076	0.19	0.40
$\text{Per Capita Income}_{\{2000\}}$	2753	52.72	41.04	28.00	42.65	83.42
$\text{Capital Gains}_{\{2006\}}$	2753	7.96	22.46	0.53	2.56	16.26
$\text{Fraction of Hisp.}_{\{00\to06\}}$	2753	0.028	0.041	-0.0084	0.020	0.083
$\text{Fraction of Black.}_{\{00\to06\}}$	2753	0.0033	0.033	-0.022	0.0021	0.034
$\text{Population}_{\{2000\}}$	2753	24,793	18,142	4,951	21,367	48,227
$\text{Population}_{\{2006\}}$	2753	26,732	19,158	5,239	23,673	51,985
$\text{Fertility}_{\{2000\}}$	2753	62.1	17.9	41.5	60.4	84.7
$\text{Fertility}_{\{2006\}}$	2753	65.5	21.9	40.6	63.6	92.5
$\text{Fertility}_{\{00\to06\}}$	2753	3.37	14.1	-11.6	2.40	19.0
$\text{Old-Homeowners}_{\{2000\}}$	2753	.099	.052	0.041	0.092	0.158
$\text{75-Homeowners}_{\{2000\}}$	2753	.057	.038	0.020	0.052	0.98

Table 3: Homeownership Change and the Old-Homeowners Instrument : Zip Code Level

This table presents the regression coefficients of the instrument defined by the fraction of homeowners living alone and older than 65 years-old, as explained in section III.c.2, with the change in homeownership for different age groups, in panel A, with other shocks and levels, in panel B and C. Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the zip code. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. HP is house price growth from Zillow. Female College is the fraction of women in the zip code who have at least a bachelor's degree. Demographics and Unemployment are from the Census and the American Community Survey (ACS). Employment is computed using the data from the County of Business Patterns. Bedrooms growth is computed using the number of bedrooms per zip code as reported by the Census and ACS. All regressions have county effects. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; t-statistics in parentheses.

Panel A

	Ownership Change from 2000 to 2006						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	25< age <34	35< age <44	45< age <54	55< age <59	60< age <64	65< age <74	age >75
Old-Homeowners$_{\{2000\}}$	0.34***	0.46***	0.06	0.05*	0.00	-0.35***	-0.49***
	(4.81)	(9.43)	(0.69)	(2.30)	(0.09)	(-6.47)	(-11.07)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753	2753
R-squared	0.218	0.232	0.144	0.122	0.123	0.237	0.319

Panel B

	From 1996 to 2000	From 2000 to 2006			Levels in 2000	
	(1)	(2)	(3)	(4)	(5)	(6)
	HP Growth	Bedrooms Growth	HP Growth	Inc. pc Growth	Log HP	Log pc Income
Old-Homeowners$_{\{2000\}}$	-0.05	-0.17***	0.11**	0.20***	-0.20**	-0.13**
	(-0.76)	(-4.15)	(2.60)	(7.49)	(-3.26)	(-2.46)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2676	2753	2753	2753	2753	2753
R-squared	0.034	0.030	0.269	0.056	0.094	0.018

Panel C

	From 2000 to 2006					
	(1)	(2)	(3)	(4)	(5)	(6)
	Fraction Hisp.	Fraction Black	Male Unemp.	Female Unemp.	Emp. Change	Female College
Old-Homeowners$_{\{2000\}}$	-0.04	-0.00	0.01	0.02	-0.01	0.26***
	(-1.28)	(-0.07)	(0.23)	(0.49)	(-0.27)	(6.60)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753
R-squared	0.019	0.001	0.010	0.005	0.002	0.066

Table 4: Homeownership Change and the 75-Homeowners Instrument : Zip Code Level

This table presents the regression coefficients of the instrument defined by the fraction of homeowners living alone and older than 75 years-old, as explained in section III.c.2, with the change in homeownership for different age groups, in panel A, with other shocks and levels, in panel B and C. Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the zip code. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. HP is house price growth from Zillow. Female College is the fraction of women in the zip code who have at least a bachelor's degree. Demographics and Unemployment are from the Census and the American Community Survey (ACS). Employment is computed using the data from the County of Business Patterns. Bedrooms growth is computed using the number of bedrooms per zip code as reported by the Census and ACS. All regressions have county effects. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; t-statistics in parentheses.

Panel A

	Ownership Change from 2000 to 2006						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	25< age <34	35< age <44	45< age <54	55< age <59	60< age <64	65< age <74	age >75
75-Homeowners$_{\{2000\}}$	0.31***	0.40***	0.09	0.07**	0.02	-0.22***	-0.54***
	(4.22)	(5.21)	(0.95)	(2.94)	(0.79)	(-4.17)	(-17.84)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753	2753
R-squared	0.208	0.216	0.146	0.124	0.123	0.195	0.373

Panel B

	From 1996 to 2000	From 2000 to 2006			Levels in 2000	
	(1)	(2)	(3)	(4)	(5)	(6)
	HP Growth	Bedrooms Growth	HP Growth	Inc. pc Growth	Log HP	Log pc Income
75-Homeowners$_{\{2000\}}$	-0.03	-0.17***	0.08	0.18***	-0.15**	-0.09*
	(-0.51)	(-4.02)	(1.84)	(6.13)	(-2.60)	(-1.98)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2676	2753	2753	2753	2753	2753
R-squared	0.033	0.030	0.263	0.049	0.077	0.011

Panel C

	From 2000 to 2006					
	(1)	(2)	(3)	(4)	(5)	(6)
	Fraction Hisp.	Fraction Black	Men Unemp.	Women Unemp.	Emp. Change	Women College
75-Homeowners$_{\{2000\}}$	-0.03	0.01	0.02	0.02	0.00	0.23***
	(-1.03)	(0.22)	(0.41)	(0.36)	(0.06)	(7.72)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753
R-squared	0.018	0.001	0.010	0.005	0.002	0.053

Table 5: Mortgage Origination and Fertility During the Housing Boom: County Level

Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the zip code. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. The bottom row indicates which regressions have state effects and population weights. All regressions include controls for age and demographic in levels and differences as described in section III.c.1. HP is house price growth from FHFA. Construction Growth is the growth in building permits from the census records. Female college is the fraction of females in the county who have at least a bachelor's degree. Standard errors are robust and clustered at the MSA level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Change in Fertility from 2000 to 2006									
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) OLS	(10) OLS
Per Cap Origination$_{\{00\to06\}}$		0.46***	0.41***		0.37***	0.35***	0.37***	0.30***		0.30***
		(0.07)	(0.07)		(0.07)	(0.06)	(0.06)	(0.05)		(0.06)
HP$_{\{00\to06\}}$ × Ownership$_{\{00\}}$									20.97***	22.09***
									(7.29)	(7.27)
HP growth$_{\{00\to06\}}$									-15.53***	-16.63***
									(5.27)	(5.21)
Homeownership$_{\{2000\}}$									-22.68***	-20.15***
									(5.62)	(5.78)
House Units Growth$_{\{00\to06\}}$									0.94**	-0.11
									(0.39)	(0.41)
Per Capita Inc. Growth$_{\{00\to06\}}$	3.18		-2.15	-2.08		-5.92**		-7.37**	-2.62	-4.90
	(3.12)		(3.08)	(2.79)		(2.84)		(3.08)	(3.16)	(3.08)
Per Capita Inc.$_{\{2000\}}$	-0.03		-0.01	-0.07***		-0.04*		-0.01	-0.03*	-0.02
	(0.03)		(0.03)	(0.02)		(0.03)		(0.02)	(0.02)	(0.02)
Unemployment$_{\{00\to06\}}$	-0.63**		-0.50**	-1.53***		-1.49***		-1.29***	-1.48***	-1.43***
	(0.25)		(0.25)	(0.38)		(0.39)		(0.32)	(0.34)	(0.33)
Female College$_{\{00\to06\}}$	4.07		1.83	4.99		0.35		-4.01	2.48	-0.87
	(10.86)		(10.44)	(9.31)		(9.39)		(10.36)	(10.26)	(10.10)
Fertility Change $_{\{95\to00\}}$	-0.06		-0.04	-0.06		-0.04		-0.06	-0.06	-0.06
	(0.05)		(0.05)	(0.04)		(0.04)		(0.04)	(0.05)	(0.05)
Fertility Rate $_{\{2000\}}$	-0.02		-0.06	-0.13***		-0.14***		-0.08***	-0.08**	-0.08***
	(0.04)		(0.04)	(0.04)		(0.04)		(0.03)	(0.03)	(0.03)
State Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pop Weight	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Age-Demo Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Counties	700	700	700	700	700	700	700	700	696	696
R-squared	0.137	0.097	0.199	0.369	0.290	0.403	0.344	0.505	0.502	0.525

Table 6: Mortgage Origination and Fertility During The Boom: Zip Code Level - Old-Homeowners

Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the zip code. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. The bottom row indicates which regressions have county effects. All regressions include controls for age and demographic in levels and differences as described in section III.c.1. HP is house price growth from Zillow. Demographics are from the Census and the American Community Survey (ACS). Female college is the fraction of women in the county who have at least a bachelor's degree. Old-Households is the instrumental variable that measures fraction of homeowners who are older than 65 years-old and live alone as described in section III.c.2. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses. This table continues in the next page.

	Fertility Change from 2000 to 2006						
	OLS	OLS	OLS	OLS	OLS	IV	1st-stage
Per Cap Origination$_{\{00\to06\}}$	0.29***				0.20***	0.31**	
	(0.04)				(0.04)	(0.13)	
Old-Homeowners$_{\{2000\}}$							22.24***
							(4.09)
HP Growth × Homeownership			15.56***	8.97***	8.90***	8.86***	0.35
			(3.41)	(2.01)	(1.66)	(1.36)	(3.11)
HP Growth$_{\{00\to06\}}$			-4.89***	-1.78	-2.34**	-2.66**	2.78***
			(1.45)	(1.00)	(0.95)	(1.15)	(0.53)
Homeownership$_{\{2000\}}$			-24.94***	-14.22***	-13.37**	-12.88***	-3.45
			(3.52)	(2.84)	(4.22)	(4.38)	(7.93)
House Units Growth$_{\{00\to06\}}$		-6.22**		-3.94*	-4.00*	-4.04***	1.48
		(2.65)		(2.06)	(1.74)	(1.41)	(1.79)
Employment Change$_{\{00\to06\}}$				3.74***	3.87***	3.94***	-0.52
				(0.77)	(0.78)	(0.73)	(0.49)
Female Unemployment$_{\{00\to06\}}$				9.38	9.63	9.77	-2.31
				(11.17)	(9.71)	(8.12)	(7.48)
Male Unemployment$_{\{00\to06\}}$				-23.07**	-23.06**	-23.05***	0.37
				(9.17)	(8.92)	(7.99)	(2.59)
Per Capita Inc. Growth$_{\{00\to06\}}$				0.27	0.11	0.01	0.75
				(2.74)	(2.46)	(2.08)	(1.84)
Log Per Capita Income$_{\{2000\}}$				-6.20**	-5.55**	-5.18***	-2.12
				(1.98)	(1.82)	(1.65)	(1.90)
Log Capital Gains$_{\{2006\}}$				0.30	0.19	0.12	0.20
				(0.66)	(0.67)	(0.62)	(0.25)
Female College (25-44)$_{\{00\to06\}}$				-63.43***	-65.59***	-66.83***	3.90
				(15.21)	(15.29)	(14.00)	(3.56)
Fertility$_{\{2000\}}$				-0.21***	-0.20***	-0.20***	-0.01
				(0.02)	(0.02)	(0.02)	(0.01)
Log Population$_{\{2000\}}$				-2.12***	-2.10***	-2.09***	-0.01
				(0.49)	(0.46)	(0.40)	(0.25)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age-Demo Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753	2753
R-squared	0.194	0.181	0.198	0.302	0.309	0.307	0.449

Table 7: Mortgage Origination and Fertility During Boom: Zip Code Level - Retired-Homeowners *(Continuation)*

This table is the continuation from the table in the previous page. Fem(a,b) is the number of females (in thousands) in the zip code with ages between a and b. Demographics are from the Census and the American Community Survey (ACS). Fertility rate is defined as the number of births divided by the number of women with ages between 15 and 44. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Fertility Change from 2000 to 2006						
	OLS	OLS	OLS	OLS	OLS	IV	1st-stage
Fraction of Hisp.$_{\{00\rightarrow06\}}$				21.05**	17.26**	15.10**	17.24***
				(6.63)	(6.84)	(6.64)	(2.97)
Fraction of Black.$_{\{00\rightarrow06\}}$				20.85**	16.77*	14.44*	19.51***
				(8.62)	(8.31)	(8.12)	(5.28)
Fem (15,17)/Fem (15,45)$_{\{00\rightarrow06\}}$				-48.88**	-53.50**	-56.14***	25.41***
				(20.62)	(20.43)	(19.29)	(7.47)
Fem (18,24)/Fem (15,45)$_{\{00\rightarrow06\}}$				-61.14***	-62.53***	-63.32***	5.39
				(8.15)	(7.96)	(7.36)	(2.91)
Fem (25,34)/Fem (15,45)$_{\{00\rightarrow06\}}$				7.76	5.37	4.01	12.06**
				(8.94)	(8.96)	(8.55)	(3.70)
Fem (15,17)/Fem (15,45)$_{\{2000\}}$				134.33***	115.88***	105.34***	107.78***
				(36.17)	(33.97)	(33.26)	(27.80)
Fem (18,24)/Fem (15,45)$_{\{2000\}}$				16.37*	12.21	9.83	23.45**
				(8.05)	(6.88)	(7.11)	(10.13)
Fem (25,34)/Fem (15,45)$_{\{2000\}}$				58.28***	51.10***	47.00***	40.51*
				(14.28)	(13.10)	(14.05)	(19.72)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age-Demo Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753	2753
R-squared	0.194	0.181	0.198	0.302	0.309	0.307	0.449

Table 8: Mortgage Origination and Fertility During Boom: Zip Code Level - 75-Homeowners

75-Homeowners is the instrumental variable that measures fraction of homeowners who are older than 75 years-old and live alone as described in section III.c.2. Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the county. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. The bottom row indicates which regressions have county effects. All regressions include controls for age and demographic in levels and differences as described in section III.c.1. HP is house price growth from zillow. Female college is the fraction of women in the county who have at least a bachelor's degree. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Fertility Change from 2000 to 2006						
	OLS	OLS	OLS	OLS	OLS	IV	1st-stage
Per Cap Origination$_{\{00\to06\}}$	0.29***				0.20***	0.31**	
	(0.04)				(0.04)	(0.16)	
75-Homeowners$_{\{2000\}}$							23.16***
							(4.15)
HP Growth × Homeownership			15.56***	8.97***	8.90***	8.86***	0.26
			(3.41)	(2.01)	(1.66)	(1.37)	(3.15)
HP Growth$_{\{00\to06\}}$			-4.89***	-1.78	-2.34**	-2.66**	2.87***
			(1.45)	(1.00)	(0.95)	(1.10)	(0.55)
Homeownership$_{\{2000\}}$			-24.94***	-14.22***	-13.37**	-12.87***	-3.79
			(3.52)	(2.84)	(4.22)	(4.73)	(8.18)
House Units Growth$_{\{00\to06\}}$		-6.22**		-3.94*	-4.00*	-4.04***	1.13
		(2.65)		(2.06)	(1.74)	(1.42)	(1.82)
Employment Change$_{\{00\to06\}}$				3.74***	3.87***	3.94***	-0.59
				(0.77)	(0.78)	(0.72)	(0.47)
Female Unemployment$_{\{00\to06\}}$				9.38	9.63	9.77	-1.82
				(11.17)	(9.71)	(8.05)	(7.49)
Male Unemployment$_{\{00\to06\}}$				-23.07**	-23.06**	-23.05***	-0.12
				(9.17)	(8.92)	(7.98)	(2.52)
Per Capita Inc. Growth$_{\{00\to06\}}$				0.27	0.11	0.01	0.66
				(2.74)	(2.46)	(2.09)	(1.82)
Log Per Capita Income$_{\{2000\}}$				-6.20**	-5.55**	-5.18***	-2.45
				(1.98)	(1.82)	(1.68)	(1.83)
Log Capital Gains$_{\{2006\}}$				0.30	0.19	0.12	0.31
				(0.66)	(0.67)	(0.63)	(0.26)
Female College (25-44)$_{\{00\to06\}}$				-63.43***	-65.59***	-66.85***	6.14
				(15.21)	(15.29)	(14.75)	(3.36)
Fertility$_{\{2000\}}$				-0.21***	-0.20***	-0.20***	-0.01
				(0.02)	(0.02)	(0.02)	(0.01)
Log Population$_{\{2000\}}$				-2.12***	-2.10***	-2.09***	-0.06
				(0.49)	(0.46)	(0.39)	(0.26)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age-Demo Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753	2753
R-squared	0.194	0.181	0.198	0.302	0.309	0.307	0.446

Table 9: The Net House Wealth Effect: Zip-Code Level

Old-Homeowners is the instrumental variable that measures fraction of homeowners who are older than 65 years-old and live alone as described in section III.c.2. Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the zip code. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. IRS Income growth is computed using the adjust gross income from the IRS data. The bottom row indicates which regressions have county effects. All regressions include controls for age and demographic in levels and differences as described in section III.c.1. HP is house price growth from Zillow. Female college is the fraction of women in the county who have at least a bachelor's degree. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Fertility Change from 2000 to 2006					
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) IV	(6) 1st-stage
Per Cap Origination$_{\{00\to06\}}$	0.29***				0.20***	0.31**
	(0.04)				(0.04)	(0.14)
Old-Homeowners$_{\{2000\}}$						
HP Growth × Homeownership		15.56***				
		(3.41)				
HP Growth$_{\{00\to06\}}$		-4.89***	4.27***	2.70***	2.10**	1.77**
		(1.45)	(1.08)	(0.80)	(0.65)	(0.82)
Homeownership$_{\{2000\}}$		-24.94***		-2.74	-1.97	-1.54
		(3.52)		(4.78)	(5.64)	(5.42)
House Units Growth$_{\{00\to06\}}$				-3.98*	-4.04*	-4.08***
				(2.10)	(1.78)	(1.44)
Employment Change$_{\{00\to06\}}$				3.78***	3.91***	3.98***
				(0.84)	(0.85)	(0.79)
Female Unemployment$_{\{00\to06\}}$				9.40	9.64	9.78
				(10.78)	(9.31)	(7.77)
Male Unemployment$_{\{00\to06\}}$				-20.39*	-20.41*	-20.41**
				(9.53)	(9.23)	(8.25)
Per Capita Inc. Growth$_{\{00\to06\}}$				0.47	0.30	0.21
				(2.54)	(2.26)	(1.92)
Log Per Capita Income$_{\{2000\}}$				-6.77***	-6.11***	-5.75***
				(1.87)	(1.75)	(1.57)
Log Capital Gains$_{\{2006\}}$				0.42	0.30	0.24
				(0.65)	(0.67)	(0.61)
Female College (25-44)$_{\{00\to06\}}$				-63.16***	-65.33***	-66.55***
				(15.39)	(15.47)	(14.21)
Fertility$_{\{2000\}}$				-0.22***	-0.21***	-0.21***
				(0.02)	(0.02)	(0.02)
Log Population$_{\{2000\}}$				-2.17***	-2.15***	-2.14***
				(0.53)	(0.49)	(0.43)
County Effects	Yes	Yes	Yes	Yes	Yes	Yes
Age Controls	Yes	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753	2753
R-squared	0.194	0.198	0.179	0.298	0.306	0.304

Table 10: Mortgage Origination and Fertility in Normal Times: Zip-Code Level

Per Cap Origination is defined as the mortgage origination for home purchase divided by the population (in thousands) in the zip code. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. The third column reports the same correlation than column two but in the sub-sample that matches the sample of the first column. The bottom row indicates which regressions have county effects. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Fertility Change		
	1995-2000	2000-2006	2000-2006
Per Cap Origination$_{\{95\to00\}}$	-0.07		
	(0.06)		
Per Cap Origination$_{\{00\to06\}}$		0.29***	0.27***
		(0.04)	(0.05)
County Effects	Yes	Yes	Yes
Age-Demo Controls	Yes	Yes	Yes
#Zip Codes	2015	2753	2015
R-squared	0.216	0.194	0.201

Table 11: Change in Homeownership and New Construction: Zip-Code Level

Each column reports the correlation coefficient of the zip code growth in housing units with the change in homeownership from 2000 to 2006 by age group. Construction growth is defined as the growth in number of housing units in the zip code. The bottom row indicates which regressions have county effects. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Ownership Change from 2000 to 2006		
	(1)	(2)	(3)
	25< age <44	45< age <59	60< age <74
House Units Growth$_{\{00\to06\}}$	-0.01	-0.08***	0.10***
	(-0.43)	(-3.59)	(4.80)
County Effects	Yes	Yes	Yes
#Zip Codes	2753	2753	2753
R-squared	0.173	0.126	0.166

Table 12: Fertility and Change in Homeownership by Income Groups: Zip-Code Level

Each column reports the correlation coefficient of the zip code fertility change between 2000 and 2006 with the change in homeownership from 2000 to 2006 by income group. Income is measured as the household income from the Census and American Community Survey. Fertility rate is defined as the number of births divided by the number of women (in thousands) with ages between 15 and 44. The bottom row indicates which regressions have county effects. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Ownership Change from 2000 to 2006				
	(1)	(2)	(3)	(4)	(5)
	Inc <25	25< Inc <50	50< Inc <100	100< Inc <150	Inc >150
$\text{Fertility}_{\{00\to06\}}$	-0.02	0.06***	0.15***	-0.01	-0.13***
	(-1.15)	(3.20)	(8.30)	(-0.63)	(-7.18)
County Effects	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753
R-squared	0.353	0.237	0.315	0.224	0.320

Table 13: Gains in Homeownership by Income Groups and Old-Homeowners: Zip-Code Level

Each column reports the correlation coefficient of the zip code fraction of old-homeowners in 2000 with the change in homeownership from 2000 to 2006 by income group. Income is measured as the household income from the Census and American Community Survey. Old-Homeowners is the instrumental variable that measures fraction of homeowners who are older than 65 years-old and live alone as described in section III.c.2. The bottom row indicates which regressions have county effects. Standard errors are robust and clustered at the state level. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; standard errors in parentheses.

	Ownership Change from 2000 to 2006				
	(1)	(2)	(3)	(4)	(5)
	Inc <25	25< Inc <50	50< Inc <100	100< Inc <150	Inc >150
Old Homeowners	-0.15***	0.15***	0.30***	-0.12***	-0.21***
	(-8.09)	(7.82)	(16.65)	(-5.78)	(-11.06)
County Effects	Yes	Yes	Yes	Yes	Yes
#Zip Codes	2753	2753	2753	2753	2753
R-squared	0.368	0.251	0.365	0.233	0.338

Table 14: Women in the Labor Force: Family Level

Mortgage and baby (1) is equal to one if a woman in a household who had a baby during the housing boom and got a mortgage loan, and is equal to zero for a woman in a household who had a baby during the housing boom but was always a renter. *Mortgage and baby (2)* is equal to one if a woman in a household who had a baby during the housing boom and got a mortgage loan, and is equal to zero for a woman in any household. PUMA are geographical divisions from the census that have on average 100,000 people. Year built is the year when the structure where the household lives was built. ***,**,* coefficient estimate statistically distinct from 0 at the 1%, 5% and 10% levels, respectively; t-statistics in parentheses.

	In Labor Force	Employed
	(1)	(2)
	2007≤ t ≤2011	2007≤ t ≤2011
Mortgage and Baby (1)	0.140***	
	(13.97)	
Mortgage and baby (2)		-0.013***
		(-7.39)
Husband Age	-0.000	0.010***
	(-0.35)	(50.94)
Husband Income	-0.000***	0.000***
	(-21.63)	(11.97)
Husband has College	0.004*	0.006***
	(1.95)	(23.28)
Wife Age	0.002**	-0.012***
	(2.34)	(-41.33)
Wife has College	0.134***	-0.029***
	(17.05)	(-12.94)
Year Built	0.005***	-0.001***
	(3.70)	(-6.74)
Number Bedrooms	0.011**	0.008***
	(2.31)	(22.69)
PUMA Effects	Yes	Yes
Race Effects	Yes	Yes
#Households	21472	1580951
R-squared	0.126	0.283

Table 15: Birth Data Sources for County Level

This table reports the sources of data for the county level data. In the case of California, Florida, Kansas, and South Carolina the department of public health have the zip code level data available online. The weblinks are valid as of September 2013.

State	Initial	Final	Link to DPH's website
AK	1992	2009	http://dhss.alaska.gov/dph/VitalStats/Documents/stats/birth_statistics/prof...
AL	1990	2011	http://www.adph.org/healthstats/index.asp?id=1572
AR	1990	2011	http://www.healthy.arkansas.gov/programsServices/healthStatistics/Pages/Sta...
AZ	1990	2011	http://www.azdhs.gov/plan/menu/for/births.htm
CA	1990	2011	http://www.cdph.ca.gov/data/statistics/Pages/CountyBirthStatisticalDataTabl...
CO	1990	2011	http://www.chd.dphe.state.co.us/cohid/Default.aspx
CT	1995	2010	http://www.ct.gov/dph/cwp/view.asp?a=3132&q=394598&dphNav_GID=1601
DC	1991	2011	http://doh.dc.gov/sites/default/files/dc/sites/doh/publication/attachments/...
DE	2000	2010	http://www.dhss.delaware.gov/dph/hp/bthsdths_pubdata.html
FL	1989	2012	http://www.floridacharts.com/FLQuery/Birth/BirthRateRpt.aspx
GA	1994	2011	http://oasis.state.ga.us/oasis/oasis/qryMCH.aspx
HI	1999	2012	http://health.hawaii.gov/vitalstatistics/
IA	1990	2012	http://www.idph.state.ia.us/apl/vital_stats.asp
ID	1990	2011	http://healthandwelfare.idaho.gov/Health/VitalRecordsandHealthStatistics/He...
IL	1990	2009	http://www.idph.state.il.us/health/statshome.htm
IN	1989	2010	http://www.stats.indiana.edu/vitals/
KS	1990	2011	http://kic.kdhe.state.ks.us/kic/birth_table.html
KY	1990	2012	http://chfs.ky.gov/dph/vital/vitalstats.htm
LA	2006	2010	http://dhh.louisiana.gov/assets/oph/Center-RS/healthstats/New_Website/5-yea...
MA	1990	2010	http://www.mass.gov/eohhs/gov/departments/dph/programs/health-stats/repi/bi...
MD	1995	2011	http://dhmh.maryland.gov/vsa/SitePages/reports.aspx
ME	1990	2006	http://www.maine.gov/dhhs/mecdc/public-health-systems/data-research/data/in...
MI	1990	2011	http://www.michigan.gov/mdch/0,4612,7-132-2944_4669---,00.html
MN	1995	2011	http://www.health.state.mn.us/divs/chs/countytables/
MO	1990	2010	http://health.mo.gov/data/mica//mica/birth.php
MS	1995	2011	http://msdh.ms.gov/msdhsite/_static/31,0,75,522.html
MT	1990	2011	http://www.dphhs.mt.gov/statisticalinformation/vitalstats/index.shtml
NC	1990	2011	http://www.schs.state.nc.us/schs/data/county.cfm
ND	1990	2011	http://ndhealth.gov/vital/stats.htm
NE	1990	2012	http://dhhs.ne.gov/publichealth/Pages/ced_vs.aspx
NH	1990	2009	http://www.dhhs.nh.gov/data/index.htm
NJ	1990	2009	http://www4.state.nj.us/dhss-shad/query/selection/birth/BirthSelection.html
NM	1990	2011	http://ibis.health.state.nm.us/query/builder/birth/BirthBirthCnty/Count.htm...
NV	1990	2011	http://health.nv.gov/publications.htm
NY	1990	2011	http://www.health.ny.gov/statistics/vital_statistics/
OH	1990	2010	http://www.odh.ohio.gov/healthstats/vitalstats/birthstat.aspx
OK	1990	2012	http://www.ok.gov/health/pub/wrapper/ok2share.html
OR	1990	2011	http://public.health.oregon.gov/BirthDeathCertificates/VitalStatistics/birt...
PA	1990	2010	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=809799&mode=2
RI	1990	2010	http://www.health.ri.gov/webquery/birth/query.php
SC	1990	2011	http://scangis.dhec.sc.gov/scan/bdp/tables/birthtable.aspx
TN	1990	2009	http://hit.state.tn.us/birthrateform.aspx
TX	1990	2010	http://soupfin.tdh.state.tx.us/birthdoc.htm
UT	1990	2010	http://health.utah.gov/vitalrecords/UTVitalStats.html
VA	1995	2011	http://www.vdh.state.va.us/HealthStats/stats.htm
VT	1996	2009	http://healthvermont.gov/research/
WA	1980	2011	http://www.doh.wa.gov/DataandStatisticalReports/VitalStatisticsData/BirthDa...
WI	1990	2010	http://www.dhs.wisconsin.gov/wish/measures/wis_births/long_form.html
WV	1994	2010	http://www.wvdhhr.org/bph/hsc/statserv/AllPub.asp?ID=01
WY	1990	2012	http://www.health.wyo.gov/rfhd/vital_records/reports.html