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THE IMPACT OF THE REAL ESTATE MARKET ON THE DECISION TO HAVE A BABY

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ABSTRACT

This project investigates how changes in Metropolitan Statistical Area (MSA)-level housing prices affect household fertility decisions. Recognizing that housing is a major cost associated with childrearing, and assuming that children are normal goods, we hypothesize that an increase in real estate prices will have a negative price effect on current period fertility. This applies to both potential first-time homeowners and current homeowners who might upgrade to a bigger house with the addition of a child. On the other hand, for current homeowners, an increase in MSA-level house prices might increase available home equity, leading to a positive effect on birth rates. Controlling for MSA fixed effects, trends, and time-varying conditions, our analysis finds that indeed, short-term increases in house prices lead to a decline in births among non-owners and a net increase among owners. Our estimates suggest that a 10 percent increase in house prices would lead to a 4 percent increase in births among home owners, and a roughly one percent decrease among non-owners. The net effect of house price changes on birth rates varies across demographic groups based on rates of home ownership. Our paper provides evidence that homeowners use some of their increased housing wealth, coming from increases in local area house prices, to fund their childbearing goals. More generally, the finding of a "home equity effect" demonstrates empirically that imperfect credit markets affect fertility timing.

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1 Introduction

This project investigates how changes in Metropolitan Statistical Area (MSA)-level house prices affect household fertility decisions. The conceptual approach is based on an economic model of fertility that recognizes that changes in house prices potentially have offsetting effects on fertility. Assuming that children are normal goods, and recognizing that housing is a major cost associated with (additional) children, an increase in the price of housing will have a negative substitution effect on the demand for children in the current period, ceteris paribus. This is true for both potential first-time homeowners (i.e., current renters who would buy a house with the addition of a child) and current homeowners who might buy a larger house with the addition of a child. On the other hand, for a homeowner, an increase in MSA-level house prices potentially increases accessible home equity, which could lead to a positive income effect. To the extent that homeowners are limited in liquid assets, but are able to consume out of housing wealth, house price increases could lead to net increases in contemporaneous fertility. The data indicate statistically significant effects of MSA-level house prices on current period fertility in the ways hypothesized.

We are interested in identifying the causal relationship between movements in local area house prices and current period fertility decisions. Our main empirical analyses consist of ordinary least square (OLS) regressions of MSA-demographic group level birth rates on MSA level house prices interacted with a baseline measure of MSA-group level home ownership rates, controlling for conditional variable main effects, time-varying MSA conditions, MSA fixed effects, and MSA-specific time trends. Groups are defined by age, rate/ethnicity, and education. Births are aggregated to the cell level using Vital Statistics natality files from 1990 to 2007. We use the county-level identifiers in the confidential natality files to construct MSAs, using MSA definitions that are consistent with the MSA definitions in the federal housing data set. Our main source of house price data is the Federal Housing Finance Agency House Price Index, although we alternatively consider the Case-Shiller Index.

Conceptually, we are examining how short-term fluctuations in house prices affect current period fertility decisions, all else equal. Our empirical analysis controls for time-varying MSA-level economic conditions that potentially covary with real estate markets and also fertility timing decisions, including the local area unemployment rate and a measure of income. It is imperative that the regression specification control for MSA fixed effects so that the estimated relationship between house prices and birth rates is not confounded by time-invariant differences in preferences for children across MSAs. If couples with lower preferences for children sort into areas with higher costs of living – driven by other amenities – there will be a negative correlation between house prices and fertility. Our estimated relationship of interest will be net of any such sorting patterns. We add MSA-specific time trends to the model to control for the possibility that individuals with plans to increase or decrease their fertility move into MSAs with upward or downward trending house prices.

Results indicate that as the proportion of women in a demographic cell who are home owners increases, an increase in house prices is conditionally associated with an increase in current period fertility. This is consistent with a positive "home equity effect" that dominates any negative price effect. The data also indicate that as the proportion of homeowners approaches zero, an increase in MSA-level house prices leads to a decrease in current period fertility, which is consistent with a negative price effect. These main results are statistically significant and economically meaningful. Using our regression estimates, we simulate the effect of a 10 percent increase in house prices. Our estimates imply that the home equity effect would increase birth rates by 4.5 percent among home owners; the price effect would lead to a decrease of 1 percent in birth rates among non-owners.

In general, the main results hold across race/ethnic groups and are equally driven by first and high-order births. We also estimate a number of additional robustness checks on the model specification and sample construction. In addition, we estimate our empirical model on individual-level data from the Current Population Survey (CPS), to confirm that the relationship we see in aggregate data is found at the individual level. And finally, we tabulate data from the American Housing Survey (AHS) to verify that access to housing wealth - via mortgage refinancing or home equity loans/lines of credit - is a viable mechanism driving the positive effect of house price increases on fertility for home owners.

The main contribution of the paper is to provide an empirical examination of how movements in house prices affect current period fertility decisions. First, as an issue of economic demography, it is informative to understand how movements in the real estate market affect current period birth rates, overall and for various demographic subgroups. Second, our results speak to the role of credit constraints, and imperfect capital markets, in affecting the timing of fertility decisions. This is an issue that features prominently in the literature on the cyclicality of fertility timing, as reviewed in Hotz, Klerman, and Willis (1997). Our finding of a positive home equity effect suggests that some individuals consume out of home equity to fund their childbearing goals. Third, our paper highlights the importance of including housing markets in any empirical analysis of how economic conditions affect fertility outcomes.[1] And fourth, there is a literature, described below, on the tendency of individuals to consume out of housing wealth. To our knowledge, that literature has not previously considered children as a potential "consumption" good in this regard. Our results provide clear empirical support for the idea that house prices impact birth rates in a statistically significant and economically meaningful way.

2 Conceptual Framework and Related Literature

There is a large literature in neoclassical economics investigating the nature and determinants of fertility in developed countries. In the most simple static approach to this question, parents are viewed as consumers who choose the quantity of children that maximizes their lifetime utility subject to the price of children and the budget constraint that they face.

[1] A contemporaneous working paper by Lovenheim and Mumford (2011) investigates the relationship between changes in own home value and fertility. Their conceptual motivation is the role of an increase/decrease in own home value as an exogenous shock to household wealth. Their main empirical analysis uses individual-level PSID data from 1990 to 2007. We discuss the results of their analysis below.

Children are conventionally thought to be normal goods, but an empirical puzzle presents itself in both time series and cross-sectional data, which tend to show a negative correlation between income and number of children.

There are two leading explanations for this observed correlation that maintain the basic premise of children as normal goods: (1) the quantity/quality trade-off (Becker, 1960) and (2) the cost of time hypothesis (Mincer (1963); Becker (1965)). The first refers to the observation that parents have preferences for both the quantity and quality of children. If the income elasticity of demand for quality exceeds the income elasticity of demand for number of children, then as income rises, parents will substitute away from the number of children, toward quality per child. The second hypothesis attributes the observed negative relationship between income and fertility to the higher cost of female time experienced by higher income families, either because of increased female wage rates or because higher household income raises the value of female time in non-market activities. There is a long and active literature that attempts to estimate the effect of changes in family income and of own-prices on fertility.[2]

These models are useful to have in mind as a way to think about the demand for children, but we hasten to note that our paper is about the timing of childbearing, not the demand for children per se.[3] Our focus on current period prices and contemporaneous fertility allows us to look separately for price and "income" effects. Changes in the real estate market are expected to generate price effects because housing costs are estimated as the greatest portion of the annual cost of raising a child: greater than food, child care, or education (Lino, 2007).[4]

[2]The key empirical challenge in this literature is to find variation that is exogenous to women's (or couple's) preferences and that alter price or income without affecting the opportunity cost of women's time. Many of these papers are reduced-form in nature, and include examinations, for example, of the effect of direct pro-natalist government payments (e.g., Milligan (2005); Cohen, Dehejia, and Romanov (2007)) and of exogenous changes in income (Lindo (2010); Black et al. (2011)).

[3]There exists a class of dynamic or life-cycle models of fertility decisions, which recognize that changes in prices and income over the life cycle may result in changes in the timing of childbearing, even if they do not cause completed lifetime fertility to change. The Handbook chapter by Hotz et al. (1997) provides an overview of these theoretical models.

[4]Each year the U.S. Department of Agriculture estimates the annual cost of raising a child. By these estimates, for a two-child husband-wife family, housing makes up 31-33 percent of the annual costs. For more, see Lino (2007).

We qualify the term "income" because an increase in house prices does not necessarily imply increased wealth or income for home owners. If homeowners do not intend to "cash out" and move to a lower-priced real estate market, there is no change in actual wealth or permanent income. But, to the extent that home owners are otherwise credit constrained and choose to liquefy increases in home equity, there can be an increase in current period accessible income. For the sake of convenience of exposition, we will refer to this effect as a "home equity effect". Our paper thus speaks to the role that credit constraints play in affecting the timing of childbearing.

Our paper is most closely related to the empirical literature investigating the cyclicality of fertility, which is a literature about fertility timing (e.g., Galbraith and Thomas (1941); Becker (1960); Silver (1965); Ben-Porath (1973)). Changes in the unemployment rate are typically thought to affect the wages of women and their husbands. Under the standard assumption that women bear the primary responsibility for childrearing, it becomes optimal for woman to select into childbearing at times when their opportunity cost is lowest, that is, when economic conditions are least favorable. Another consideration affecting optimal timing with regard to unemployment rates is skill depreciation (Happel, Hill, and Low, 1984). In a world with imperfect capital markets and credit constraints, women might not be able to optimally time fertility with regard to opportunity cost and skill depreciation considerations. In particular, though some women might optimally choose to select into childbearing during economic downturns, they might not be able to afford to do this, if husbands' income is also negatively affected. Dehejia and Lleras-Muney (2004) show that white women opt into childbearing during economic downturns and black women tend to opt out of childbearing during economic downturns; they attribute this difference to credit constraints facing Blacks.[5]

[5]Dehejia and Lleras-Muney (2004) are ultimately interested in the relationship between unemployment and infant health outcomes, so they focus on how the composition of mothers changes with economic conditions. They find that in times of high unemployment, black mothers are "positively selected" in terms of marital status and education, and white mothers are "negatively selected". Their presumed mechanism is twofold: differential skill-depreciation coupled with differential access to credit. Though our papers are asking fundamentally different questions, it seems worth noting here that the results of our regression analyses

In many respects, the context of real estate markets is more straightforward to consider conceptually because changes in house prices do not affect the cost of parental time. Our conceptual framework is thus not encumbered by considerations of skill depreciation or opportunity cost of time. We motivate our empirical model and interpret our estimated effects simply in terms of housing costs (which affect the price of childbearing) and housing equity effects (which affect ability to consume in the current period).

There are two final conceptual considerations relevant to the issue of how short-term movements in house prices can be thought to affect fertility timing. First, there is an issue about whether economic shocks – be it through the unemployment rate or the real estate market – are perceived to be permanent or transitory. Transitory shocks will not affect lifetime prices or income, and thus will not directly affect total fertility. If movements in the real estate market are thought to be transitory, they might affect the timing decision without affecting completed fertility. On the other hand, one could reasonably argue that in contrast to unemployment rates – which are generally understood to be cyclical – movements in the housing market over the period we analyze were likely to be perceived at least in part as permanent. This would follow from the observation that the national trend in housing prices between 1990 and 2005 was monotonically increasing. If one accepts that claim, we could think that part of what we find in terms of short term changes will be reflected in completed fertility. But as an empirical matter, we leave that to future research.

Second, we acknowledge that we talk about fertility throughout the paper as though it is a simple decision. Of course, fertility is a stochastic outcome, albeit one that is to a large extent controllable by individual's actions with regard to sexual activity, contraceptive use, fertility treatments, and abortion. We recognize, however, that latent demand for fertility timing will not be perfectly realized. Thus, any response we see of fertility to house prices will be a muted reflection of a couple's desired fertility response, since giving birth is not perfectly within an individual's control.

do not demonstrate a differential relationship between unemployment rates and current period fertility for whites and blacks, as we describe below.

3 Data and Empirical Approach

The main empirical approach of this paper is to empirically relate MSA level birth rates to demeaned and de-trended MSA-level house prices, interacting house prices with a baseline measure of group-level home ownership rates and controlling for time-varying MSA level characteristics. The three main data requirements are (1) MSA-level birth rates, (2) MSA-level house prices, and (3) group-level home ownership rates. In this section we describe our main data sources and briefly describe how we construct the relevant variables. Table 1 provides overview details on data sources.

3.1 Data

Data on births come from the Vital Statistics Natality Files, years 1990 to 2007. Vital statistics data contain birth certificate information for virtually every live birth that takes place in the United States. Vital statistics data identifies the race/ethnicity, marital status, age, and education of the mother, as well as some limited information about the baby's pregnancy conditions, and the baby's health status at time of birth. These data do not include information about home ownership status of the parent. For the purposes of matching births to our explanatory variables, we create a file of conceptions for the years 1990 to 2006, using information on the date of birth and length of gestation to identify year of conception. We do this because in terms of the decision-making process, the most relevant decision is the decision to get pregnant in a given time period. It is thus the economic conditions that exist at the conception decision point that are relevant, as opposed to the economic conditions in place at the time when the birth actually occurs (typically 40 weeks later.) To be precise, our analysis sample is a sample of conceptions that result in live births in year t.

We aggregate births up to the MSA-year-group cell, where groups are defined by race/ethnicity, age category, and education category. We define three mutually-exclusive race/ethnic groups: White non-Hispanic, Black, and Hispanic white. We define race/ethnicity in this way because we can obtain county-level population estimates for these racial/ethnic groups for the full period of our sample. (Before 2000, county level census population estimates are not available for blacks separately by Hispanic identification). We exclude other race/ethnicities from the analysis. We define two age categories, 20-29 and 30-44. Maternal education is categorized into four groups according to reported number of years of schooling completed: less than high school (11 years or less), high school graduate (12 years), some college (13-15 years), and college (16 or more years).[6]

We applied for and obtained access to confidential natality files that identify the mother's state and county of residence. We use the demographic information and county-level identifiers to construct MSA-group-level birth rates, where a group is defined by age category, race/ethnicity, and maternal education. To aggregate from counties to MSAs, we use the MSA definitions that are used in the federal housing data sets: 5-digit MSAs and Divisions as defined by the Office of Management and Budget in December 2009 (Bulletin 10-02).[7] We identify a total of 383 MSAs in the birth records. We are able to merge all explanatory variables of interest for all years for 101 MSAs. We further restrict our sample to MSAs that have at least 5 births in every year/group cell.[8] This leaves us with a baseline analysis sample of 66 MSAs.[9]

[6]Starting in 2003 some states changed their recording of education in the Vital Statistics system to the highest degree achieved. To harmonize the new and old system, we classify high school but no degree as less than high school, high school degree or GED as high school, some college, no degree and associates degree as some college, and bachelors, professional, or PhD as college. As a consequence our total births by education will differ from those reported by the NCHS in the annual vital statistics reports; (see National Vital Statistics Reports 54(2), 55(1), 56(6), and 57(7)).

[7]In a data appendix we describe how we link counties to MSAs in more detail. We use counties to construct a consistent set of MSAs over our sample period; the MSA identifiers reported in the public use Vital Statistics data are based on current period definitions, which include a changing set of boundaries over time. This is commonly done when dealing with MSAs when counties are available, c.f. Bound and Holzer (2000) and Blau, Kahn, and Waldfogel (2004).

[8]Other empirical papers that have used aggregate level MSA data have used the following rules: Blau, Kahn, and Waldfogel (2000) look at MSA level marriage rates and MSA level indicators of labor and marriage market conditions. They use a rule of 20 observations per race-education group. Blau et al. (2004) look at MSA level single motherhood and headship rates and welfare benefits. They use a rule of 10 observations per race-education group.

[9]This process eliminates the majority of MSAs, but it does not eliminate the majority of births. 85% of births are to women who live in any of the 383 MSAs. 59% of these births are represented by our sample of 66 MSAs (which represents 50% of all births to rural and urban women).

Our data source for MSA-level house prices is the Federal Housing Finance Agency (FHFA) housing price index (HPI), previously known as the OFHEO housing price index. The index is available for nearly all metropolitan areas in the United States.[10] It measures the movement of single family home prices by looking at repeat mortgage transactions on homes with conforming, conventional mortgages purchased or securitized through Fannie Mae or Freddie Mac since 1975.[11] Since the index looks at repeat mortgages of the same home, it is continually revised to reflect current MSA boundaries. This is the reason we must use the most current definitions of MSAs in constructing the birth data. As advised by FHFA documentation, we adjust nominal house prices to 2006 dollars using the CPI-U "All items less shelter" series.

Figure 1 displays trends in mean (CPI adjusted) HPI in our sample, both in levels (panel (a)) and yearly percentage changes between year $t-1$ and t (panel (b)). Figure 1 also displays the Case-Shiller Index. The sample period used in this study (1990-2006) is highlighted. The year to year percentage change generally rises over the 1990 to 2005 period, ranging from a low of -1.7 percent in 1990 to a peak of 5.9 percent in 2005. From 1990 to 2005, the house price index rises a total of 55 points, or 42 percent.

The third main variable we need to construct is a measure of mean group-level home ownership rates. This is key to our analysis because conceptually, we expect there to be heterogeneous responses of birth rates to home prices across groups with different rates of home ownership. If home ownership rates were zero for a group, then an increase in house prices should only have a negative price effect. Recall that Vital Statistics data do

[10]FHFA requires a metro area to have at least 1,000 transactions before it is published.

[11]Conventional mortgages are those that are neither insured nor guaranteed by the FHA, VA, or other federal government entities. Mortgages on properties financed by government-insured loans, such as FHA or VA mortgages, are excluded from the HPI, as are properties with mortgages whose principal amount exceeds the conforming loan limit. Mortgage transactions on condominiums, cooperatives, multi-unit properties, and planned unit developments are also excluded. This contrasts to the alternative Case-Shiller index, which includes all homes. We have chosen to use the FHFA index because the Case-Shiller index is not available for 13 states and it covers fewer MSAs. Additional differences between the two indices are that the Case-Shiller index puts more weight on more expensive homes and the Case-Shiller index uses purchases only, whereas the FHFA index also includes refinance appraisals. As a robustness check, we re-estimate our results using the Case-Shiller index.

not include information about home ownership status, so we can not separately tabulate current period births (or conceptions) separately for home owners and non owners. Home ownership rates are calculated using the 1990 5 percent sample of the decennial census for MSA/group cells, where groups are defined, as above, by race/ethnicity, age category, and education category. We match the MSA definitions provided in the Census to the 2009 MSA definitions used for the birth and housing price data according to the crosswalk procedure described in the appendix. Our group-level measure of home ownership is taken at baseline and is time invariant, as we discuss below.

3.2 Descriptive statistics and trends

In Figure 2 we consider the time-series correlation between births, house prices, and unemployment rates for the period 1990-2006. The top graph in Figure 2 plots the standardized, de-trended (off a linear time trend) residual of the fertility rate among women age 20-44 in our sample of 66 MSAs and the standardized, de-trended (off a linear time trend) residual of annual HPI, averaged across the 66 MSAs in our sample. The bottom graph plots the same standardized, de-trended residual fertility rate alongside standardized, de-trended residual annual unemployment rate, averaged across the 66 MSAs in our sample. These plots suggest that movements in fertility rates follow movements in house prices fairly closely. In fact, a comparison of the two graphs shows that the time-series correlation is greater than it is for fertility rates and unemployment rates. The raw correlation of these de-trended fertility rates is 0.90 with house price residuals and 0.29 with de-trended unemployment rate residuals. This provides a prima facie case for the importance of including housing prices when investigating how economic conditions affect current period birth rates.

Table 2 lists the 66 MSAs included in our analysis sample. MSAs are ranked according to the value of the housing price index in 2005, the peak of the housing boom. Also listed are percentage changes in housing prices between 1990-2005, fertility rates in 2005, and the percentage changes in fertility rates 1990-2005. Fertility rates are defined as births to women aged 20-44 over the female population aged 20-44. The top 9 MSAs/MSADs in terms of the value of the housing price index are all in California, with the MSAs including San Diego, Oakland, and Vallejo-Fairfield topping the list as the most expensive. The least expensive cities are Rochester, NY, Indianapolis, IN, and Wichita, KS, respectively. Every city in the analysis sample but one - Rochester, NY - experiences growth over the sample period. The largest increases in house prices occurred in the MSAs that include Miami, FL, Sarasota, FL, and Fort Lauderdale, FL.

Table 3 provides summary statistics from the 1990-2006 Vital Statistics natality files, the 1990-2009 CPS files, and and the 1990 Census. All three sources of data are used in various analyses. The first three columns of table 3 summarize the main dependent variable of interest: log births, which are shown on aggregate and separately for first time mothers and those who already have children. Log births are highest to Non-Hispanic white mothers, younger mothers, and high school educated mothers. This is partially a reflection of population counts, which we will control for in our regression specifications. The next two columns tabulate means from the CPS. We will use this data as a supplement to the main analysis to look individually at the propensity to have a child and housing prices. The last three columns summarize data from the 1990 census on cell level home ownership rates and mean home values. The highest home ownership rates are among non-Hispanic white mothers, older mothers, and college educated mothers. The last column displays mean reported home values in 2006 dollars.[12]

3.3 Empirical Specification

We estimate regression models of the following form:

$$\begin{aligned} ln(births)_{mtg} = \beta_0 + \beta_1(HPI_{mt-1} * Ownrate_{mg}) + \beta_2 HPI_{mt-1} + \beta_3 Ownrate_{mg} \\ + \beta_4 lnpop_{mgt-1} + \beta_5 \mathbf{X}_{mt-1} + \gamma_m + \gamma_{t-1} + \gamma_g + \gamma_m * (yeartrend) + \epsilon_{mgt-1} \end{aligned} \quad (1)$$

[12]Top-coded values are replaced with 1.5 the listed value.

The level of analysis is an MSA/year/group cell. In the above equation, the subscript m denotes MSA division, t denotes year of the birth (where *t-1* refers to the year of conception), and g denotes group.[13] Groups are defined by race/ethnicity category, education category, and age category. We have 17 years of birth data (years 1990-2007) for 24 groups (4 education categories*2 age categories*3 race/ethnicity categories), yielding 408 observations per MSA. Our final analysis sample consists of 26,928 observations (408 groups*66 MSAs).

The coefficients of primary interest are β_1 and β_2 , which capture the conditional effect, respectively, of MSA-year house price index (HPI) interacted with a baseline measure of MSA-group-level ownership rates and the conditional main effect of the MSA-year house price index (HPI) on log births. The former indicates how an increase in home ownership rates affects the relationship between de-meaned, de-trended MSA house prices and births. The conditional main effect of HPI indicates how movements in house prices affect birth rates net of ownership interactions, all else held constant. We interpret this to be the conditional relationship between HPI and ln births for a non-home-owning population of households.

The variable *ownrate* is the MSA-group level home ownership rate measured in the 1990 5-percent sample of the decennial census. This measure is taken at baseline to minimize concerns about the endogeneity of year-specific MSA-home ownership rates and year-specific MSA-fertility rates. It could be problematic to have current period home ownership rates on the right-hand side of our regression specifications for annual birth outcomes. Taking a baseline measure of home ownership rates for a group is therefore preferable. Figure 3 displays mean ownership rates across groups over time from the CPS. The figures make two patterns clear. First, there is considerable heterogeneity across groups in home ownership rates. Second, home ownership rates are quite stable over time within groups, which means the baseline measure is highly predictive of current period home ownership rates. Therefore, this approach does not entirely eliminate any concern about endogenously determined current

[13]For the sake of convenience, we write *t-1*, but our empirical analysis is precise in dating the year of conception by taking the date of birth and subtracting off the reported weeks of gestation.

period births and our measure of home ownership rates. We control for this conditional main effect to facilitate a causal interpretation of β_1, but we are careful not to assign a causal interpretation to the coefficient on ownership rates.

We aggregate census female population estimates by county and demographic group to construct MSA level female population estimates using the crosswalk procedure described above and in the appendix. However, census population estimates are not available for education groups, so we cannot perfectly control for group-level population. To be clear, our regression model describes ln(births) defined at the level of group (MSA, year, race/ethnicity, age category, and education category) controlling for approximate group-specific female population (MSA, year, race/ethnicity, and age category) which is represented by $lnpop_{mtg}$.

We are interested in identifying the causal relationship between current house prices and fertility timing. It is thus important to control for other time-varying MSA-level economic conditions that potentially covary with real estate markets and also fertility timing decisions. Our regression specification includes controls for MSA-year unemployment rate and MSA-year per capita income, included in the vector X_{mt} in equation (1). Data on MSA-year level unemployment rates come from the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics. Our measure of MSA-year level per capita income comes from the Bureau of Economic Analysis (BEA) Regional Economic Accounts. Each of these is collected at the county level and aggregated to MSAs using the crosswalk procedure described in the appendix.

The regression also includes controls for MSA fixed effects (γ_m), year fixed effects (γ_t), group fixed effects (γ_g), and MSA specific time trends ($\gamma_m * t$). It is imperative that the regression specification control for MSA fixed effects so that the estimated relationship between house prices and birth rates is not confounded by time-invariant differences in preferences for children across MSAs. If couples with lower preferences for children sort into areas with higher costs of living – driven by other amenities – there will be a negative correlation between house prices and fertility.[14] Given our goals in this paper, we want to isolate the effect of house prices on current period fertility net of these sorting patterns. It is thus important that our regressions control for mean MSA-level differences in birth rates. The resulting regression estimate of the relationship between house prices and birth rates is identified off within-MSA changes in house prices. And finally, we add MSA specific time trends to the model to control for the possibility that individuals with plans to increase or decrease their fertility move into MSAs with upward or downward trending house prices.

As noted above, our empirical analysis is designed to capture contemporaneous fertility responses to movements in local house prices. Certainly it would be interesting to know whether any short term responses observed translate into changes in completed fertility. To the extent that we observe a change in births to older women or to higher-order births, we can speculate that those changes reflect changes in total completed fertility, as those women and births are more likely to be near the end of a woman's childbearing. But, we leave it to future research to consider the lifetime implications of any short term changes that we find. Such an analysis requires a different empirical framework.[15]

4 Estimation results

Table 4 presents the results of estimating equation (1). Column 1 reports the results without MSA-specific trends and column 2 reports the results with MSA-specific trends included. The estimated coefficient on the $HPI * ownrate$ interaction is 0.00362 (with a

[14] For example, consider the hypothetical case of two couples, in which one moves to San Francisco, where household expenses are high, because they expect to have few children and spend their time and money instead indulging in city-type amenities. The other couple moves to Wichita, in expectation of buying a big house at a much lower cost per square foot, and filling it with kids. If these couples are typical, then high-latent-fertility couples will sort into lower priced real estate markets and low-latent-fertility couples will sort into lower priced real estate

[15] One potential approach would be to compare the completed fertility of cohorts who experienced their prime childbearing years during different real estate market realizations, controlling econometrically for differences in wage levels and income over those periods. In such an approach, given that the empirical analysis is no longer about a point in time, one would have to grapple with the issue of mobility over the course of one's childbearing years, which would not be observed in most datasets.

standard error of .000635). Column 2 reports the results with MSA specific trends included. The positive point estimate on the interaction term – statistically significant at the one percent level – indicates that as home ownership rates increase, higher house prices lead to an increase in current period births, all else held constant. This implies a positive home equity effect that dominates any negative price effect among current home owners. The estimated coefficient on HPI is negative and statistically significant. This is consistent with a negative price effect of house prices on current period fertility for non-home owners. To facilitate an interpretation of magnitudes, we simulate the effect of a 10 percent increase in house prices using the coefficient estimates from our regression analyses. We describe the results of this simulation exercise below.

Table 4 also reports the coefficient estimates for the control variables MSA-group ownership rate (as measured in the 1990 census), MSA-year unemployment rate, and MSA- year income per capita. The estimated coefficient on the mean ownership rate is positive and statistically significant. This implies that all else equal, higher levels of ownership are associated with increased birth rates in the current period. As noted above, we do not propose a causal interpretation to this relationship. In terms of the other covariates, we see that the sign of the point estimate on the unemployment rate switches from positive to negative when MSA-trends are included in the model. And finally, the estimated coefficient on income per capita is not statistically significant.

In the remaining columns of Table 4, we report the results of estimating equation (1) for various demographic subgroups and then for first and higher order births. In all cases, the point estimate on HPI is negative, implying a negative price effect. The point estimate on the interaction term $HPI * ownrate$ is positive, implying a net positive effect of house price increases among home owners. Columns (3) and (4) report the results for non-Hispanic whites, with and without MSA-trend variables included in the model. Columns (5) and (6) report the results for Blacks and Columns (7) and (8) report the results for Hispanic whites. The magnitudes of the estimated coefficient on the interaction term $HPI*ownrate$ are larger than those estimated among the pooled sample; they are always statistically significant at the one percent level. They are qualitatively unchanged by the inclusion of MSA-trend controls. The estimated coefficient on HPI is consistently negative, though in column 8 it is not statistically significant. The stability of these estimated coefficients across demographic groups is interesting. These groups have very different ownership rates, as shown in Table 3, but the estimated relationship between house prices and births is consistent across groups when ownership is controlled for and explicitly interacted with HPI. This says that for all race/ethnic groups, there is a negative price effect of house prices on current birth rates, but a net positive effect among owners.

Given that a previous literature exists on the relationship between unemployment rates and contemporaneous fertility, we describe the estimated coefficients on the unemployment rate. As noted above, the estimated coefficient on the unemployment rate is sensitive to the inclusion of MSA-trend controls. In terms of differences across race/ethnic group group, our estimates show a negative relationship between MSA-year unemployment rate and births to non-Hispanic whites. In column (4), this estimated negative effect is statistically significant. For blacks and Hispanics the point estimate is not statistically significant.

We next consider whether the effects of house prices on current period births are driven by first births or higher order births. It is not clear a priori which would be more price or income elastic. On the one hand, the optimal timing of first births might be less constrained, since mothers will tend to be younger and might consider that a deliberate delay will be less consequential, as they have more childbearing years ahead of them. Also, if couples have specific ideas about optimal spacing, they might be more flexible about the timing of their first birth. On the other hand, subsequent births might be more "marginal" and thus might exhibit a great degree of elasticity with respect to price or a (temporary) income shock. In addition, as a matter of interpretation, an effect on higher order births might be more indicative of a change in completed fertility.

The results are reported in Table 4, columns (9) through (12). The point estimate for the coefficient on HPI is not significant in the specifications for first births, but is negative and statistically significant for higher-order births. These estimates imply that as home ownership rates approach zero, all else equal, an increase in house prices reduces the number of higher-parity births, but not first births. This is consistent with higher-parity births being more price-elastic than first births. For both first and higher parity births, the estimated coefficient on the interaction between HPI and ownership rate is positive and statistically significant, with a larger magnitude for higher parity births. This too is consistent with higher-parity births being more elastic.

Table 5 reports the results of estimating equation (1) separately by race/ethnic group, age group, and first and higher parity births. The motivation for doing so is to push further on this idea of whether the changes we observe in current birth rates might reflect changes in total fertility. Higher parity births to older women are the births most likely to reflect "final" childbearing outcomes. So if house prices are associated with changes in this set of births, we might suspect that completed fertility is affected. On the other hand, if the change in births is being driven by births to younger mothers, there is less reason to think that the changes observed reflect anything more than timing changes.

In fact, in Table 5, we see that the largest negative point estimates of the conditional main effect of HPI are for higher parity births to older mothers. For white mothers age 30-44, for both first and higher-order births, we see the usual pattern of coefficient estimates – the estimated coefficient on HPI is negative and statistically significant; the estimated coefficient on $HPI * ownrate$ is positive and statistically significant. This pattern also holds for higher-parity births to the younger mothers; the estimated coefficients are not statistically different from zero for the younger white mothers. For black mothers, the estimated main effects appear to be driven by higher order births. The data do not generate a clear set of results when we try to break things down in this way among non-Hispanic white mothers. These results are certainly not conclusive of an effect on completed fertility, but they are consistent with the possibility.

5 Robustness Checks

In this section we examine individual-level data from the CPS, which identifies home ownership status and whether a woman has a child under the age of one. Our goal with this supplementary CPS analysis is to confirm that there is a positive relationship between short-term fluctuations in MSA-level house prices and the likelihood of giving birth among homeowners. We then revisit our cell-level analysis using Vital Statistics complete birth records and conduct a series of robustness checks to confirm that the results reported in Table 4 are not sensitive to variable definition or sample selection criteria.

5.1 Individual level estimation using Current Population Survey (CPS)

The empirical results presented above suggest that an increase in MSA-level house prices exert a negative price effect on births among non-owners and a net positive effect on births among owners (presumably through a positive "home equity effect"), all else equal. These estimates are generated by an aggregated cell-level analysis, but the underlying conceptual framework is at the individual level. We thus turn to individual-level Current Population Survey (CPS) data to check that the story told by aggregate level data is confirmed with individual level data. We map the older MSA designations provided in the CPS (as in the Census) to the 2009 MSA designations provided in the FHFA house price data using the crosswalk procedure described in the appendix. There are two important reasons why the CPS is not the ideal dataset for the purpose of this paper. First, it is not ideal for an analysis of MSA-level house prices because it offers severely limited sample sizes at the MSA level; this reduces the statistical power of our empirical analysis. Second, we do not see the full population of births, as we do with an analysis of Vital Statistics birth data. However, as a supplementary data source, the CPS offers a couple distinct advantages. First, it directly identifies home-owners. Second, it is available through 2010, allowing us to look at the post-boom period.

In this individual level analysis, we define *own* as an indicator for whether the individual in the CPS is the household head or head's spouse and the household is reported to own their home. In the aggregate analysis above, ownership was defined at the group level in the baseline year of 1990. Here it is defined at the individual level in the current year, as we have no measure of lagged home ownership available. Caution should thus be exercised in assigning a causal interpretation to the $HPI*own$ interaction term in this specification, since individuals who intend to have a baby this year might decide to buy a house in anticipation of that event. Again, we consider this analysis supplementary to the main analysis above. We define the dependent variable "Had baby" to be one if there is a child under the age of one in the household. All the other variables are defined at the MSA level as defined in equation (1) above. Explanatory variables, including the house price index, are matched to observations by the year prior to the survey year in order to capture the effect of conditions in the year of the baby's conception. (We do not have perfect birth-date or gestation information, as we do in the Vital Statistics natality files, and so here we use year minus one as an approximation.) Recall that our goal is to obtain an estimate of the causal relationship of house prices on current period birth rates. Even if we had individual level house prices, we would not use them because individuals are likely to sort into houses at least in part based on their expectations of number of children. For example, individuals intending to have more children will likely seek larger houses, which tend to be more expensive. We thus use MSA-level house prices conditional on MSA fixed effects (to control for endogenous sorting into higher or lower priced MSAs) in all our analyses.

Table 6 reports the results. In the pooled sample regression reported in equation 1, we see the familiar pattern of point estimates – a negative point estimate on HPI (statistically significant at the 1 percent level) and a positive point estimate on the interaction of $HPI * own$ (significant at the 5 percent level). Columns 2-4 report the results separately by race/ethnicity. Among both non-Hispanic whites and Hispanic whites, the estimated coefficient on the interaction of HPI and the indicator for *own* is positive and statistically significant and the coefficient on HPI is negative and statistically significant. This confirms that the documented positive "home equity effect" reported above is in fact driven by owners.

The CPS provides us with additional years of data, as compared to the Vital Statistics data, and takes the time period through the housing bust of the late 2000s. We next examine whether the pattern of results differs over real estate cycles. Table 6 columns 5-8 reports the results separately for the periods 1990-94, 1995-99, 2000-05, and 2006-09 where 2006-2009 represents the housing bust period (as evidenced by table 1). For the period of the bust, the pattern remains the same as the period prior: the estimated coefficient on HPI is negative and the estimated coefficient on the interaction of $HPI * own$ is positive (although neither are statistically significant) .

5.2 Alternative specifications

In this section we estimate alternative specifications to equation (1) above, providing some specification checks on the main MSA-group level analysis. These results are reported in Appendix Table 1. Columns 1 and 2 of that table reproduce the main results from Table 4, for the sake of comparison. In columns 3 and 4 we add a control variable for average rental prices in the MSA-year. Average rental prices and house prices tend to covary, but there are years during which the two series are more or less closely aligned. Our measure of average rental prices comes from the Department of Housing and Urban Development (HUD) Fair Market Rents program, used for the purpose of calculating rent for the Section 8 housing assistance payment program.[16] We adjust the nominal values of rental prices to 2006 dollars using the CPI-U "all items less shelter" series (as we do for the HPI). As shown in the table, the inclusion of this control variable does not appreciably change the estimated coefficients

[16]Calculated rent is inclusive of utilities and is typically calculated at the 40th percentile of the rent distribution by number of bedrooms. Prior to 1995, rent was calculated at the 45th percentile. Some cities are calculated at the 50th percentile. We take the unweighted average of the reported fair market rental value for zero to four bedroom units as the average rental price in a given city.

on our two explanatory variables of interest: HPI and $HPI * ownrate$.

We next replace the income per capita control variable with wage measures. Wages are in 2006 dollars, adjusted using the BLS CPI-U "all items" series. First we include a measure of the average wage calculated at the MSA-year level. We aggregate the BEA measure of total wages in the county to the MSA level and divide by the total number of jobs in the MSA (aggregated from the county BEA numbers) to obtain an estimated average wage per job in the MSA. These results are reported in columns 5 and 6. In columns 7 and 8 we instead include measures of the wage distribution, in particular, the 25th, 50th, and 75th percentile of the wage distribution. The sample size for these regressions is decreased because we calculate these measures over 5-year periods from the March CPS from 1990-2004. (Beginning in 2005, the CPS began using new MSA boundary definitions. We thus do not use the 2005 and 2006 wage data.) The pattern of coefficient estimates on HPI and $HPI * ownrate$ are not sensitive to these changes.

In the main specification above, we estimate log births, aggregated to the MSA-year-group level, as the dependent variable and control for MSA-year-female population counts – for age category/race/ethnicity – on the right-hand side of the regression equation. We use log births, instead of fertility rates, because the Census does not collect MSA level population data by education group, and our groups were defined by age category, race/ethnicity, and education level. We define groups by education because it is an important predictor of group level home ownership rates, as shown in Figure 2. In Appendix Table 2 we report the results of estimating our main set of analyses (from Table 4) with the dependent variable defined as ln(fertility rate), instead of ln(births), and we define groups only by race/ethnicity and age category only. Note that in doing so, the measure of *own rate* is less precisely measured. One benefit of this approach is that by eliminating education as a defining cut to our cells, the number of births per MSA-year-group cell is larger and we can therefore include more MSAs in the analysis. For example, when we restrict the sample to MSA-year-race/ethnicity-age cells with at least 5 births as we did throughout the prior analysis, we are left with 175

MSAs (as opposed to 66). Since MSAs vary in their size, and the fertility rate does not capture this variation as the count of total births does, we use weighted least squares, where the weight is the total number of births in the cell. The results indicate that the pattern on the coefficients *HPI* and *HPI*ownrate* remain the same despite the change in the definition of the dependent variable and the sample of MSAs, providing additional assurance that our main results are not qualitatively sensitive to either of these changes.

Appendix Table 3 reports the results from estimating our main specification with an alternative housing price index, the Case-Shiller Index. This index differs from the FHFA index used above in a few ways. As compared to the FHFA index, which is available for all MSAs, the Case-Shiller index is only available for 20 cities, 17 of which we are able to match to the rest of our data).[17] However, the Case-Shiller index offers the benefit of being constructed using virtually all homes in the MSAs it covers, whereas the FHFA index only includes home purchased or refinanced using conventional, conforming mortgages. In addition, the Case-Shiller index is value-weighted, meaning more expensive homes figure more heavily in its construction, and it only includes purchases, whereas the FHFA index includes purchases and refinances. Even though the indices are slightly different and the sample size is severely limited by using the Case-Shiller index, the pattern of the coefficients is familiar, confirming the results are not sensitive to the chosen housing price index.

In Appendix Table 4, we consider that current housing prices could be endogenously determined with current period birth rates if movements in birth rates immediately alter the demand for housing and equilibrium prices. We view the pattern of estimates as inconsistent with this type of reverse causality. Recall that the estimated conditional relationship between HPI and ln(births) is negative, and the estimated relationship between the interaction *HPI*ownrate* and ln(births) is positive. For this to be driven by reverse causality, it must be the case that an increase in birth rates changes house prices differentially by ownership rates in an MSA. Under that alternative explanation, in places with lower levels

[17] See the data appendix for how we match the Case-Shiller index to the rest of our data.

of ownership, increases in birth rates would lead to decreases in house prices. However, as a strategy to adjust for the possible endogeneity of current period house prices and birth rates, we implement an Instrumental Variables estimator, using a one-year lag in the HPI as an instrument for current period HPI. The idea behind this approach is that lagged housing prices are not expected to be affected by *future* fertility patterns but are expected to be correlated with future housing price patterns. Not surprisingly, first stage F-statistics are well above conventional levels, indicating the instrument has significant predictive power. Appendix Table 4 displays the results from this IV approach. The estimates are similar in magnitude and sign to the OLS specifications.

Finally, in Appendix Table 5 we consider an alternative sample of MSAs, as a check on whether the changing boundaries of MSAs over the sample period is influencing our estimates. We re-estimate the specifications reported in Table 4 using a restricted set of MSAs. In particular, we limit the sample to MSAs whose boundaries did not change between 1990 and 2009. This is done as a check on the sensitivity of our estimates to the crosswalk procedure we have used to link current MSAs (2009 OMB definitions) to vintage MSAs (1990 OMB definitions) which we use to match the group level home ownership rates to the rest of the data. This procedure effectively ignores boundary changes that have occurred over our sample period. Though the sample size is reduced, the range of point estimates on the two coefficients of primary interest is not qualitatively altered.

6 Discussion of Results

Our analysis of Vital Statistics birth data coupled with MSA-level house prices shows that an increase in MSA-level house prices lead to a negative price effect on births and an offsetting positive "home equity effect" for owners, controlling for other economic indicators, MSA fixed effects, and MSA-specific time trends. These patterns hold for whites, blacks, and Hispanics. They effects appear for both first and higher parity births, but are larger for higher parity births. For both white and black mothers, the negative price effect appears to be larger for older mothers (age 30-44), while the positive home equity effect appears to be larger for younger mothers (age 20-29).

6.1 Interpreting the Magnitudes of the Estimated Effects

In order to facilitate an understanding of whether these results are economically large or small, we have conducted a simple simulation exercise. Figure 4 presents the predicted effect of a 10 percent increase in house prices on births for each race/ethnic group. The x-axis represents group home ownership rates and the y-axis represents the net predicted percentage change in births from of a 10 percent increase in house prices, conditional on each level of home ownership. The prediction is indicated by the solid line and a 95% confidence interval is indicated by the dashed lines.[18] The predictions are calculated based on point estimates displayed in the odd columns of Table 4, which include all of the main demographic group and MSA level control variables, MSA and year fixed effects, and MSA time trends.

In all cases, the exercise suggests a positive, linear relationship between home ownership rates and the change in birth due to a 10% increase in house prices. The net effect for all demographic groups implies that as the ownership rate increases from 10% to 20%, the net effect become positive. This implies that in MSAs with sizable rates of home ownership, the positive home equity effect among owners is large enough to outweigh the negative price effect, leading to increases in MSA-level birth rates. Among whites, the impact switches from negative to positive between 30 and 40 percent ownership. For Blacks, the impact becomes positive between 20 and 30 percent, and for Hispanics, between 0 and 10 percent. Overall, this suggests that white women are more sensitive to the negative price effect of an increase in housing prices than any other demographic group. To get a more complete picture of the net effect, it is useful to consider what the change would be at each group's mean level of

[18] The 95% confidence interval was estimated by 100 bootstrap replications. The net predicted effect and confidence intervals were calculated at each displayed value of home ownership in 10% intervals and smoothed using a locally weighted linear regression.

home ownership. In the CPS, mean home ownership is 47%. At this rate, the net effect of a 10% increase in prices is a 2% increase in births. Among whites, the mean home ownership rate is 56%, which is associated with a 2% increase in births. Among blacks, the mean home ownership rate is 26%, which is associated with a net increase of 0.5% in births. And among white Hispanics, the mean home ownership rate is 32%, which is associated with a net increase in births of 1.7%. These estimates suggest that although Whites appear to more sensitive to the negative price effect, because their home ownership rates are higher, the net predicted effect in the aggregate is a greater increase in births. Finally, it is an interesting exercise to consider an out-of-sample prediction for those that are sure to be home owners, or in other words, the net effect assuming 100% ownership rates. In this case, the net impact is a 4.5% for all groups, 6% increase for whites and Hispanics, and a 9% increase for Blacks. To be clear, this implies that among owners, an increase in house prices can have a sizable increase in the likelihood of giving birth in a given year.

In a contemporaneous working paper, Lovenheim and Mumford (2011) investigate the relationship between changes in home value and current period fertility using data from the Panel Study of Income Dynamics (PSID) for the time period 1990 to 2007. Those authors estimate linear probability models of the probability that a woman gives birth in a given year as a function of two and four year changes in the reported market value of her home. To address the issue of selection into more expensive houses, the authors construct a measure of "simulated housing price growth", where reported house price changes are defined as lagged reported house value times changes in the MSA-level housing price index. The identification assumptions of this approach are that (a) households with higher underlying fertility rates are not sorting into regions in which house prices are growing the fastest and (b) lagged home prices are exogenously determined with respect to current period fertility. The authors find that a $10,000 increase in real housing wealth is associated with a 0.07 percentage point increase in fertility among homeowners. Their back-of-the envelope calculations suggest that the housing boom of 1999-2005, which was associated with an average four-year home price change of roughly $80,000, would lead to a 0.55 percentage point, or 9.8 percent, increase in fertility. Our estimated effects lead to comparable predictions for owners. In our sample, the average annual increase in house prices between 1990 and 2007 is 2 percent. We calculate that at the mean home ownership rate of 47% percent, this would lead to an additional 0.31 percent increase in births per year. Compounded over the period, this implies 4.99 percent more births over the period. The Lovenheim and Mumford (2011) estimate is based off a sample of owners. If we assume a cell ownership rate of 100%, then total births increase 0.88 percent each year. Under the strong assumption that these births are not displacing births that would occur in a later year, this leads to a compounded rate of 15 percent more births between 1990 and 2007.[19]

6.2 Interpreting the "Home Equity Effect"

We have interpreted the positive effect of house price increases for owners – inferred from the estimated coefficient on the *HPI*own* interaction in the MSA-group level analyses and the individual-level CPS analysis – as a "home equity effect". The mechanism we have posited is that an increase in MSA-level house prices could increase liquifiable housing wealth. According to the Federal Reserve Survey of Consumer Finances, among families in the 40-60th percentile of the income distribution in 2004, housing represents an average of 48 percent of a household's total assets (Bucks et al., 2009). But, if households do not intend to realize these gains by selling their current house and moving to a lower-priced real estate market, there is not necessarily an increase in permanent wealth. However, households can potentially liquefy home equity by refinancing one's mortgage, or obtaining a second mortgage, home equity loan, or home equity line of credit. Our findings could potentially be explained by homeowners "consuming" – in this case, paying for costs associated with childbearing and childrearing – out of housing wealth through such mechanisms.

[19] Predictions are based on estimates from table 4, column (2). Percentage change in births is: $((births|HPI = 1.02 * \bar{h}, own = o) - (births|HPI = \bar{h}, own = o))/(births|HPI = \bar{h}, own = o)$ for $o = (\bar{o}, 1)$ The annualized percentage change is then compounded over 17 years (1990-2007).

There is a large body of research on the propensity for households to fund current consumption out of housing wealth (See for example, Case, Quigley, and Shiller (2005); Benjamin, Chinloy, and Jud (2004); Bostic, Gabrial, and Painter (2009); Haurin and Rosenthal (2006)). Most papers in this literature find that the propensity to consume out of housing wealth is substantially higher than the propensity to consume out of financial wealth. This is a curious finding because accessing housing wealth carries relatively high fixed costs compared to other more liquid assets. However, recent research suggests that it is those households who are otherwise credit constrained and have few other liquid assets that have the highest propensity to consume out of housing wealth (Hurst and Stafford (2004); Lehnart (2005)).

We use data from the 1997-2009 files of the American Housing Survey (AHS) to tabulate rates of home equity borrowing and refinancing. Our main goal is to simply confirm that households across demographic groups are accessing their housing wealth. This is necessary for our interpretation of the "home equity effect" to be valid. The AHS includes a survey of about 60,000 housing units across all 50 states and the District of Columbia. It is conducted every two years, in odd-numbered years.[20]

Table 7 tabulates means for relevant variables. The left-hand side of the table reports rates of housing equity loans and lines of credit and mortgage refinancing. These questions are asked of home owners. We see in the data that 20 percent of owners report having an equity loan or line of credit. The proportion is 12 percent among blacks and Hispanic whites, and 23 percent among non-Hispanic whites. The rate is 14 percent among homeowners age 20-29 and 21 percent among those 30-44. The rates increase with the educational attainment of the homeowner, ranging from 11 percent among those with less than a high school degree to 24 percent among college educated homeowners.

The AHS also gives information about rates of refinancing. The mean rate of having refinanced a first mortgage is 35 and the mean rate of having refinanced a second mortgage

[20]The AHS also includes a metropolitan area survey that has included varying numbers of areas and has been conducted at varying intervals over the past 30 years.

is 7 percent. Table 7 tabulates these mains for the various demographic groups. The survey asks homeowners who report having refinanced why they refinanced. Eighty-six percent respond to obtain a lower interest rate. Lower interest rates leave people with lower monthly payments, which would make more disposable income available to fund current consumption. Interestingly, 13 percent explicitly report "to get cash" as being a motivating factor in the decision to refinance. This speaks directly to the use of housing equity to fund current consumption.

Our tabulations from the American Housing Survey (AHS) lead us to conclude that it is feasible that some households fund current childbearing/childrearing by "consuming" out of increased home equity, either through home equity loans or lines of credit or refinanced mortgages. But all we have done is confirmed that a non-negligible share of individuals from all demographic groups do in fact access housing wealth in this way. We next consider whether the likelihood that an individual homeowner accesses housing wealth is affected by a change in MSA-level house prices. This need not be true for a home equity effect to occur, but it is interesting to consider nonetheless. Table 8 reports the results from estimating regressions of the likelihood of having an equity loan/line or a refinanced mortgage on MSA-year HPI. The estimated coefficient on HPI is positive and statistically significant for the pooled sample, indicating that increases in housing prices are associated with increase home equity extraction.

7 Conclusion

This paper has investigated how current house prices affect current period fertility. Our results suggest that house prices are a relevant factor in a couple's decision to have a baby at the present time. House prices lead to a negative price effect that conditionally reduces birth rates in the current period, and an offsetting positive home equity effect that leads to a net increase in births among homeowners. We use the estimated coefficients from our regression analyses to simulate the effect of a 10 percent increase in house prices on current year births. For home owners, the simulated (net) effect is a 4.5 percent increase in births, implying that the positive home equity effect more than offsets any negative price effect for owners. Given underlying differences in home ownership rates and slightly different point estimates, the predicted net effect of house price changes varies across race/ethnic groups. We simulate that a 10 percent increase in MSA-level house prices leads to a 2 percent increase in current year births among whites, a 0.5 percent increase in births among blacks, and a 1.7 percent increase in births among white Hispanics.

Our paper is written within the paradigm of the empirical literature on the cyclicality of fertility and as such, it is about the timing of fertility decisions. The finding of a "home equity effect" demonstrates empirically that (imperfect) credit markets affect fertility timing. We provide evidence suggesting that couples use some of their increased housing wealth to "fund" their childbearing goals. We have discussed our results in terms of the decision couples make with regard to whether or not to have a baby in the current period. We leave it to future research to investigate how house prices affect completed fertility or the demand for children more generally. In addition, it might also be true that when house prices increase or decrease, parents increase (or decrease) quality investments in children, where quality of children is meant in the Beckerian sense. For example, perhaps some home-owning parents use their increased home equity to purchase, say, private education for their children. Once we allow for this possibility, it becomes clear that our empirical analysis is not designed to capture the full range of how real estate markets might affect childbearing and childrearing decisions.

Data Appendix

Metropolitan Statistical Area Construction

Metropolitan statistical areas are defined by the Office of Management and Budget. Metropolitan statistical areas are currently defined based on core urban areas with a population of 50,000 or more and adjacent counties with a "high degree of social and economic integration (as measured by commuting to work) with the urban core" (Census Bureau documentation). Current metropolitan area definitions include both metropolitan areas (MSA) and divisions (MSADs), which are smaller units with this metropolitan area. Prior to 2003 these were called PMSAs. Throughout the study our unit of observation will be MSADs. For MSAs without divisions, we use the MSA.

The definition of metropolitan statistical areas has changed over time as cities grow and shrink. The Office of Management and Budget releases revised definitions based on the decennial census and yearly census population estimates. In order to have a consistent set of geographic areas over time, we use county level data and construct metropolitan areas based on counties whenever possible. We use the November 2008 definitions (released in December 2009) because this is how the housing price index is constructed. Since the index is based on repeat sales of the same home, the 2009 definitions apply throughout the data. For example, suppose a home sells once in 1980, 1990, and 2005. Suppose that in 1980 and 1990 it was not in an MSA, but in 2005 it was. Then, the home is considered part of the MSA and the housing price index for 1980 and 1990 are revised to reflect the current boundaries.

Table 1 lists the level of geographic detail available for each of our control variables. The Census, CPS, and AHS data do not identify all counties and therefore we are unable to construct MSAs based on the 2009 coding system as we do in the birth, unemployment, population, wage and income data. This is problematic because we use the Census and CPS to construct aggregate measures of wages and home ownership that need to be linked to the birth certificate data. We also need to merge the housing price data, which is based on the

2009 definitions, with the individual level CPS and AHS. Fortunately, the Census, CPS, and AHS do identify metropolitan areas directly. However, they use historical MSA codes and definitions that do not directly map to the 2009 definitions which are used in the all of the rest of the data. Census uses 1983 4 digit metropolitan area definitions, the CPS uses 1983 4 digit (1990-1995), 1993 4 digit (1996-2005), and 2003 5 digit (2006-2010), and the AHS uses 1980 4 digit definitions.

In order to match the Census and CPS data to the birth certificate data which was constructed with the 2009 coding system, we create a crosswalk by linking counties that make up the metropolitan areas. Unlike the current 2009 definitions which directly map entire counties to MSAs, the 1980, 1983, and 1993 metropolitan area definitions allow for a single county to be in multiple metropolitan areas. If this is the case, we use 1990 population counts of the minor civil divisions (a smaller unit within the metropolitan area) to determine the MSA in which the majority of the population resides and assign the county to that metropolitan area.

Since the definition of metropolitan areas changes over time, its possible for certain metropolitan areas to have split into two, or combined to form a single metropolitan area between 1980/1983/1993 and 2009. We use the crosswalk to deal with the changing composition of MSAs in two separate ways for the purposes of (1) attaching the aggregate home ownership and wage data to the birth data and (2) attaching the housing price data to the individual level CPS and AHS.

In the first case, we begin by constructing MSA-group level home ownership rates and MSA level wages using the 1983/1993 4 digit MSA codes that are provided in the Census/CPS. We do the following: for metropolitan areas that have been combined into one metro area in 2009, we use 1990 population weights to assign these aggregate/cell level measures of home ownership and wages to current metropolitan areas. For metropolitan areas that have been split into two, we apply the aggregate/cell level measure of home ownership and wages to both areas.

For the second case, in the individual CPS we are provided with 1983, 1993 and 2003 MSA codes and in the AHS we are provided with 1980 MSA codes, but we need to attach the housing price data which is only available with 2009 MSA codes.[21] We use the same crosswalk linking counties that make up the metropolitan areas, except that we assign each metropolitan area in the CPS/AHS to a unique 2009 metropolitan area code based on counts of the 1990 population. In this case, if two 1980/1990/2003 MSAs combine to form a single MSA in 2009, we assign the housing price data to both MSAs. For the case when a single 1980/1983/1993 MSA split to form two MSAs in 2009, we apply the housing price data for the MSA in which the majority of the population resided (in terms of 1990 counts).

It is worth noting a few technical points about linking counties to MSAs. First, Miami-Dade County, FL was renamed between the 1990 and 2000 census; so in all cases we have assigned the post-2000 FIPS code to this county.[22] Another issue concerns BLS Local Area Unemployment (LAU) Statistics, which are calculated at the county level, but use a coding system based on what are called "areas". For the most part, the area codes are simply county FIPS codes. However, for counties which had large populations (50,000-100,000 and 100,000 plus) in 1970; a different coding system is applied.[23] We construct a crosswalk between the two using state FIPS codes and county names using vintage 2009 county FIPS codes.[24] Finally, in the BEA personal income and wage data, BEA combines some counties/county equivalents in Virginia and assigns new county codes. We re-assign those counties which are contained within an MSA one of the combined counties' FIPS code. In all cases these combinations were wholly contained within one MSAD.[25]

Finally, when we use the Case-Shiller housing price index instead of the FHFA housing price index, the sample is further limited. The Case-Shiller Index uses only 20 metropolitan areas, of which 18 match to the OMB MSA definitions, one matches to an OMB MSAD

[21] In the CPS, we also attach the unemployment and income data in a similar manner.

[22] See, for example, `http://www.census.gov/popest/archives/files/90s-fips.txt`

[23] See `http://www.bls.gov/lau/laucodes.htm`

[24] `http://www.census.gov/popest/geographic/codes02.html`

[25] See `http://www.bea.gov/regional/docs/msalist.cfm`

definition (Chicago), and one does not match any OMB definition (New York City). When constructing the data for specifications that use the Case-Shiller HPI, we use only the 19 MSA/MSADs that match to an OMB definition.

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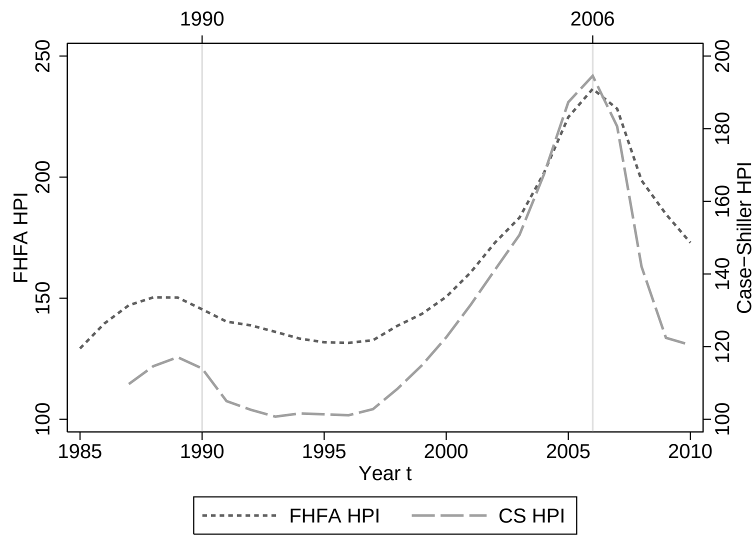
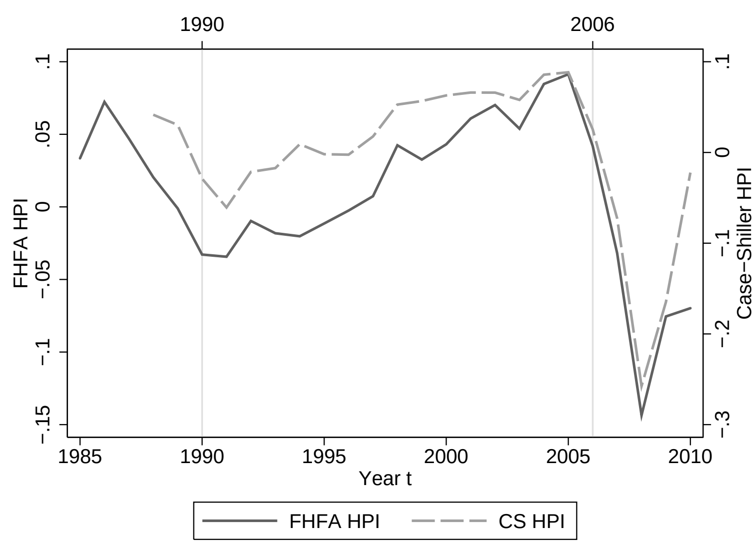
Tables and Figures

Figure 1: Housing Price Index (FHFA and Case-Shiller)

(a) Levels



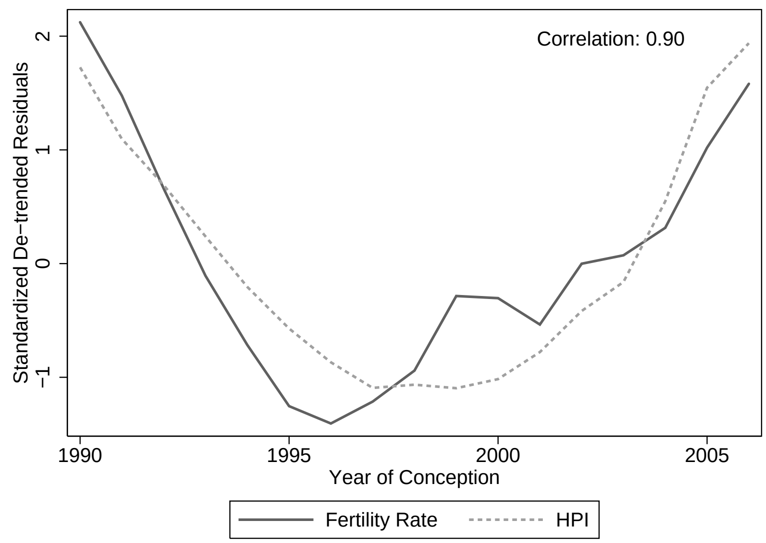
(b) Percentage Change HPI Year t-1 to Year t



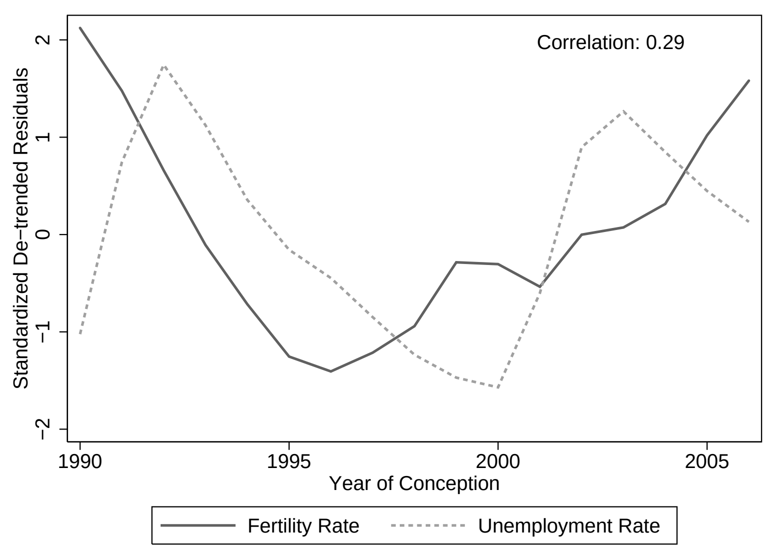
Notes: FHFA HPI is the mean yearly value of the the Federal Housing Finance Agency (FHFA) housing price index for the 66 MSAs in our sample 1984-2010. The Case-Shiller HPI is the mean yearly value of the Case-Shiller housing price index for the 17 MSAs in both our sample and the Case-Shiller Index 1987-2010. Both are adjusted to 2006 dollars using CPI-U "all items less shelter" series. Percentage change in HPI is calculated as $(hpi_t{-}hpi_t{-}1)/hpi_t{-}1$. In both figures, the left y-axis is represents the FHFA HPI and the right y-axis represents the Case-Shiller HPI.

Figure 2: Fertility Rates and Macro Indicators

(a) Housing Prices

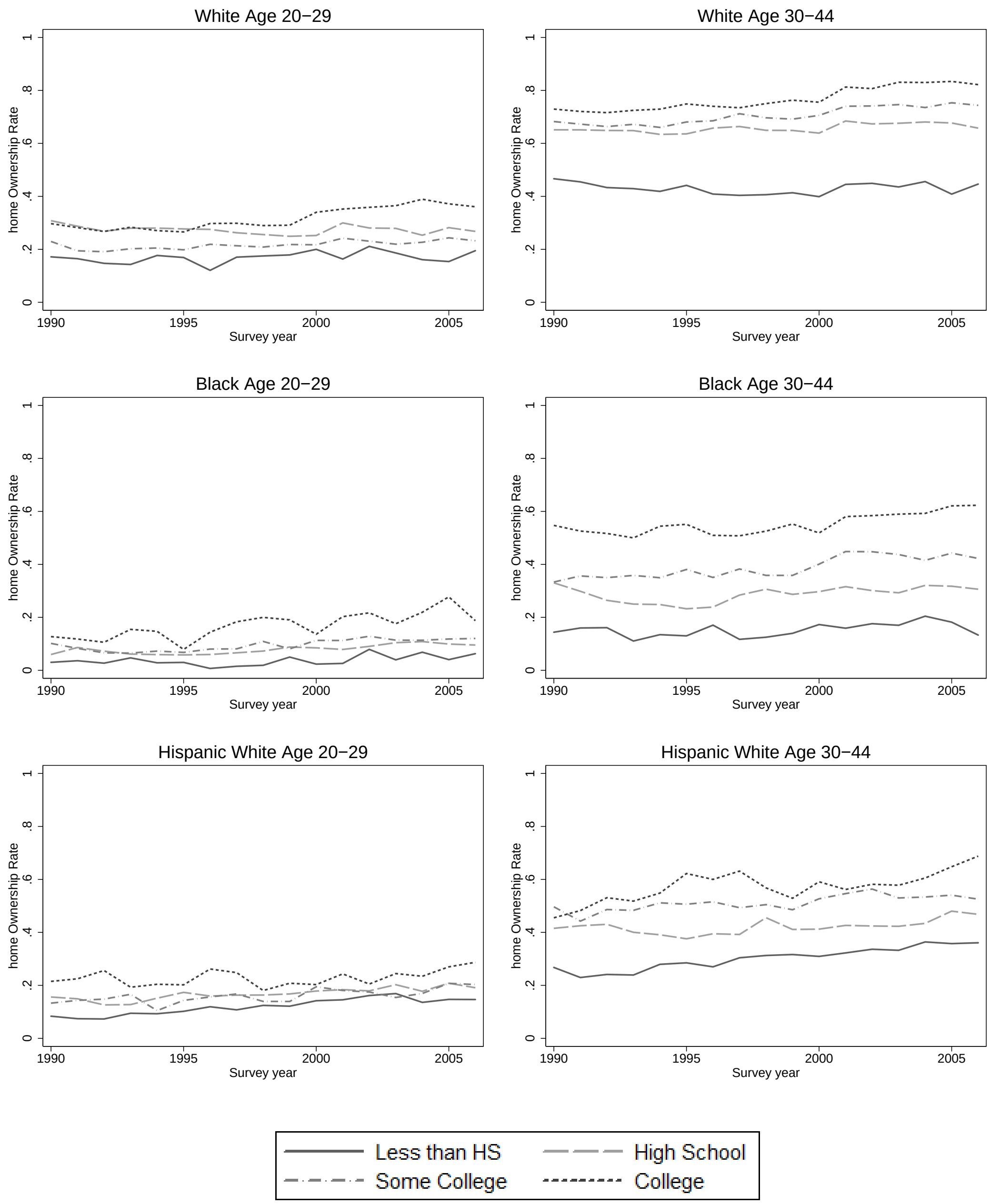


(b) Unemployment Rates



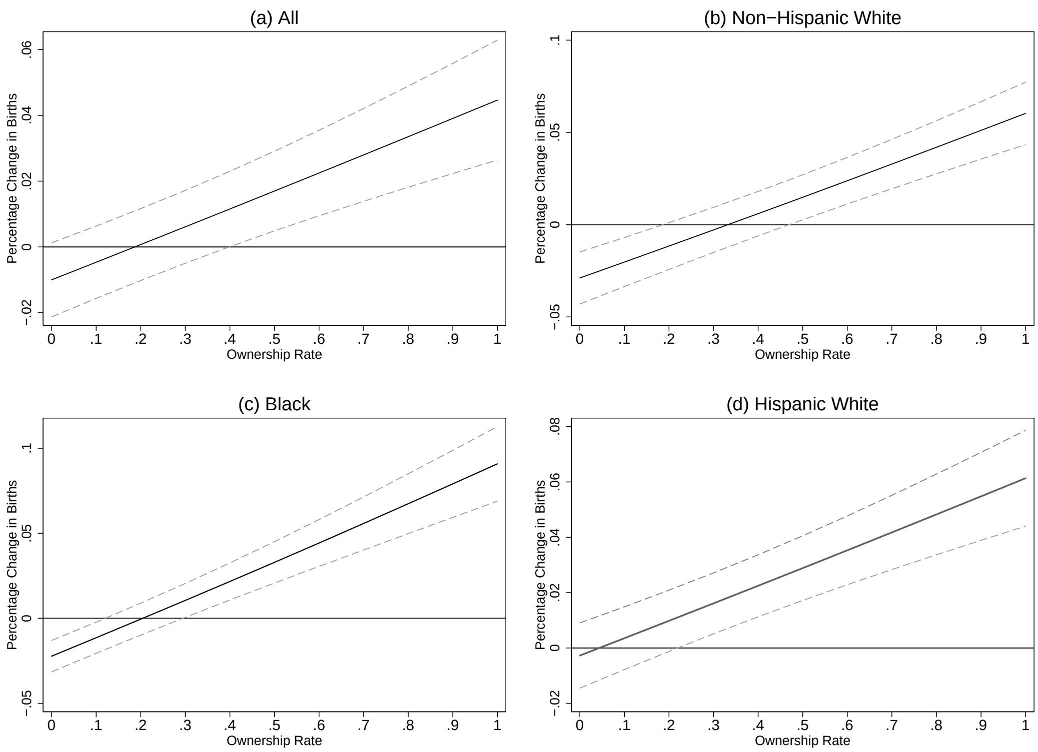
Notes: Displayed are standardized de-trended residuals of fertility rates, housing prices, and unemployment rates. Annual fertility rates (births per 1000 women) are calculated using yearly totals of MSA-level births to women age 20-44 from Vital Statistics data, divided by total female population age 20-44 estimate from the Census multiplied by 1000. HPI is the annual mean value of the Federal Housing Finance Agency (FHFA) housing price index, deflated using CPI-U "all items less shelter" series. Unemployment rate is the annual mean unemployment are taken from Bureau of Labor Statistics local area unemployment statistics. All three measures are limited to the 66 MSAs in our sample.

Figure 3: Home Ownership Rates by Race/Ethnicity and Age



Notes: Home Ownership rates are calculated in the Current Population Survey for females age 20-44 by race and age group. Only household heads and spouses are assigned household home ownership status.

Figure 4: Predicted Percentage Change in Births for a 10% Increase in MSA Housing Prices



Notes: These figures display the results of simulation exercises using estimates from the regression specification displayed in the even columns of table 4. Simulated is the percentage change in predicted births from a 10% increase in mean housing prices for each ownership rate o displayed on the x axis: $(births|hpi = 1.1 * h, own = o) - (births|hpi = h, own = o)/(births|hpi = h, own = o)$. The solid line represents the predicted effect and the dashed line represents a 95% confidence interval, both of which were calculated for each displayed level of o and smoothed using a locally weighted linear regression. Estimates of the confidence intervals at each value of o were calculated using 100 bootstrap replications.

Table 1: Aggregate Variables

	Mean	Std Dev.	Source	Description	Geographic Detail
Housing Price Index	158.97	40.21	Federal Housing Finance Agency	Housing price index; all transactions	MSA Divisions(2009)
Home Ownership Rate	0.32	0.50	1990 Census (IPUMS USA)	MSA-Year-Group Home Ownership Rate	Primary MSA (1983)
Unemployment Rate	5.41	2.11	Bureau of Labor Statistics Local Area Unemployment Statistics	Number of unemployed divided by total labor force	County
Income Per Capita	41549	7798	Bureau of Economic Analysis Regional Economic Accounts	Sum of income from all sources divided by the total population	County
Average Rent	901.91	218.10	Department of Housing and Urban Development	Mean fair market rent for 0 to 4 bedroom residences	County
Average Wage	36.54	7.97	Bureau of Economic Analysis Regional Economic Accounts	Sum of all wage and salary disbursements divided by the number of wage and salary jobs	County
25th Percentile Wage	14.84	2.60			
Median Wage	21.94	3.81	Current Population Survey	Individual annual wage and salary income divided by the product of weeks worked and hours worked.	Primary MSAs (1983/1993)
75th Percentile Wage	32.18	5.52			

Notes: Listed are aggregate level variables and their means for the 66 MSAs used in our sample. All variables are aggregated up the the MSA level from the level of geographic detail (column 6) available using the crosswalk procedure described in the text and data appendix. All nominal values are CPI adjusted to 2006 dollars.

Table 2: Metropolitan Areas by Housing Prices

MSA or Division Name	Change HPI 1990-2005	HPI 2005	Change Fertility 1990-2005	Fertility Rate 2005
San Diego-Carlsbad-San Marcos, CA	91.96%	319.93	-16.10%	71.69
Oakland-Fremont-Hayward, CA	84.85%	304.44	2.00%	73.49
Vallejo-Fairfield, CA	86.17%	299.01	-3.44%	78.67
San Jose-Sunnyvale-Santa Clara, CA	78.95%	297.01	7.91%	81.00
Los Angeles-Long Beach-Glendale, CA	55.65%	294.93	-21.16%	77.48
Riverside-San Bernardino-Ontario, CA	60.56%	293.81	-12.49%	85.05
San Francisco-San Mateo-Redwood City, CA	74.47%	288.94	6.98%	63.16
Stockton, CA	76.80%	287.65	6.47%	91.20
Sacramento–Arden-Arcade–Roseville, CA	73.07%	284.77	2.36%	74.29
Nassau-Suffolk, NY	81.79%	284.30	35.19%	71.87
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	103.19%	282.75	-1.55%	67.93
West Palm Beach-Boca Raton-Boynton Beach, FL	91.50%	282.49	1.75%	74.12
North Port-Bradenton-Sarasota, FL	105.07%	278.82	3.99%	69.65
Boston-Quincy, MA	71.40%	275.67	-1.11%	62.40
Miami-Miami Beach-Kendall, FL	120.29%	275.12	-5.58%	73.47
Peabody, MA	62.93%	260.66	0.92%	68.10
Fresno, CA	86.69%	259.17	-0.53%	95.76
Providence-New Bedford-Fall River, RI-MA	54.69%	255.72	-14.64%	52.80
Washington-Arlington-Alexandria, DC-VA-MD-WV	67.22%	254.95	13.54%	72.40
New York-White Plains-Wayne, NY-NJ	61.64%	252.85	4.47%	69.40
Edison-New Brunswick, NJ	59.50%	251.29	7.16%	72.73
Deltona-Daytona Beach-Ormond Beach, FL	77.10%	250.15	-3.79%	62.87
Tampa-St. Petersburg-Clearwater, FL	76.68%	249.70	3.91%	67.14
Phoenix-Mesa-Glendale, AZ	88.01%	247.77	12.01%	88.80
Atlantic City-Hammonton, NJ	56.79%	246.45	-6.31%	67.11
Worcester, MA	48.94%	245.92	1.03%	67.34
Bethesda-Rockville-Frederick, MD	61.46%	243.92	20.69%	78.47
Bakersfield-Delano, CA	61.95%	242.53	-2.29%	99.21
Poughkeepsie-Newburgh-Middletown, NY	45.48%	242.28	21.37%	69.94
Las Vegas-Paradise, NV	75.99%	238.95	1.30%	83.16
Bridgeport-Stamford-Norwalk, CT	47.64%	234.39	28.60%	74.98
Newark-Union, NJ-PA	53.88%	233.52	8.80%	72.67
Orlando-Kissimmee-Sanford, FL	61.79%	233.26	8.55%	74.00
Minneapolis-St. Paul-Bloomington, MN-WI	79.78%	232.21	14.92%	71.87
Baltimore-Towson, MD	57.28%	225.03	4.18%	66.61
Virginia Beach-Norfolk-Newport News, VA-NC	55.97%	219.71	-3.22%	72.01
Trenton-Ewing, NJ	38.18%	219.29	6.73%	66.80
New Haven-Milford, CT	20.16%	210.35	12.90%	64.18
Tucson, AZ	75.38%	209.06	-0.36%	73.79
Lakeland-Winter Haven, FL	48.49%	204.71	14.83%	82.55
Philadelphia, PA	34.63%	204.17	0.81%	69.77
Camden, NJ	32.42%	203.69	11.66%	67.13
Denver-Aurora-Broomfield, CO	87.30%	202.85	15.12%	78.44
Springfield, MA	19.22%	202.82	-7.38%	55.78
Detroit-Livonia-Dearborn, MI	54.53%	194.10	-12.84%	65.03
Chicago-Joliet-Naperville, IL	50.08%	192.12	-3.91%	73.89
Hartford-West Hartford-East Hartford, CT	6.81%	190.14	15.11%	61.59
Milwaukee-Waukesha-West Allis, WI	57.98%	185.35	6.99%	73.00
Warren-Troy-Farmington Hills, MI	48.72%	184.85	-1.17%	63.27
St. Louis, MO-IL	34.70%	181.90	-1.07%	69.15
Lansing-East Lansing, MI	40.00%	180.33	3.75%	54.57
Atlanta-Sandy Springs-Marietta, GA	29.92%	178.11	13.28%	72.79
Kansas City, MO-KS	34.11%	177.88	17.27%	78.62
Lake County-Kenosha County, IL-WI	38.11%	177.18	-5.88%	74.75
Austin-Round Rock-San Marcos, TX	53.69%	168.71	22.87%	77.47
Houston-Sugar Land-Baytown, TX	20.29%	167.23	12.55%	85.91
Omaha-Council Bluffs, NE-IA	35.49%	167.20	17.55%	86.29
Dallas-Plano-Irving, TX	11.77%	158.79	15.92%	83.06
Charlotte-Gastonia-Rock Hill, NC-SC	18.64%	157.89	18.63%	78.79
Cleveland-Elyria-Mentor, OH	26.13%	155.20	-2.88%	66.30
Fort Worth-Arlington, TX	8.07%	152.39	12.73%	81.76
San Antonio-New Braunfels, TX	21.50%	152.22	7.40%	79.50
Gary, IN	27.79%	151.03	6.05%	72.28
Wichita, KS	14.25%	149.72	8.89%	85.62
Indianapolis-Carmel, IN	16.19%	149.04	14.11%	77.34
Rochester, NY	-7.64%	136.42	20.07%	63.27

Notes: Source is Federal Housing Finance Agency Housing Price Index 1990 and 2006, which is displayed in 2006 dollars (deflated by CPI less housing). Fertility Rates constructed from Vital Statistics Birth Data and Census Population data for women age 20-44.

Table 3: Summary Statistics

	Vital Statistics			CPS		1990 Census	
	Log Births	Log First Births	Log Higher Births	Percent Had a Baby	Percent Own Home	Home Ownership Rate	Mean Home Value
All	5.92	4.62	5.50	0.06	0.47	0.32	171433
	(1.50)	(1.76)	(1.49)	(0.24)	(0.50)	(0.12)	(103366)
Non-Hispanic White	6.85	5.69	6.37	0.06	0.56	0.43	201042
	(1.20)	(1.53)	(1.13)	(0.24)	(0.50)	(0.22)	(106704)
Black	5.42	3.96	5.07	0.05	0.26	0.20	141906
	(1.33)	(1.58)	(1.34)	(0.22)	(0.44)	(0.17)	(88173)
Hispanic White	5.48	4.19	5.06	0.07	0.32	0.34	170951
	(1.51)	(1.63)	(1.55)	(0.26)	(0.47)	(0.23)	(105481)
Age 20-29	6.18	5.23	5.59	0.09	0.21	0.17	150183
	(1.40)	(1.47)	(1.45)	(0.29)	(0.41)	(0.11)	(93646)
Age 30-44	5.66	4.00	5.41	0.05	0.61	0.48	192494
	(1.55)	(1.81)	(1.51)	(0.21)	(0.49)	(0.20)	(108130)
Less than HS	5.52	3.65	5.33	0.08	0.25	0.20	129931
	(1.43)	(1.69)	(1.39)	(0.27)	(0.43)	(0.16)	(94263)
High School	6.34	4.95	6.01	0.06	0.44	0.31	160442
	(1.34)	(1.63)	(1.29)	(0.23)	(0.50)	(0.21)	(90217)
Some College	6.05	4.90	5.60	0.05	0.46	0.35	181434
	(1.38)	(1.59)	(1.33)	(0.23)	(0.50)	(0.23)	(95856)
College	5.76	4.95	5.08	0.07	0.63	0.43	213106
	(1.71)	(1.75)	(1.74)	(0.26)	(0.48)	(0.24)	(113291)

Notes: Source is Vital Statistics birth certificate data (1990-2007), Current Population Survey (1990-2010), and Census (1990). Samples are limited to women age 20-44. Home owners are household heads and spouses in households who own their home. In the CPS, individuals who "had a baby" are those with a child under age 1 in the survey year. Mean home value is in 2006 dollars.

Table 4: Log Births by Age, Race, Parity and and Ownership Category

	All		Non-Hispanic White		Black		Hispanic White		First Births		Higher Births	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep Var: Log Births												
hpi*ownrate	0.00362***	0.00338***	0.00557***	0.00553***	0.00675***	0.00685***	0.00434***	0.00392***	0.00235***	0.00213***	0.00432***	0.00405***
	(0.000635)	(0.000649)	(0.000816)	(0.000840)	(0.00127)	(0.00128)	(0.000728)	(0.000749)	(0.000786)	(0.000795)	(0.000669)	(0.000676)
hpi	-0.00149***	-0.000630**	-0.00255***	-0.00184***	-0.00175***	-0.00141***	-0.00178***	-0.000172	-0.000469	0.000353	-0.00191***	-0.000990***
	(0.000284)	(0.000248)	(0.000386)	(0.000385)	(0.000320)	(0.000282)	(0.000397)	(0.000406)	(0.000345)	(0.000289)	(0.000294)	(0.000257)
ownrate	0.662***	0.700***	3.668***	3.676***	1.233***	1.230***	-0.117	-0.0573	1.173***	1.209***	0.866***	0.908***
	(0.184)	(0.185)	(0.463)	(0.467)	(0.309)	(0.313)	(0.251)	(0.259)	(0.243)	(0.240)	(0.198)	(0.199)
unemp rate	0.00863**	-0.00568**	-0.000369	-0.00563*	0.0112	-0.000581	0.0157*	-0.00438	0.000998	-0.00969***	0.0112***	-0.00458*
	(0.00371)	(0.00231)	(0.00333)	(0.00292)	(0.00680)	(0.00459)	(0.00825)	(0.00464)	(0.00501)	(0.00297)	(0.00388)	(0.00238)
income pc	0.00191	-0.00198	-0.000939	-0.00400	0.00337	0.000409	0.00344	-0.00189	0.00469	0.000299	0.000295	-0.00297
	(0.00277)	(0.00278)	(0.00275)	(0.00366)	(0.00323)	(0.00402)	(0.00477)	(0.00306)	(0.00417)	(0.00330)	(0.00233)	(0.00234)
MSA FE	x	x	x	x	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x	x	x	x	x
MSA Trend		x		x		x		x		x		x
Mean Log Births	5.92	5.92	6.85	6.85	5.42	5.42	5.48	5.48	4.62	4.62	5.50	5.50
Mean Own Rate	0.32	0.32	0.43	0.43	0.20	0.20	0.34	0.34	0.32	0.32	0.32	0.32
R^2	0.796	0.797	0.869	0.870	0.904	0.907	0.904	0.908	0.832	0.833	0.771	0.771
N	26928	26928	8976	8976	8976	8976	8976	8976	26784	26784	26928	26928

Notes: Births are tabulated by msa, year of conception, education category, age category and race/ethnicity for women age 20-44. Unemployment, housing prices, and income per capita are matched by msa and year of conception (1990-2006). Mean home ownership rates are calculated in 1990 Census by year, msa, education category, age category, and race. All regressions include fixed effects for education and age category and control for the log total msa-year-race/ethnicity-age group female population. Columns (1),(2), and (8)-(12) also include fixed effects for race/ethnicity. Robust standard errors are in parentheses and clustered at the msa level. * $p < .1$, ** $p < .05$, *** $p < .01$

Table 5: Housing Prices and Log Births by Race/Ethnicity

	Non-Hispanic White				Black				Hispanic White			
	Age 20-29		Age 30-44		Age 20-29		Age 30-44		Age 20-29		Age 30-44	
	First	Higher	First	Higher	First	Higher	First	Higher	First	Higher	First	Higher
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep Var: Log Births												
hpi*ownrate	0.00311	0.0118***	0.00813***	0.00951***	-0.00676**	0.0129***	0.00180	0.00502***	-0.00159	-0.000406	-0.00265	-0.00254
	(0.00236)	(0.00217)	(0.00199)	(0.00186)	(0.00267)	(0.00276)	(0.00167)	(0.00149)	(0.00219)	(0.00214)	(0.00190)	(0.00165)
hpi	0.000411	-0.00186***	-0.00359***	-0.00512***	0.00119***	-0.000457	0.0000457	-0.00211***	0.00265***	0.00142***	0.00278***	0.00166*
	(0.000587)	(0.000513)	(0.00134)	(0.00117)	(0.000325)	(0.000329)	(0.000701)	(0.000601)	(0.000579)	(0.000508)	(0.000968)	(0.000879)
ownrate	-1.821**	-3.163***	-0.793	-1.761**	0.485	-2.923***	0.0823	-0.689	0.244	0.241	0.294	0.412
	(0.720)	(0.734)	(0.638)	(0.833)	(0.512)	(0.597)	(0.407)	(0.441)	(0.440)	(0.426)	(0.346)	(0.330)
unemp rate	-0.0106***	-0.00237	-0.0136**	-0.00690**	-0.0131*	0.00269	-0.00560	-0.00205	0.00105	-0.000564	0.000531	-0.00119
	(0.00331)	(0.00301)	(0.00609)	(0.00321)	(0.00735)	(0.00549)	(0.00714)	(0.00557)	(0.00602)	(0.00541)	(0.00856)	(0.00505)
income pc	-0.00201	-0.00304	0.00438	0.00652*	0.00273	-0.00378	0.0114**	0.00301	0.00163	-0.00402	0.00230	0.00148
	(0.00406)	(0.00336)	(0.00547)	(0.00363)	(0.00597)	(0.00441)	(0.00538)	(0.00369)	(0.00504)	(0.00406)	(0.00409)	(0.00315)
MSA FE	x	x	x	x	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x	x	x	x	x
MSA Trend	x	x	x	x	x	x	x	x	x	x	x	x
Mean Log Births	6.17	6.33	5.21	6.41	4.63	5.27	3.28	4.88	4.89	5.19	3.49	4.94
Mean Ownership Rate	0.25	0.25	0.62	0.62	0.08	0.08	0.33	0.33	0.17	0.17	0.50	0.50
R^2	0.947	0.923	0.963	0.944	0.953	0.957	0.926	0.938	0.943	0.961	0.910	0.931
N	4488	4488	4482	4488	4487	4488	4385	4488	4488	4488	4454	4488

Notes: Births are tabulated by msa, year of conception, education category, age category and race/ethnicity for women age 20-44. Unemployment, housing prices, and income per capita are matched by msa and year of conception (1990-2006). Mean home ownership rates are calculated in 1990 Census by year, msa, education category, age category and race. All regressions include fixed effects for education and control for the log total msa-year-race/ethnicity-age group female population. Robust standard errors are in parentheses and clustered at the msa level. * $p < .1$, ** $p < .05$, *** $p < .01$

Table 6: CPS Individual Level Analysis 1990-2009

	All	Non-Hispanic White	Black	Hispanic White	1990-1994	1995-1999	2000-2005	2006-2009
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep Var: Had Baby (0,1)								
hpi*own	0.0000792***	0.000110***	0.0000962	0.0000708*	-0.0000544	0.000249	0.0000870*	0.0000279
	(0.0000301)	(0.0000296)	(0.0000779)	(0.0000370)	(0.000126)	(0.000234)	(0.0000501)	(0.0000518)
hpi	-0.0000794***	-0.000113***	0.0000216	-0.0000984***	0.000143	0.000213	-0.0000858*	-0.0000939
	(0.0000210)	(0.0000270)	(0.0000663)	(0.0000356)	(0.000145)	(0.000233)	(0.0000437)	(0.0000979)
own	0.0282***	0.0342***	-0.000912	0.00726	0.0471***	0.00621	0.0275***	0.0346***
	(0.00510)	(0.00488)	(0.0128)	(0.00664)	(0.0170)	(0.0324)	(0.00934)	(0.0111)
unemp rate	0.000549	-0.000703	0.0000580	0.000477	0.000673	0.00117	-0.000546	-0.000376
	(0.000528)	(0.000668)	(0.00176)	(0.000708)	(0.00125)	(0.00237)	(0.00181)	(0.00290)
income pc	-0.000126	0.000318	-0.00140**	-0.000123	-0.00294*	0.00117	-0.000606	0.000597
	(0.000323)	(0.000436)	(0.000612)	(0.000675)	(0.00162)	(0.000894)	(0.000935)	(0.00163)
MSA Fixed Effects	x	x	x	x	x	x	x	x
Year Fixed Effects	x	x	x	x	x	x	x	x
Mean Had Baby	0.06	0.06	0.05	0.07	0.06	0.06	0.06	0.06
Mean Own	0.46	0.56	0.26	0.32	0.43	0.45	0.50	0.47
R^2	0.015	0.017	0.022	0.020	0.019	0.019	0.016	0.017
N	363610	236721	52841	74048	93807	85187	111483	73133

Notes: Sample is women age 20-44 in March Current Population Survey 1991-2007. Dependent variable is an indicator for having a child under one. Unemployment, housing prices, and income per capita are matched by msa and year t-1. All regressions include fixed effects for education, year, age category and msa. Robust standard errors are in parentheses and clustered at the msa level.Ownership is the household's home ownership status, which is assigned as a 1 when the household owns a home and the respondent is the household head or spouse of the household head. * $p < .1$, ** $p < .05$, *** $p < .01$

Table 7: Home Equity Withdrawals by Group

		Does the Homeowner Currently have a...					Why First Mortgage Refinanced?				
	Equity Loan or Line of Credit	Equity Line of Credit	Equity Loan	First Mortgage Refinanced	Second Mortgage Refinanced	Lower Interest Rate	To Get Cash	Renew or Extend	Increase Payments	Reduce Payments	Other
All	0.20	0.19	0.08	0.35	0.07	0.86	0.13	0.01	0.02	0.10	0.09
	(0.40)	(0.39)	(0.28)	(0.48)	(0.26)	(0.34)	(0.33)	(0.10)	(0.14)	(0.31)	(0.29)
Non-Hispanic White	0.23	0.22	0.10	0.39	0.07	0.89	0.12	0.01	0.02	0.11	0.08
	(0.42)	(0.42)	(0.30)	(0.49)	(0.26)	(0.32)	(0.33)	(0.09)	(0.14)	(0.31)	(0.27)
Black	0.12	0.10	0.06	0.23	0.10	0.76	0.11	0.02	0.02	0.07	0.16
	(0.32)	(0.29)	(0.24)	(0.42)	(0.30)	(0.43)	(0.31)	(0.12)	(0.14)	(0.26)	(0.37)
Hispanic White	0.12	0.10	0.05	0.28	0.06	0.78	0.17	0.01	0.03	0.10	0.12
	(0.32)	(0.30)	(0.22)	(0.45)	(0.24)	(0.42)	(0.38)	(0.12)	(0.16)	(0.31)	(0.32)
Age 20-29	0.14	0.12	0.07	0.23	0.06	0.83	0.11	0.02	0.03	0.06	0.12
	(0.35)	(0.32)	(0.26)	(0.42)	(0.24)	(0.38)	(0.31)	(0.14)	(0.16)	(0.24)	(0.32)
Age 30-44	0.21	0.20	0.09	0.37	0.08	0.87	0.13	0.01	0.02	0.11	0.09
	(0.41)	(0.40)	(0.28)	(0.48)	(0.27)	(0.34)	(0.34)	(0.09)	(0.14)	(0.31)	(0.28)
Less than HS	0.11	0.10	0.05	0.28	0.09	0.71	0.20	0.02	0.03	0.12	0.15
	(0.31)	(0.30)	(0.22)	(0.45)	(0.28)	(0.46)	(0.40)	(0.13)	(0.17)	(0.33)	(0.35)
High School	0.17	0.16	0.08	0.33	0.07	0.82	0.16	0.01	0.03	0.09	0.12
	(0.38)	(0.37)	(0.27)	(0.47)	(0.25)	(0.38)	(0.36)	(0.11)	(0.17)	(0.29)	(0.33)
Some College	0.19	0.17	0.09	0.34	0.06	0.86	0.13	0.01	0.02	0.10	0.09
	(0.40)	(0.38)	(0.29)	(0.47)	(0.24)	(0.35)	(0.34)	(0.11)	(0.13)	(0.30)	(0.28)
College	0.24	0.23	0.09	0.38	0.08	0.91	0.10	0.01	0.02	0.11	0.07
	(0.43)	(0.42)	(0.28)	(0.49)	(0.28)	(0.29)	(0.30)	(0.08)	(0.13)	(0.31)	(0.26)

Notes: Source is American Housing Survey, National Version, Every other year 1997-2009. Refinancing is only available in 2001-2009. Questions only asked of home owners. Data is in panel form, so if the respondent has ever done the specific activity they respond yes. For instance, the question will ask, "is the respondents first mortgage a refinancing of a previous mortgage?" "Why refinance?" is only asked for those who have refinanced. The categories are not mutually exclusive and respondents may respond yes to multiple categories.

Table 8: The Effect of Housing Prices on Probability of Making a Home Equity Withdrawal

	Equity Loan/Line (1)	Refinanced Mortgage (2)	Refi for Cash (3)	Refi for Lower Interest (4)
All	0.000310***	0.000582***	0.000318	-0.000133
	(0.000114)	(0.000170)	(0.000194)	(0.000336)
R^2	0.052	0.070	0.056	0.235
N	21147	11275	3931	3931
Non-Hispanic White	0.000346**	0.000636***	0.000237	-0.000165
	(0.000155)	(0.000220)	(0.000221)	(0.000391)
R^2	0.043	0.090	0.063	0.266
N	14765	7896	3053	3053
Black	0.000391	0.000329	0.000195	-0.000986
	(0.000279)	(0.000513)	(0.000883)	(0.00163)
R^2	0.083	0.066	0.244	0.279
N	2751	1278	282	282
Hispanic White	0.000512**	-0.000213	-0.000224	0.000143
	(0.000201)	(0.000346)	(0.000602)	(0.000973)
R^2	0.085	0.067	0.107	0.285
N	3631	2101	596	596
Ago 20-29	0.000321	0.0000952	0.000693	-0.000874
	(0.000240)	(0.000379)	(0.000562)	(0.00117)
R^2	0.078	0.098	0.211	0.295
N	3611	1958	462	462
Age 30-44	0.000297**	0.000724***	0.000231	0.0000701
	(0.000129)	(0.000191)	(0.000208)	(0.000357)
R^2	0.054	0.076	0.063	0.243
N	17536	9317	3469	3469

Notes: Displayed is the coefficient of the housing price index on the probability of making different types of home equity withdrawals. All regressions also control for msa, year, race, and age. Source is American Housing Survey, National Version, Every other year 1997-2009. Refinancing is only available in 2001-2009. Questions only asked of home owners. Data is in panel form, so if the respondent has ever done the specific activity they respond yes.

Appendix Tables

Table 1: (Appendix) Different Macro Indicators

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var: Log Births								
hpi*ownrate	0.00362***	0.00338***	0.00364***	0.00340***	0.00367***	0.00337***	0.00395***	0.00370***
	(0.000635)	(0.000649)	(0.000637)	(0.000650)	(0.000637)	(0.000648)	(0.000761)	(0.000768)
hpi	-0.00149***	-0.000630**	-0.00163***	-0.000830***	-0.00170***	-0.000663***	-0.00155***	-0.000826***
	(0.000284)	(0.000248)	(0.000283)	(0.000259)	(0.000274)	(0.000249)	(0.000320)	(0.000270)
ownrate	0.662***	0.700***	0.659***	0.696***	0.654***	0.700***	0.602***	0.641***
	(0.184)	(0.185)	(0.184)	(0.185)	(0.184)	(0.185)	(0.184)	(0.185)
income pc	0.00191	-0.00198	0.000877	-0.00244				
	(0.00277)	(0.00278)	(0.00284)	(0.00271)				
avg rent			0.0000965**	0.000147***				
			(0.0000453)	(0.0000361)				
avg wage					0.00758*	-0.000520		
					(0.00387)	(0.00401)		
med wage							0.0142	0.0162
							(0.00902)	(0.0115)
p25 wage							-0.0186**	-0.0166**
							(0.00813)	(0.00678)
p75 wage							0.00464	-0.00461
							(0.00439)	(0.00519)
MSA FE	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x
MSA Trend		x		x		x		x
R^2	0.796	0.797	0.796	0.797	0.796	0.797	0.799	0.800
N	26928	26928	26928	26928	26928	26928	24456	24456

Notes: Births are tabulated by msa, year of conception, education category, age category and race/ethnicity for women age 20-44. Unemployment, housing prices, and income per capita are matched by msa and year of conception (1990-2006). Mean home ownership rates are calculated in 1990 Census by year, msa, education category, age category and race. All regressions include fixed effects for education and control for the log total msa-year-race/ethnicity-age group female population. Robust standard errors are in parentheses and clustered at the msa level. * $p < .1$, ** $p < .05$, *** $p < .01$

Table 2: (Appendix) Fertility Rates

	All		Non-Hispanic White		Black		Hispanic White		First Births		Higher Births	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep Var: Fertility Rate												
hpi*own rate	0.00568***	0.00562***	0.00842***	0.00891***	0.00751***	0.00779***	0.00482***	0.00378***	0.00664***	0.00657***	0.00547***	0.00543***
	(0.000490)	(0.000569)	(0.000704)	(0.000826)	(0.00102)	(0.000991)	(0.000578)	(0.000433)	(0.000666)	(0.000768)	(0.000459)	(0.000527)
hpi	-0.00207***	-0.00147***	-0.00413***	-0.00394***	-0.00153***	-0.00136***	-0.000945***	0.000413	-0.00192***	-0.00144***	-0.00223***	-0.00156***
	(0.000187)	(0.000275)	(0.000303)	(0.000362)	(0.000284)	(0.000299)	(0.000209)	(0.000291)	(0.000224)	(0.000316)	(0.000199)	(0.000279)
own rate	0.815**	0.820**	2.461**	2.425**	-2.919***	-2.951***	-1.084***	-0.957***	1.074**	1.082**	0.991**	0.993**
	(0.367)	(0.378)	(0.949)	(0.978)	(0.505)	(0.531)	(0.130)	(0.119)	(0.434)	(0.451)	(0.407)	(0.415)
unemp rate	0.00956***	-0.00652**	0.000775	-0.00943***	0.0119***	0.00101	0.00656	-0.0219***	0.00219	-0.0103***	0.0131***	-0.00484*
	(0.00291)	(0.00263)	(0.00350)	(0.00284)	(0.00415)	(0.00362)	(0.00694)	(0.00666)	(0.00334)	(0.00376)	(0.00309)	(0.00250)
income pc	0.00904***	0.000355	0.0121***	0.000882	0.00766***	-0.000888	0.00484	-0.00174	0.0120***	0.00237	0.00778***	-0.000705
	(0.00242)	(0.00198)	(0.00352)	(0.00198)	(0.00186)	(0.00259)	(0.00610)	(0.00333)	(0.00293)	(0.00219)	(0.00235)	(0.00201)
MSA FE	x	x	x	x	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x	x	x	x	x
MSA Trend		x		x		x		x		x		x
R^2	0.874	0.878	0.858	0.864	0.954	0.960	0.944	0.966	0.895	0.898	0.997	0.997
N	17850	17850	5950	5950	5950	5950	5950	5950	17815	17815	17850	17850

Notes: Births are tabulated by msa, year of conception, age category and race/ethnicity for women age 20-44. Unemployment, housing prices, and income per capita are matched by msa and year of conception (1990-2006). Fertility rates are constructed as the ratio of total births to total age and race specific population female population counts (multiplied by 1000 and logged). Mean home ownership rates are calculated in 1990 Census by year, msa, education category, age category and race. All regression include fixed effects for race and age category. Robust standard errors are in parentheses and clustered at the msa level. * $p < .1$, ** $p < .05$, *** $p < .01$

Table 3: (Appendix) Case-Shiller Index

	All		Non-Hispanic White		Black		Hispanic White		First Births		Higher Births	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep Var: Log Births												
cs hpi*ownrate	0.00393***	0.00389***	0.00593***	0.00594***	0.00607***	0.00606***	0.00540***	0.00590***	0.00238*	0.00236*	0.00482***	0.00477***
	(0.00109)	(0.00109)	(0.00109)	(0.00109)	(0.00193)	(0.00194)	(0.00143)	(0.00153)	(0.00118)	(0.00118)	(0.00115)	(0.00115)
cs hpi	-0.000673	-0.000426	-0.00248***	-0.00240***	-0.000495	-0.000441	-0.000731	-0.000374	0.000476	0.000643	-0.00122**	-0.000923*
	(0.000514)	(0.000522)	(0.000535)	(0.000542)	(0.000596)	(0.000607)	(0.000606)	(0.000715)	(0.000585)	(0.000601)	(0.000535)	(0.000529)
ownrate	1.159***	1.165***	5.301***	5.300***	2.174***	2.175***	0.452	0.391	1.820***	1.824***	1.511***	1.517***
	(0.381)	(0.380)	(0.785)	(0.784)	(0.406)	(0.407)	(0.279)	(0.303)	(0.451)	(0.450)	(0.399)	(0.398)
unemp rate	0.0254***	0.0230***	0.00931	0.00863	0.0205	0.0199	0.0428**	0.0421***	0.0145	0.0128	0.0306***	0.0277***
	(0.00749)	(0.00703)	(0.00581)	(0.00572)	(0.0134)	(0.0139)	(0.0162)	(0.0149)	(0.00994)	(0.00979)	(0.00759)	(0.00689)
income pc	-0.00202	-0.00360	-0.00531*	-0.00585**	0.00594	0.00547	-0.000764	-0.00700	-0.00292	-0.00399	-0.00271	-0.00461
	(0.00513)	(0.00460)	(0.00305)	(0.00280)	(0.00595)	(0.00612)	(0.00932)	(0.00945)	(0.00547)	(0.00523)	(0.00550)	(0.00477)
MSA FE	x	x	x	x	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x	x	x	x	x
MSA Trend		x		x		x		x		x		x
R^2	0.738	0.738	0.870	0.870	0.871	0.871	0.901	0.902	0.793	0.793	0.717	0.717
N	9240	9240	3080	3080	3080	3080	3080	3080	9233	9233	9240	9240

Notes: Births are tabulated by msa, year of conception, education category, age category and race/ethnicity for women age 20-44. Unemployment, housing prices, and income per capita are matched by msa and year of conception (1990-2006). Mean home ownership rates are calculated in 1990 Census by year, msa, education category, age category and race. All regressions include fixed effects for education and control for the log total msa-year-race/ethnicity-age group female population. Robust standard errors are in parentheses and clustered at the msa level. * $p < .1$, ** $p < .05$, *** $p < .01$

Table 4: (Appendix) Instrumental Variable Estimates

	All		Non-Hispanic White		Black		Hispanic White		First Births		Higher Births	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep Var: Log Births												
hpi*ownrate	0.00362***	0.00336***	0.00571***	0.00565***	0.00708***	0.00712***	0.00416***	0.00358***	0.00243***	0.00220***	0.00432***	0.00404***
	(0.000654)	(0.000668)	(0.000876)	(0.000905)	(0.00132)	(0.00133)	(0.000746)	(0.000750)	(0.000801)	(0.000815)	(0.000690)	(0.000697)
hpi	-0.00147***	-0.000666**	-0.00257***	-0.00197***	-0.00187***	-0.00157***	-0.00159***	-0.00000171	-0.000523	0.000277	-0.00186***	-0.00104***
	(0.000289)	(0.000262)	(0.000400)	(0.000400)	(0.000313)	(0.000284)	(0.000433)	(0.000417)	(0.000348)	(0.000297)	(0.000303)	(0.000273)
ownrate	0.663***	0.702***	3.647***	3.656***	1.181***	1.186***	-0.0894	-0.00620	1.162***	1.197***	0.865***	0.909***
	(0.184)	(0.184)	(0.472)	(0.476)	(0.310)	(0.313)	(0.251)	(0.256)	(0.242)	(0.239)	(0.198)	(0.199)
unemp rate	0.00881**	-0.00607***	-0.000146	-0.00597**	0.0108	-0.00104	0.0167**	-0.00486	0.000759	-0.00991***	0.0115***	-0.00499**
	(0.00690)	(0.00456)	(0.00840)	(0.00458)	(0.00516)	(0.00295)	(0.00400)	(0.00239)				
income pc	0.00180	-0.00170	-0.00102	-0.00360	0.00368	0.000977	0.00283	-0.00197	0.00484	0.000564	0.0000984	-0.00265
	(0.00280)	(0.00297)	(0.00271)	(0.00370)	(0.00331)	(0.00422)	(0.00482)	(0.00320)	(0.00411)	(0.00348)	(0.00238)	(0.00254)
MSA FE	x	x	x	x	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x	x	x	x	x
MSA Trend		x		x		x		x		x		x
R^2	0.796	0.797	0.869	0.870	0.904	0.907	0.904	0.908	0.832	0.833	0.771	0.771
N	26928	26928	8976	8976	8976	8976	8976	8976	26784	26784	26928	26928

Notes: Births are tabulated by msa, year of conception, education category, age category and race/ethnicity for women age 20-44. Unemployment, housing prices, and income per capita are matched by msa and year of conception (1990-2006). Mean home ownership rates are calculated in 1990 Census by year, msa, education category, age category and race. All regressions include fixed effects for education and control for the log total msa-year-race/ethnicity-age group female population. Robust standard errors are in parentheses and clustered at the msa level. HPI is instrumented with a one year lag of HPI. * $p < .1$, ** $p < .05$, *** $p < .01$

Table 5: (Appendix) Sample of MSAs With Boundaries that Do Not Change

	All		Non-Hispanic White		Black		Hispanic White		First Births		Higher Births	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep Var: Log Births												
hpi*ownrate	0.00418***	0.00391***	0.00651***	0.00644***	0.00787***	0.00792***	0.00455***	0.00424***	0.00296***	0.00271***	0.00495***	0.00467***
	(0.000754)	(0.000771)	(0.000928)	(0.000947)	(0.00131)	(0.00132)	(0.000911)	(0.000869)	(0.000964)	(0.000976)	(0.000783)	(0.000790)
hpi	-0.00183***	-0.000847***	-0.00298***	-0.00212***	-0.00221***	-0.00172***	-0.00208***	-0.000503	-0.000762*	0.000134	-0.00227***	-0.00124***
	(0.000332)	(0.000296)	(0.000443)	(0.000447)	(0.000343)	(0.000318)	(0.000508)	(0.000480)	(0.000399)	(0.000353)	(0.000340)	(0.000310)
ownrate	0.470**	0.512**	3.138***	3.146***	0.880**	0.868**	-0.335	-0.291	0.913***	0.953***	0.649***	0.692***
	(0.209)	(0.208)	(0.540)	(0.542)	(0.377)	(0.379)	(0.312)	(0.316)	(0.283)	(0.279)	(0.228)	(0.226)
unemp rate	0.00883*	-0.00832***	-0.00149	-0.00995***	0.0165*	-0.000818	0.0117	-0.00908	-0.000100	-0.0128***	0.0119**	-0.00615**
	(0.00441)	(0.00278)	(0.00396)	(0.00359)	(0.00834)	(0.00619)	(0.00993)	(0.00543)	(0.00573)	(0.00371)	(0.00468)	(0.00290)
income pc	0.00222	-0.00152	-0.000268	-0.00547	0.00327	-0.000864	0.00499	0.000889	0.00351	-0.000145	0.00117	-0.00192
	(0.00304)	(0.00331)	(0.00277)	(0.00390)	(0.00321)	(0.00379)	(0.00532)	(0.00426)	(0.00398)	(0.00335)	(0.00252)	(0.00300)
MSA FE	x	x	x	x	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x	x	x	x	x
MSA Trend		x		x		x		x		x		x
R^2	0.780	0.781	0.849	0.850	0.890	0.892	0.900	0.903	0.826	0.827	0.752	0.753
N	18360	18360	6120	6120	6120	6120	6120	6120	18256	18256	18360	18360

Notes: Births are tabulated by msa, year of conception, education category, age category and race/ethnicity for women age 20-44. Unemployment, housing prices, and income per capita are matched by msa and year of conception (1990-2006). Mean home ownership rates are calculated in 1990 Census by year, msa, education category, age category and race. All regressions include fixed effects for education and control for the log total msa-year-race/ethnicity-age group female population. Robust standard errors are in parentheses and clustered at the msa level. * $p < .1$, ** $p < .05$, *** $p < .01$