Housing Market Shocks and the Persistent Decline in U.S. Fertility

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16 October 2026

Abstract

Fertility in the United States declined sharply following the Great Recession and has remained persistently low despite the subsequent economic recovery. This paper examines whether the housing bust contributed to this sustained decline. Using variation across metropolitan areas in the severity of the housing bust, I show that more exposed MSAs experienced substantially larger declines in fertility after the recession. These effects persist through 2022, are similar across several measures of housing-market exposure, and are not explained by differential deterioration in local labor markets. The fertility response also persists even as mortgage lending and residential construction recover from their recession lows. To investigate potential channels, I examine housing and household outcomes among young adults. Young adults in more exposed MSAs became more likely to live with their parents and less likely to form partnered households, own homes, and move. The persistence of the fertility effects across successive cohorts of young women suggests that the response was not confined to those directly exposed to the housing bust during young adulthood. These findings suggest that persistent disruptions to housing and household transitions following the housing bust contributed to the long-run decline in U.S. fertility.

JEL codes: J13, E32, R21

Keywords: Fertility, housing markets, Great Recession, economic shock, homeownership

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1 Introduction

U.S. fertility fell sharply at the onset of the Great Recession and has continued to trend downward despite the subsequent economic recovery. The general fertility rate fell from 71.1 per 1,000 women aged 15 to 44 in 2007, to 57.2 per 1,000 in 2022 (Figure 1). This persistence in fertility decline contrasts with recovery after earlier recessions. The U.S. decline is part of a broader trend across high-income countries in recent decades (Kearney and Levine 2022), suggesting that broader secular forces likely contributed to falling fertility. At the same time, the sharp U.S. decline beginning with the Great Recession raises the possibility that recession-related disruptions contributed to its timing and persistence.

While economic theory and empirical evidence show that recessions can lead to declines in fertility through income, employment, and economic uncertainty (Lindo 2010; Kearney and Wilson 2018), these explanations do not readily explain why fertility remained depressed long after the Great Recession ended. Reviewing a broad range of economic, policy, and social explanations, Kearney, Levine, and Pardue (2022) conclude that no existing explanation can fully account for either the magnitude or the persistence of the decline. The fact that fertility continued to decline throughout the economic recovery suggests that the Great Recession may have fundamentally altered an important determinant of fertility in a way that endured well beyond the recession itself.

One distinguishing feature of the Great Recession was the unprecedented collapse in housing markets (Mian and Sufi 2011, 2018). The years preceding the recession were characterized by rapid growth in mortgage lending, rising housing prices, and a surge in residential construction, fueled in part by the expansion of subprime lending (Mian and Sufi 2009, 2014). When the housing bubble burst, house prices fell, mortgage credit contracted sharply, and residential construction collapsed. Importantly, the housing bust was not merely transitory. Mortgage lending and residential construction recovered from their recession lows but did

not return to their pre-boom trajectories. House prices also remained below their pre-crisis level for over a decade. (Figure 2). The persistence of these housing-market disruptions makes the housing bust a potential explanation for why fertility remained depressed even as aggregate economic conditions recovered.

Falling house prices reduced housing wealth and home equity for existing homeowners. Some homeowners may also have become underwater, constraining their ability to move to housing better suited for larger families. Both the negative wealth effect and these residential constraints could reduce fertility. For prospective buyers, falling house prices made housing more affordable, but tighter mortgage credit could make home purchase more difficult even at lower prices, leaving the overall effect on residential independence, partnership formation, and fertility ambiguous. The collapse in residential construction reduced the supply of new housing, which could further reduce fertility by constraining households' ability to adjust their housing as their families expand. How the housing bust affected fertility therefore depends on which dimensions of the housing market were most consequential for household decisions.

This paper examines whether housing-market disruptions contributed to the persistent decline in U.S. fertility following the Great Recession. I combine data on births from the National Center for Health Statistics Vital Statistics Natality Files with mortgage data from the Home Mortgage Disclosure Act (HMDA). I exploit variation across metropolitan areas (MSAs) in exposure to the housing bust, measured by the decline in mortgage originations per capita between 2006 and 2011, to compare changes in fertility over time between more and less exposed MSAs using an event-study framework. This variation captures differences in the severity of the local housing boom and bust, with larger subsequent contractions concentrated in MSAs that experienced greater housing-market activity before the bust. To assess whether the results reflect broader housing-market conditions rather than a single measure of exposure, I also examine declines in single-family building permits, pre-crisis

subprime mortgage lending, and house prices.

I find that metropolitan areas more exposed to housing-market disruptions saw substantially larger declines in fertility following the Great Recession, with the effects persisting through the end of the sample. Moving from the 25th to the 75th percentile of housing-market exposure implies a decline of approximately 3.1 births per 1,000 women by 2011, compared with a national decline of approximately 5.7 births per 1,000 women between 2006 and 2011.

Because the preferred exposure measure uses the decline in mortgage originations through 2011, I also construct an alternative measure based on the expansion in mortgage originations before the housing bust. The results are similar using this predetermined measure of exposure, suggesting that the findings are not driven by reverse causality from subsequent fertility declines to mortgage originations. The patterns are also similar when using declines in single-family building permits and pre-crisis subprime lending as the measure of housing-market exposure, suggesting that the results reflect broader housing-market disruptions rather than any single dimension of the housing crisis. In contrast, house-price exposure produces a different pattern. MSAs that subsequently experienced larger house-price declines already had declining fertility relative to other MSAs during the 1990s, followed by a relative increase during the housing boom and another decline after the bust. This pattern suggests that house prices are related to fertility over the broader housing cycle, but that changes in house prices alone are unlikely to explain the distinct and persistent fertility decline following the Great Recession.

One concern is that housing-market exposure may capture broader local effects of the Great Recession, particularly labor-market deterioration. Prior work documents persistent local employment effects of the Great Recession (Yagan 2019), while labor-market and income shocks have been shown to affect fertility (Lindo 2010; Kearney and Wilson 2018). I find little evidence that more housing-exposed MSAs experienced persistently larger employment

declines after accounting for baseline MSA characteristics. Moreover, the fertility estimates remain largely unchanged when I directly account for differences in the severity of local labor-market shocks. The persistent fertility response therefore does not appear to be driven primarily by differential deterioration in local labor markets.

The fertility decline extends to both first and higher-order births, suggesting that the relationship between housing-market exposure and fertility extends to both entry into parenthood and decisions about family expansion. The effects are concentrated among women under age 35. The persistence across successive cohorts reaching these ages suggests that the response was not confined to cohorts directly exposed to the housing bust during young adulthood, but instead reflects lasting changes in the housing and household conditions faced by subsequent cohorts entering adulthood and family formation.

Homeownership among women of childbearing age declined substantially following the housing bust. Whereas fertility remained relatively stable among homeowners, fertility among non-homeowners also declined, suggesting that changes in homeownership alone cannot account for the fertility response. To examine how exposure to the housing bust affected housing and household conditions among young adults, I use the Census and American Community Survey (ACS) to study residential independence, partnered household formation, homeownership, and residential mobility. In more exposed MSAs, young adults became more likely to live with their parents and less likely to form partnered households or own homes. Moves into owner-occupied housing also declined, along with residential mobility more broadly. These patterns suggest that the housing bust disrupted housing and household transitions closely connected to family formation and expansion.

A large literature studies how economic conditions affect fertility, emphasizing mechanisms such as unemployment, income shocks, and economic uncertainty (Lindo 2010; Sobotka, Skirbekk, and Philipov 2011; Kearney and Wilson 2018). While these mechanisms help explain why fertility falls during recessions, less is known about why fertility remained depressed

long after the Great Recession. Kearney, Levine, and Pardue (2022) argue that existing economic, policy, and social explanations cannot fully account for the magnitude or persistence of the decline. Recent work has proposed additional explanations, including smartphone diffusion (Myers and Hooper 2026). This paper examines whether persistent disruptions to local housing-markets also contributed to the sustained fertility decline following the Great Recession.

This paper also contributes to the literature on housing-markets and fertility. Existing work shows that housing-market conditions influence fertility through changes in housing wealth, housing affordability, and access to mortgage credit (Lovenheim and Mumford 2013; Dettling and Kearney 2014; Cumming and Dettling 2023). Dettling and Kearney (2025) show that the rise of modern mortgages contributed to the baby boom by increasing homeownership among young families. More recently, Kim, Kim, and Park (2024) show that counties experiencing larger negative credit supply shocks during the Great Recession experienced persistent declines in fertility. Rather than focusing on a specific housing-market channel, I examine whether broader disruptions to local housing-markets following the Great Recession contributed to the persistent decline in fertility over the subsequent decade.

Finally, this paper contributes to a growing literature examining the long-run consequences of the Great Recession. Previous work documents persistent effects of the recession on labor market outcomes (Yagan 2019; Hershbein and Kahn 2018; Rothstein 2023). I extend this literature by showing that the housing bust also had lasting demographic consequences, contributing to the sustained decline in U.S. fertility.

The remainder of the paper is organized as follows. Section 2 provides background on trends in fertility and housing markets. Section 3 describes the data, and Section 4 outlines the empirical strategy. Section 5 presents the main results, Section 6 examines the role of labor-market shocks, and Section 7 examines housing and household responses. Section 8 concludes.

2 Background

2.1 Decline in Fertility

U.S. fertility has historically been procyclical, declining during economic downturns but generally recovering as economic conditions improve (Sobotka, Skirbekk, and Philipov 2011). The decline following the Great Recession, however, was markedly different (Figure 1).

The general fertility rate fell from 71.1 births per 1,000 women aged 15–44 in 2007 to 65.7 in 2010 and, rather than recovering as economic conditions improved, continued to decline to 57.0 per 1,000 by 2020. Thus, fertility remained persistently depressed throughout the following decade despite declining unemployment and sustained economic growth.

This decline was not limited to first births. Fertility fell for both first and higher-order births (Figure A.1), suggesting declines in both entry into parenthood and subsequent childbearing.

2.2 Housing Boom and Bust

The early 2000s were characterized by a rapid expansion of the U.S. housing market. Mortgage credit expanded substantially, accompanied by a sharp increase in subprime and other high-risk lending (Mian and Sufi 2009, 2014). House prices rose rapidly, residential construction expanded, and housing-market activity reached historically high levels. The expansion of mortgage credit, rising house prices, and residential construction reinforced one another, contributing to the housing market boom.

The subsequent housing bust reversed many of these trends. As house prices began to fall, mortgage delinquencies, defaults, and foreclosures increased, with distressed sales placing further downward pressure on house prices. Falling prices substantially reduced homeowners' housing wealth and left many mortgage borrowers with negative equity. For existing homeowners, these losses could make selling or moving more difficult, particularly

when the outstanding mortgage balance exceeded the value of the home. At the same time, mortgage credit contracted sharply and lending standards tightened, making entry into homeownership more difficult despite lower house prices. Residential construction also collapsed and recovered only gradually following the recession.

These disruptions to housing markets may have consequences for fertility. Housing and fertility decisions are closely linked, as home purchase and childbearing frequently occur at similar stages of the life cycle and households often adjust their housing as they start or expand families. Existing work shows that housing-market conditions can affect fertility through changes in housing wealth, housing costs, and access to mortgage credit (Lovenheim and Mumford 2013; Dettling and Kearney 2014; Cumming and Dettling 2023). The housing bust could therefore affect fertility through several distinct and potentially offsetting channels. Falling house prices reduced housing wealth and home equity for existing homeowners, potentially discouraging fertility and leaving highly leveraged homeowners locked into their current residences. Tighter mortgage credit could also make it more difficult for prospective buyers to finance a home purchase, while the collapse in residential construction reduced the supply of new housing. On the other hand, lower house prices made housing more affordable for prospective buyers and could facilitate home purchase and family formation. The net effect of the housing bust on fertility is therefore ambiguous ex ante and may differ across the different dimensions of the housing market.

The lasting effects of the housing bust are visible in aggregate housing activity. Mortgage originations and single-family building permits rose substantially during the housing boom before declining sharply as the housing bubble burst and the financial crisis unfolded (Figure 2). Although both mortgage lending and residential construction subsequently recovered, neither returned to its pre-boom trajectory. House prices fell less sharply during the housing bust and remained below their pre-crisis level for over a decade. Homeownership among women of childbearing age also declined substantially following the housing bust and

remained below its pre-recession level throughout the subsequent decade (Appendix Figure A.2). These patterns contrast with the recovery in aggregate labor-market conditions and motivate examining whether geographic differences in exposure to the housing bust can account for persistent differences in fertility.

2.3 The Great Recession

The housing bust occurred alongside a severe deterioration in U.S. labor markets. Employment fell sharply during the Great Recession, and local areas differed substantially in the severity of the downturn. Labor-market conditions may independently affect fertility by changing household income, employment prospects, and the opportunity cost of childbearing. The broader recession therefore provides an important alternative explanation for the geographic relationship between housing-market exposure and fertility.

Employment recovered following the Great Recession, in contrast to fertility, which remained persistently depressed (Figure 3). Employment increased steadily prior to the Great Recession, declined sharply during the recession, and recovered gradually over the subsequent decade. By the end of the sample, national employment had largely returned to its pre-recession level, while fertility continued to decline.

3 Data

3.1 Fertility Outcomes

Fertility data are obtained from the National Center for Health Statistics (NCHS) Vital Statistics Natality Files, which contain information on all live births in the United States. The primary analysis uses the restricted-use natality files from 1989 onward, which include county and metropolitan statistical area (MSA) identifiers. For descriptive national trends

presented in the introduction and background, I additionally use the public-use natality files for earlier years.

Population denominators are obtained from the Surveillance, Epidemiology, and End Results (SEER) Program population estimates. Female population counts for ages 15–44 are aggregated to the metropolitan statistical area (MSA) level and used to construct the primary fertility measure.

The primary outcome is the race-by-age-group fertility rate,[1] defined as the number of live births per 1,000 women in each race-by-age-group cell.

$$BirthRate_{mgt} = \frac{Births_{mgt}}{FemPop_{mgt}} \times 1000,$$

where $Births_{mgt}$ is the number of births to women in MSA m, race-by-age-group g, and year t, and $FemPop_{mgt}$ is the corresponding female population.

Finally, using information on birth order reported in the natality files, I separately examine first and higher-order births.

3.2 Housing Market Measures

Mortgage lending data are obtained from the Home Mortgage Disclosure Act (HMDA) database, which contains loan-level information on mortgage applications and originations reported by covered financial institutions. I measure local mortgage market activity using the number of originated home-purchase mortgages, aggregated to the metropolitan statistical area (MSA) level and expressed per 1,000 residents.

Data on residential construction come from the U.S. Census Bureau's Building Permits Survey (BPS), which reports the number of privately owned housing units authorized by building permits. I use single-family housing permits reported at the metropolitan statistical

1. Race and ethnicity groups are White, Black, Hispanic, and other. Throughout the paper, I refer to these groups as race groups for brevity. Age groups are 15–19, 20–24, 25–29, 30–34, 35–39, and 40–44.

area (MSA) level and express them as the number of permits per 1,000 residents.

House price data are obtained from the Federal Housing Finance Agency (FHFA) House Price Index (HPI). I use the annual all-transactions county house price index (developmental series), and aggregate county-level house price indexes to the metropolitan statistical area (MSA) level using population weights.

3.3 Labor Market Measures

Labor market data are obtained from the Bureau of Labor Statistics' Local Area Unemployment Statistics (LAUS) program. I use annual metropolitan statistical area (MSA)-level estimates of employment, unemployment, and the labor force. The unemployment rate is defined as the ratio of unemployed individuals to the labor force. The employment-to-population ratio is calculated using the SEER working-age population (ages 16 to 64) as the denominator.

3.4 Homeownership and Household Formation

To examine the mechanisms underlying the relationship between housing-market shocks and fertility, I use data from the Census and the American Community Survey (ACS). The analysis uses the 2000 Census, the 2003 ACS, and annual ACS samples beginning in 2005, when MSA identifiers are available. The Census and ACS provide nationally representative information on household composition and homeownership, and the ACS additionally provides information on residential mobility, allowing me to examine mobility responses to housing-market shocks.

3.5 Control Variables

I use several time-varying measures of local economic, housing-market, and policy conditions as controls. MSA-level personal income is obtained from the Bureau of Economic Analysis (BEA), and the housing price index is from the Federal Housing Finance Agency (FHFA). State-level Medicaid enrollment is obtained from the Centers for Medicare & Medicaid Services (CMS), which I use to construct the Medicaid enrollment rate.

4 Empirical Method

4.1 Defining Housing Market Exposure

Local housing markets experienced different degrees of disruption during the housing bust surrounding the Great Recession. To characterize this heterogeneity, I construct measures of each MSA's exposure to the housing bust. These measures are intended to capture the severity of local housing-market disruptions rather than isolate the causal effect of any single housing-market channel. This approach is closely related to a broader literature exploiting geographic variation in exposure to the Great Recession to study its long-run consequences (Yagan 2019; Charles, Hurst, and Notowidigdo 2018, 2019).

The preferred measure of housing-market exposure is the decline in home-purchase mortgage originations per 1,000 residents between 2006 and 2011. This measure captures the contraction in local mortgage-market activity during the housing bust. I also consider three alternative measures. First, I use the decline in single-family building permits per 1,000 residents between 2006 and 2011, which reflects changes in residential construction activity. Second, I use the share of mortgage originations that were subprime during the pre-crisis period from 2004 to 2006, which captures ex ante exposure to the subsequent collapse in mortgage credit. Finally, I use the decline in house prices over the same period, mea-

sured as the percentage decline in the housing price index between 2006 and 2011, which captures changes in local housing values. These measures capture different dimensions of local housing-market disruptions during the Great Recession. Consistent results across them would suggest that the findings reflect broader housing-market shocks rather than any single housing-market channel.

I measure changes in mortgage originations, building permits, and house prices between 2006 and 2011, which spans the peak of the housing boom and the subsequent collapse. Measuring exposure over this interval captures cross-MSA differences in the severity of the housing downturn while avoiding contamination from subsequent recovery dynamics.

One concern with the preferred exposure measure is that it is constructed using changes in mortgage originations through 2011, during the period of fertility declines. Home-purchase mortgages are originated by households forming and expanding families. An MSA where fertility fell for reasons unrelated to the housing bust would therefore record a larger decline in originations and be classified as more exposed. To address this concern, I alternatively measure pre-crisis housing-market exposure using the increase in mortgage originations per 1,000 residents between 2000 and 2006. This measure captures the expansion in local mortgage activity during the housing boom and is determined entirely before the onset of the subsequent fertility decline. The mortgage boom and bust measures are highly correlated, with a correlation of 0.90. Given the high correlation between the two measures, this exercise addresses the timing of the measurement window rather than providing independent variation.

4.2 Characterizing Housing Market Exposure

The exposure measures capture overlapping but distinct dimensions of local housing-market disruption (Table A.1). The decline in mortgage originations is particularly strongly correlated with the decline in single-family building permits, while its correlations with house-price

declines and pre-crisis subprime lending are substantially smaller. More generally, the correlations indicate meaningful overlap across the exposure measures while leaving substantial independent variation.

Table 1 relates the housing-market exposures to MSA characteristics measured in 2000. MSAs that subsequently experienced larger contractions in mortgage originations and building permits tended to have greater housing-market activity before the bust, including higher mortgage origination rates, more single-family construction, and larger construction employment shares. These MSAs also tended to have lower baseline personal income. Baseline fertility and employment are not systematically related to these measures of subsequent housing-market contraction. Pre-crisis subprime exposure is more strongly associated with MSA size, higher mortgage activity, and lower baseline house prices. House-price exposure exhibits a somewhat different pattern. MSAs that subsequently experienced larger declines in house prices had higher baseline house prices and mortgage activity and lower personal income, but were not systematically different in baseline fertility, employment, population, or residential construction. These patterns indicate that exposure to the housing bust was related to the intensity of pre-recession housing-market activity, while the house-price measure captures somewhat different pre-existing local conditions.

Finally, I examine how housing-market conditions themselves evolved following the housing bust, and whether the differential contraction across localities persisted. Figure 4 reports trends in mortgage originations, single-family building permits, and housing prices separately for MSAs with above- and below-median exposure based on the decline in mortgage originations. Panel (a) shows that more exposed MSAs experienced a substantially larger expansion in mortgage originations before the Great Recession, followed by a much larger contraction after 2006. By around 2011, mortgage origination rates in the two groups had converged. Mortgage originations in both groups remained well below their pre-recession peaks and even below their levels in the early 1990s. Panel (b) shows that more exposed MSAs had higher

rates of single-family construction before the recession and experienced a larger construction boom in the early 2000s. Building permits then fell sharply in both groups, with a substantially larger contraction in more exposed MSAs. Construction subsequently recovered, particularly in more exposed MSAs, but remained below its pre-recession level through the end of the sample. Panel (c) shows that more exposed MSAs also experienced a larger house-price cycle. House prices evolved similarly across the two groups before the housing boom, before rising more rapidly in more exposed MSAs during the early 2000s and falling more sharply during the bust. House prices subsequently recovered in both groups.

Taken together, these patterns show that the preferred exposure measure identifies MSAs that experienced a larger housing-market cycle rather than simply a larger decline from otherwise similar pre-recession conditions. More exposed MSAs experienced larger expansions in mortgage lending, residential construction, and house prices before the Great Recession, followed by larger contractions during the bust. The subsequent contraction therefore partly reflects a reversal of the earlier housing boom. At the same time, housing-market activity did not simply return to its pre-boom trajectory. Mortgage originations fell below their early-1990s levels in both groups, while residential construction remained well below its pre-recession level through the end of the sample.

4.3 Event-Study Specification

To estimate how fertility evolved in MSAs with greater exposure to the housing bust, I use an event-study specification that interacts each exposure measure with year indicators. The primary outcome is the fertility rate, measured as births per 1,000 women for each race-by-age-group cell. I also estimate analogous specifications for age- and parity-specific fertility rates.

I estimate regressions of the form:

$$Y_{mgt} = \sum_{k \neq -1} \beta_k \mathbb{1}\left\{k = t - 2007\right\} Exposure_m + X_{m,2000} \times \delta_t + \delta_m + \delta_t + \delta_g + \varepsilon_{mgt}, \qquad (1)$$

where Y_{mgt} denotes the fertility rate for race-by-age-group cell g in MSA m in year t; $Exposure_m$ is a measure of MSA m's exposure to the housing bust; $X_{m,2000}$ is a vector of baseline MSA characteristics measured in 2000, including the mortgage origination rate, single-family permit rate, housing price index, personal income, employment rate, and construction employment share; and δ_m, δ_t, and δ_g are MSA, year, and race-by-age-group FEs. The omitted year is 2006, immediately prior to the onset of the housing collapse, so all coefficients are interpreted relative to the pre-crisis period.

The coefficients of interest are the β_ks, which measure how outcomes evolved over time in MSAs with greater exposure to housing-market shocks relative to those with less exposure.

To summarize the average effect over time, I also estimate regressions of the following pooled specification:

$$Y_{mgt} = \beta Post_t \times Exposure_m + X_{m,2000} \times \delta_t + \delta_m + \delta_t + \delta_g + \varepsilon_{mgt}, \qquad (2)$$

where $Post_t$ is an indicator variable for the post period, defined as 2007 and later.

The estimation sample consists of 203 MSAs with both fertility outcomes and the preferred mortgage-market exposure measure. All specifications include metropolitan area, year, and race-by-age-group fixed effects. The preferred specification additionally includes baseline mortgage originations, single-family building permits, the housing price index, personal income, the employment rate, and the construction share of employment, all measured in 2000 and interacted with year fixed effects. As a robustness check, I additionally control for lagged employment rate, personal income, and housing price index at the MSA level,

and lagged Medicaid enrollment rate at the state level. Regressions are weighted by race-by-age-group female population, and standard errors are clustered at the metropolitan area level.

5 Results

MSAs with larger mortgage-market contractions experienced substantially larger declines in fertility following the housing bust (Figure 5). The estimates exhibit little evidence of differential pre-trends prior to the Great Recession. Beginning in 2007, fertility declines in more exposed MSAs compared to less exposed ones, consistent with the timing of the housing-market collapse. The effect grows over the following several years, with the estimated coefficient reaching -0.35 by 2011 and remaining persistent through the end of the sample. Table A.2 reports the corresponding pooled estimates from Equation 2. In the preferred specification in column (2), the estimated coefficient is -0.276. Moving from the 25th to the 75th percentile of housing-market exposure (a difference of 8.94 mortgage originations per 1,000 residents) implies 2.5 fewer births per 1,000 women during the post period, a 3.9% decline from the baseline fertility rate of 64.1 in 2006.

These results are remarkably robust to using the pre-crisis mortgage-market expansion measure (Figure A.3; Table A.3), suggesting that the findings are not driven by reverse causality in which declining fertility after the housing bust reduced housing demand and mortgage originations.

The estimated effects are also robust to alternative sets of controls (Figure A.5; Table A.2). The results are similar when not allowing fertility trends to vary with baseline housing-market and economic characteristics, and when additionally controlling for time-varying characteristics at the MSA level. Across specifications, the timing and persistence of the fertility decline remain largely unchanged.

Figure A.4 reports results using the alternative measures of housing-market exposure. Using either the decline in single-family building permits (A.4a) or the pre-crisis share of subprime mortgage originations (A.4b) produces a similar pattern of results. Pre-treatment trends remain close to zero, and MSAs experiencing larger housing-market disruptions exhibit larger declines in fertility. These results suggest that the main findings are not specific to the contraction in mortgage originations.

The results are different when exposure is measured using the decline in house prices. Figure A.4c shows substantial differential fertility trends before the Great Recession. MSAs that subsequently experienced larger house-price declines had declining fertility relative to other MSAs during the 1990s, followed by a relative increase during the housing boom and another decline after the bust. This pattern illustrates the relationship between fertility and house prices more generally, consistent with the findings of Dettling and Kearney (2014). The substantial differential pre-trends suggest that the house-price decline does not provide a clean measure of exposure to the housing bust. This is consistent with the baseline differences observed in Table 1, which show that MSAs with larger subsequent house-price declines already differed along several dimensions before the housing boom. The pooled estimates with the alternative exposure measures are reported in Table A.3.

The decline in fertility is observed for both first and higher-order births (Figure 6). First births began to decline shortly after the housing bust, while the decline in higher-order births emerged with a slight delay and became larger over time. The decline in higher-order births suggests that the fertility response was not limited to delayed entry into parenthood, but also affected decisions about expanding existing families.

The effects are concentrated among younger women (Figure 7). Fertility among women aged 20–34 declined sharply following the housing bust, and the estimated effects remain large through the end of the sample. The estimates for women aged 35–44 are considerably smaller and emerge more gradually, becoming more negative primarily in the later years of

the sample. Figure A.6 reports results separately by 5-year age group. The persistence of the effects among subsequent cohorts of younger women suggests that the fertility response was not confined to women who were directly exposed to the housing bust as young adults, but instead reflects persistent changes in the conditions that shape household formation and fertility. Table A.4 reports the corresponding pooled post-period estimates by birth order and age group.

6 Labor Market Conditions

6.1 Housing Market Exposure and Employment

The Great Recession combined a severe housing-market contraction with a sharp deterioration in local labor markets. Prior work shows that local exposure to the Great Recession had persistent effects on employment (Yagan 2019), and labor-market conditions are a known determinant of fertility (Lindo 2010; Kearney and Wilson 2018). Hence, the fertility effects above could have been driven by broader local labor-market shocks rather than housing-market conditions specifically.

Figure 8 examines the relationship between housing-market exposure and employment rates. I estimate an analogous event-study specification to Equation 1 at the MSA level, using the employment rate as the outcome. Conditional on baseline MSA characteristics, there is little evidence of a sharp or persistent deterioration in employment in more exposed MSAs following the Great Recession. Although employment falls modestly in more exposed areas around the recession, the decline is small in magnitude and not statistically significant. These patterns suggest that MSAs which experienced larger housing-market contractions did not experience comparably large or persistent declines in employment.

6.2 Labor Market Shocks and Fertility

Next, I directly examine whether the relationship between housing-market exposure and fertility instead reflects labor-market exposure to the Great Recession. I construct a measure of labor-market exposure analogous to the housing-market measures, defined as the increase in the MSA unemployment rate between 2006 and 2011. I first estimate Equation 1 using this measure of labor-market exposure.

Figure A.7 shows that MSAs experiencing larger increases in unemployment during the Great Recession also experienced larger subsequent declines in fertility. However, the unemployment estimates exhibit substantial differential trends well before the recession. Fertility in MSAs that would later experience larger unemployment shocks was already declining relative to other MSAs throughout the 1990s, followed by a partial reversal during the housing boom and another decline after the bust. This pattern is similar to that observed using house-price exposure, suggesting that unemployment exposure captures broader boom-bust trajectories in fertility rather than the post-recession decline.

Furthermore, accounting for labor-market exposure has little effect on the main estimates. Figure A.8 reports results from the preferred specification additionally controlling for labor-market exposure interacted with year fixed effects, allowing fertility trends to vary flexibly with the severity of the local labor-market shock. The estimates remain close to zero immediately before the Great Recession and become increasingly negative following the housing-market collapse. Both the magnitude and persistence of the fertility decline are largely unchanged after accounting for labor-market exposure. Table A.5 reports the corresponding pooled estimates for the three labor-market analyses.

Taken together, these results suggest that the main estimates are not simply capturing broader differences in the severity of the Great Recession. While MSAs experiencing larger increases in unemployment following the Great Recession also experienced larger declines in fertility, this relationship appears to reflect broader pre-existing differences in fertility trajec-

tories associated with local labor-market conditions rather than the distinct post-recession fertility decline. Moreover, controlling directly for labor-market exposure leaves the persistent relationship between housing-market exposure and fertility largely unchanged. Hence, the persistent fertility decline associated with housing-market exposure is unlikely to have been driven primarily by corresponding deterioration in local labor-market conditions.

7 Housing and Household Responses

7.1 Household Formation, Homeownership, and Residential Mobility

One potential channel through which housing-market disruptions may affect fertility is by delaying young adults' residential independence. The share of young adults living with their parents has increased in recent decades (U.S. Census Bureau 2024), raising the possibility that disruptions to housing markets made it more difficult to leave the parental home and establish an independent household, with potential consequences for family formation.

To examine this possibility, I use the 2000 Census and the American Community Survey (ACS) to study whether exposure to the housing bust altered residential independence, partnered household formation, homeownership, and residential mobility among young adults. First, I measure residential independence using an indicator for whether an individual lives with at least one parent. Second, I measure partnered household formation using an indicator for whether the individual is a householder living with a spouse or unmarried partner, or is the spouse or unmarried partner of the householder. Third, I define homeownership as being a householder or spouse living in an owner-occupied residence. Finally, the ACS reports whether respondents lived in the same residence one year earlier, allowing me to measure residential mobility and whether a move ended in an owner-occupied residence. Because the

ACS is a repeated cross-section and does not report tenure at the respondent's previous residence, I cannot distinguish first-time transitions into homeownership from moves by existing homeowners.

I estimate individual-level event study specifications analogous to Equation 1:

$$Y_{imt} = \sum_{k \neq -1} \beta_k \mathbb{1}\{k = t - 2007\} Exposure_m + X_{m,2000} \times \delta_t + W_{imt}\gamma + \delta_m + \delta_t + \epsilon_{imt}, \quad (3)$$

where Y_{imt} denotes the outcome for individual i in MSA m in year t, and W_{imt} are demographic controls including sex and race-by-age indicators. Regressions are weighted using ACS survey weights, and standard errors are clustered at the MSA level. I focus on men and women ages 20–34, for whom these household transitions are most relevant, and show that the patterns are robust to women ages 15–44.

I again estimate the following pooled specification to summarize the post-period effects:

$$Y_{imt} = \beta Post_t \times Exposure_m + X_{m,2000} \times \delta_t + W_{imt}\gamma + \delta_m + \delta_t + \epsilon_{imt}, \quad (4)$$

where $Post_t$ is defined as in Equation 2. The pooled specification includes the same controls, fixed effects, and weights as the event-study specification in Equation 3.

Exposure to the housing bust disrupted residential independence and partnered household formation. Young adults in more exposed MSAs were more likely to live with a parent following the Great Recession (Figure 9a), suggesting a persistent decline in residential independence. Figure 9b shows that this pattern was not limited to declines in living alone or with roommates, as exposure to the housing bust also reduced the likelihood of forming a partnered household. The decline becomes largest in the late 2010s and subsequently attenuates, but remains negative through the 2020s.

Housing tenure and residential mobility also declined in more exposed MSAs. Home-

ownership declined substantially following the housing bust (Figure 9c), with the decline persisting throughout much of the post-recession period. Moves ending in owner-occupied housing declined immediately following the Great Recession and remained persistently lower through the end of the sample (Figure 10a). Overall residential mobility also declined, with the reduction becoming more pronounced over time (Figure 10b). The results are similar when restricting the sample to women ages 15–44 (Appendix Figure A.10). Table A.6 reports the corresponding pooled estimates for household formation and residential mobility.

Taken together, these results show persistent differences in both household formation and housing transitions between more and less exposed MSAs.

7.2 Housing and Fertility

The decline in fertility following the Great Recession coincided with a substantial reduction in homeownership among women of childbearing age. If the fertility decline operated primarily through lower homeownership, fertility trends within homeowners and non-homeowners should remain relatively stable. Figure A.9 plots fertility between 1990 and 2025 separately by homeownership status using data from the Current Population Survey (CPS). Fertility among homeowners increased modestly over this period and remained relatively stable in the decades following the Great Recession. Among non-homeowners, in contrast, fertility fell substantially, with the drop accelerating after the recession. The relative stability among homeowners is consistent with lower homeownership contributing to the aggregate fertility change. At the same time, the substantial decline in fertility among non-homeowners indicates that changes in homeownership alone cannot account for the full pattern.

The results in this paper do not point to a single housing-market margin through which the housing bust affected fertility. Exposure to the housing bust affected multiple aspects of housing and household behavior, and the fertility response extended beyond changes in homeownership alone. While this paper does not identify the causal relationship between

individual household transitions and fertility, the evidence suggests that the housing bust affected a broader set of housing and household conditions relevant to fertility decisions.

The different dimensions of the housing bust may have contributed through distinct and potentially offsetting channels. Declines in house prices reduced housing wealth for existing homeowners while lowering the cost of housing for prospective buyers. Contractions in mortgage lending could make home purchase more difficult even as prices fell. Negative equity or less favorable financing conditions could lock existing homeowners into their current residences and reduce residential mobility. Declines in residential construction may also have reduced the availability of new housing.

The empirical patterns are more consistent with disruptions to housing access and housing transitions than with a house-price channel alone. The post-recession fertility decline is most clearly identified using contractions in mortgage originations and residential construction, while the house-price measure exhibits substantial differential pre-trends. Fertility declined for both first and higher-order births and also fell substantially among non-homeowners, suggesting that the effects of housing-market disruptions were not limited to initial family formation but also extended to decisions about family expansion. The household responses are also consistent with constraints on housing transitions. The declines in homeownership and moves into owner-occupied housing suggest that young adults in more exposed areas faced greater difficulty moving into ownership, while the broader decline in residential mobility is consistent with reduced ability to adjust housing more generally. The increase in parental coresidence and decline in partnered household formation further suggest that these disruptions extended beyond housing tenure and mobility to household formation itself. These patterns point to housing access and mobility as important margins through which the housing bust may have affected fertility.

8 Discussion

This paper examines whether housing-market disruptions contributed to the persistent decline in U.S. fertility following the Great Recession. Using variation across MSAs in exposure to the housing bust, I find that more exposed areas experienced substantially larger declines in fertility. These effects persist through 2022, are robust across several measures of housing-market exposure, and are not explained by differential deterioration in local labor markets. Exposure to the housing bust also reduced residential independence, partnered household formation, homeownership, and residential mobility among young adults, pointing to disruptions in housing and household transitions as a potential mechanism linking the housing bust to fertility.

The fertility response persisted even as housing-market conditions began to recover. Mortgage lending and residential construction increased from their recession lows, although neither returned to its pre-boom trajectory. The persistence of the fertility effects across successive cohorts of young women suggests that the response was not confined to women who were directly exposed to the housing bust during young adulthood. Instead, the bust appears to have altered housing and household conditions faced by subsequent cohorts entering adulthood and family formation.

The housing bust involved simultaneous changes in several dimensions of local housing markets and household housing outcomes, including mortgage credit, residential construction, house prices, homeownership, and residential mobility. The exposure measures used in this paper therefore capture broader housing-market disruptions rather than the effect of any single housing-market margin. Consistent with this interpretation, the estimates provide little evidence that the expansion in mortgage originations during the housing boom generated a corresponding increase in fertility, suggesting that the subsequent fertility decline cannot be understood simply as the reversal of an earlier mortgage-market expansion. Nev-

ertheless, the consistency of the fertility results across multiple measures of housing-market exposure, together with the incomplete recovery in mortgage lending and residential construction, suggests that housing markets played an important role in the sustained fertility decline.

Fertility in the United States continues to decline, with successive cohorts reaching each age having fewer children than previous generations. While some of this decline may reflect delayed childbearing, existing evidence suggests that delayed births have not been fully offset at older ages. The results of this paper suggest that persistent changes in housing markets following the Great Recession may have contributed to this long-run demographic shift. More broadly, they highlight that housing-market shocks can have consequences extending beyond housing markets themselves, influencing family formation and long-run fertility.

References

Charles, Kerwin Kofi, Erik Hurst, and Matthew J. Notowidigdo. 2018. "Housing Booms and Busts, Labor Market Opportunities, and College Attendance." *American Economic Review* 108 (10): 2947–94.

———. 2019. "Housing Booms, Manufacturing Decline and Labour Market Outcomes." *The Economic Journal* 129 (617): 209–248.

Cumming, Fergus, and Lisa Dettling. 2023. "Monetary Policy and Birth Rates: The Effect of Mortgage Rate Pass-Through on Fertility." *The Review of Economic Studies* 91 (1): 229–258.

Dettling, Lisa J., and Melissa S. Kearney. 2014. "House prices and birth rates: The impact of the real estate market on the decision to have a baby." *Journal of Public Economics* 110:82–100.

Dettling, Lisa J., and Melissa S. Kearney. 2025. *Did the Modern Mortgage Set the Stage for the U.S. Baby Boom?* Working Paper, Working Paper Series 33446. National Bureau of Economic Research.

Hershbein, Brad, and Lisa B. Kahn. 2018. "Do Recessions Accelerate Routine-Biased Technological Change? Evidence from Vacancy Postings." *American Economic Review* 108 (7): 1737–72.

Kearney, Melissa S., and Phillip B. Levine. 2022. "The Causes and Consequences of Declining US Fertility." In *Economic Policy in a More Uncertain World,* edited by Melissa S. Kearney and Amy Ganz. Washington, DC: Aspen Institute.

Kearney, Melissa S., Phillip B. Levine, and Luke Pardue. 2022. "The Puzzle of Falling US Birth Rates since the Great Recession." *Journal of Economic Perspectives* 36 (1): 151–76.

Kearney, Melissa S., and Riley Wilson. 2018. "Male Earnings, Marriageable Men, and Nonmarital Fertility: Evidence from the Fracking Boom." *The Review of Economics and Statistics* 100 (4): 678–690.

Kim, Bokyung, Minseog Kim, and Narae Park. 2024. "Credit Supply Shocks and Fertility: Long-Term Consequences." Working paper, March.

Lindo, Jason M. 2010. "Are Children Really Inferior Goods?" *Journal of Human Resources* 45 (2): 301–327.

Lovenheim, Michael F., and Kevin J. Mumford. 2013. "Do Family Wealth Shocks Affect Fertility Choices? Evidence from the Housing Market." *The Review of Economics and Statistics* 95 (2): 464–475.

Mian, Atif, and Amir Sufi. 2009. "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis*." *The Quarterly Journal of Economics* 124 (4): 1449–1496.

———. 2011. "House Prices, Home Equity-Based Borrowing, and the US Household Leverage Crisis." *American Economic Review* 101 (5): 2132–56.

———. 2014. "What Explains the 2007–2009 Drop in Employment?" *Econometrica* 82 (6): 2197–2223.

———. 2018. "Finance and Business Cycles: The Credit-Driven Household Demand Channel." *Journal of Economic Perspectives* 32 (3): 31–58.

Myers, Caitlin K, and Ezekiel Hooper. 2026. *Is the iPhone Birth Control? Causal Evidence from AT&T's 2007–2011 Carrier Monopoly.* Working Paper, Working Paper Series 35310. National Bureau of Economic Research, June.

Rothstein, Jesse. 2023. "The Lost Generation?" *Journal of Human Resources* 58 (5): 1452–1479.

Sobotka, Tomáš, Vegard Skirbekk, and Dimiter Philipov. 2011. "Economic Recession and Fertility in the Developed World." *Population and Development Review* 37 (2): 267–306.

U.S. Census Bureau. 2024. *America's Families and Living Arrangements: 2022.* Technical report. U.S. Census Bureau.

Yagan, Danny. 2019. "Employment Hysteresis from the Great Recession." *Journal of Political Economy* 127 (5): 2505–2558.

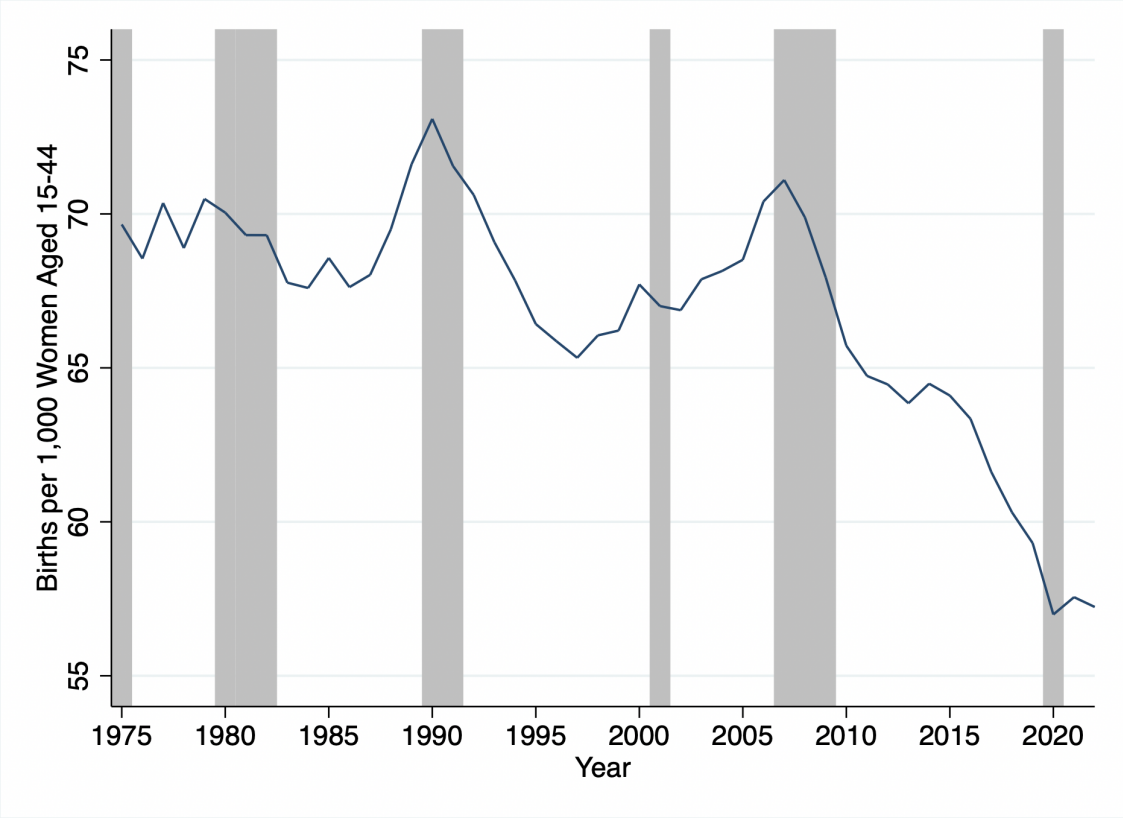
9 Tables and Figures

Table 1: Baseline MSA characteristics by Housing Market Exposure

VARIABLES	(1) Δ Mortgage Originations	(2) Δ Permits	(3) Subprime Rate	(4) Δ HPI
Employment Rate	0.0107	0.0293	0.0690*	-0.000759
	(0.0477)	(0.0258)	(0.0374)	(0.00141)
Construction Share of Employment	182.4***	80.85***	-14.01	0.255
	(50.48)	(27.13)	(39.61)	(1.489)
Personal Income	-0.0507**	-0.0556***	-0.00665	-0.00164**
	(0.0240)	(0.0129)	(0.0188)	(0.000707)
HPI	0.000752	0.00174	-0.00930***	0.000705***
	(0.00390)	(0.00210)	(0.00306)	(0.000115)
Fertility Rate	0.0536	0.00679	0.0193	0.000595
	(0.0356)	(0.0192)	(0.0280)	(0.00105)
ln(MSA Population)	2.344***	0.322	5.421***	0.0133
	(0.550)	(0.296)	(0.432)	(0.0162)
Mortgage Rate	1.499***	0.601***	0.363***	0.0192***
	(0.129)	(0.0714)	(0.101)	(0.00380)
Single-Family Permit Rate	0.324***	0.0995*	-0.0689	0.00332
	(0.0940)	(0.0507)	(0.0737)	(0.00277)
N	203	202	203	203

Notes: Each column reports coefficients from an MSA-level regression of the indicated housing-market exposure measure on MSA characteristics measured in 2000. The employment rate is the number of employed persons per 100 residents ages 16–64. The mortgage rate is mortgage originations per 1,000 residents. Single-family permit rate is the number of single-family building permits per 1,000 residents, and subprime rate is the share of mortgage originations that are subprime between 2004–2006. The fertility rate is the number of births per 1,000 women ages 15–44. Regressions are unweighted. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

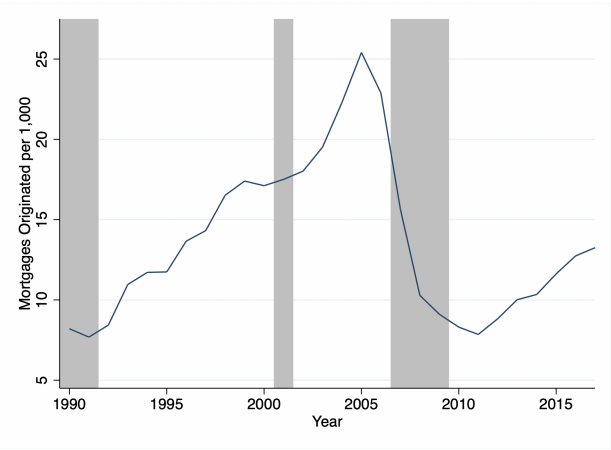
Figure 1: Births per 1,000 Women Aged 15–44



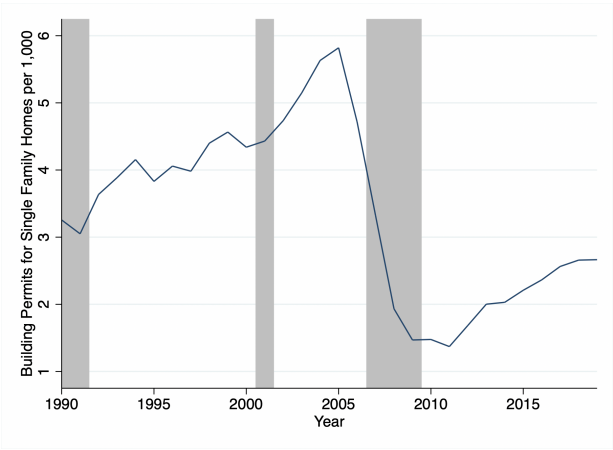
Notes: The figure reports the national fertility rate, measured as births per 1,000 women ages 15–44. Births are from the National Vital Statistics System (NVSS), and population denominators are from the Surveillance, Epidemiology, and End Results (SEER) Program. Shaded areas indicate NBER recession years.

Figure 2: Trends in Housing Market Variables

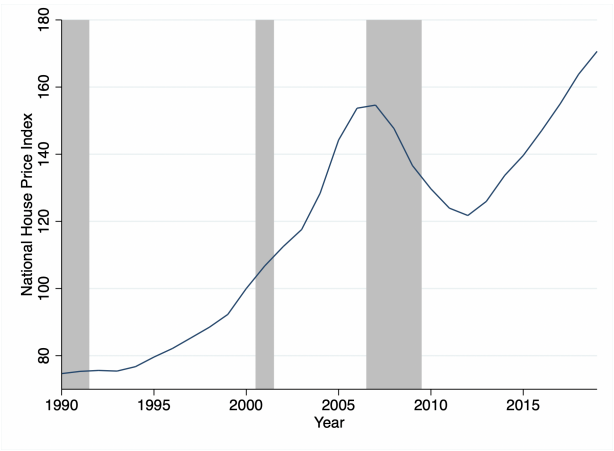
(a) Mortgage Originations



(b) Single-Family Building Permits

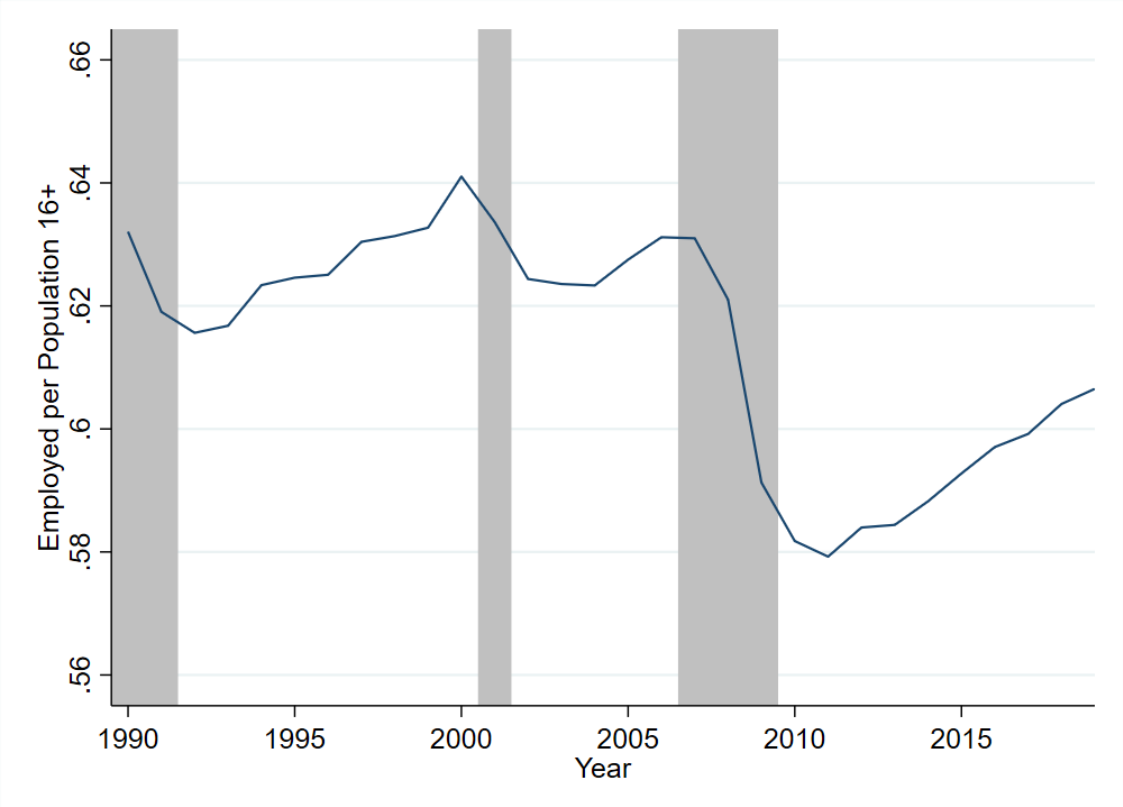


(c) House Price Index



Notes: Panel (a) reports national mortgage originations per 1,000 residents, Panel (b) reports single-family building permits per 1,000 residents, and Panel (c) reports national House Price Index (HPI). Mortgage originations are from the Home Mortgage Disclosure Act (HMDA), building permits are from the Census Building Permits Survey, HPI from the Federal Housing Finance Agency (FHFA). Population denominators are from the Surveillance, Epidemiology, and End Results (SEER) Program. Shaded areas indicate NBER recession years.

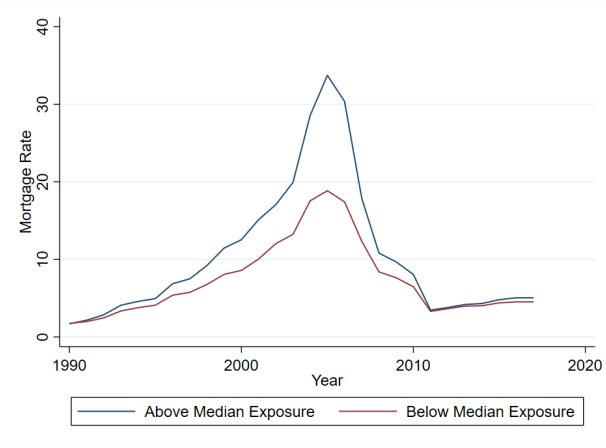
Figure 3: Trends in Employment



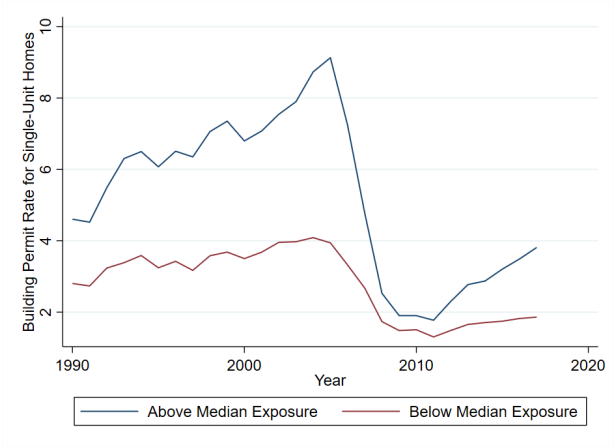
Notes: The figure reports the national employment rate, measured as the number of employed individuals divided by the population aged 16–64. Employment data are from the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics (LAUS), and population denominators are from the Surveillance, Epidemiology, and End Results (SEER) Program. Shaded areas indicate NBER recession years.

Figure 4: Trends in Housing Market Outcomes

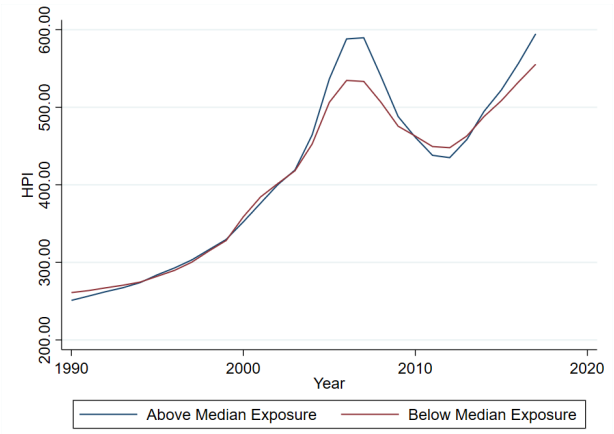
(a) Mortgage Originations per 1,000 Population



(b) Single-Unit Building Permits per 1,000 Population

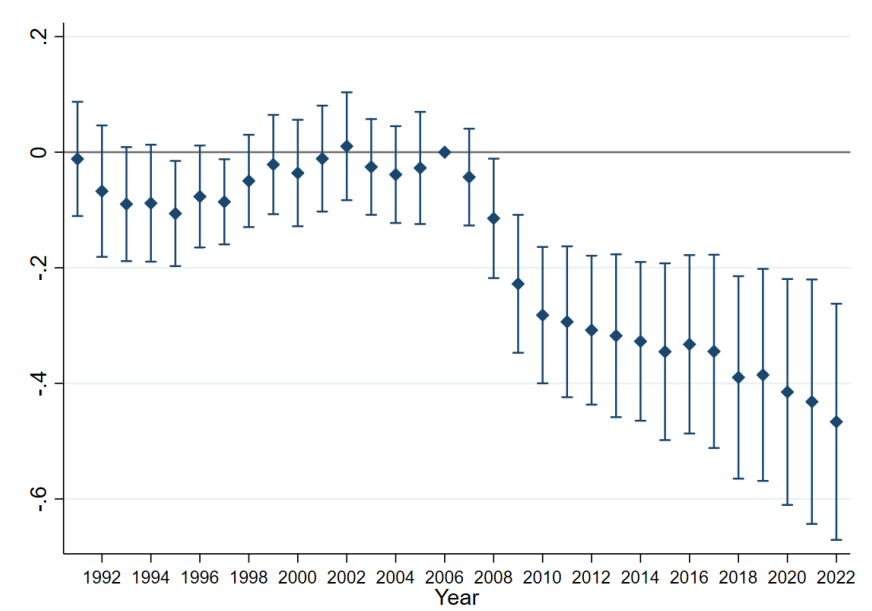


(c) Housing Price Index



Notes: The figure reports unweighted average housing-market outcomes separately for MSAs with above- and below-median declines in mortgage origination rates between 2006 and 2011. Panel (a) reports mortgage originations per 1,000 residents, Panel (b) reports single-family building permits per 1,000 residents, and Panel (c) reports the housing price index.

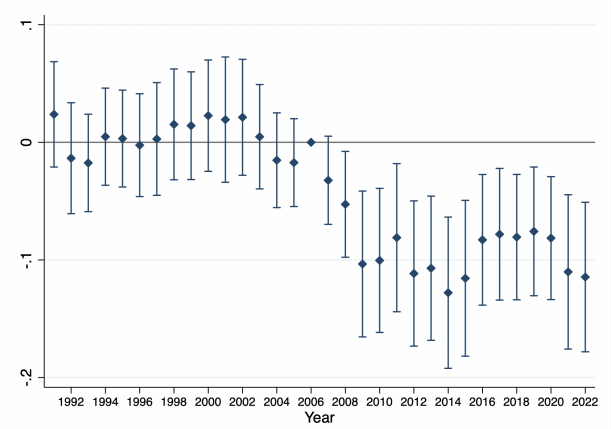
Figure 5: Effect of Mortgage Origination Decline on Fertility Rate



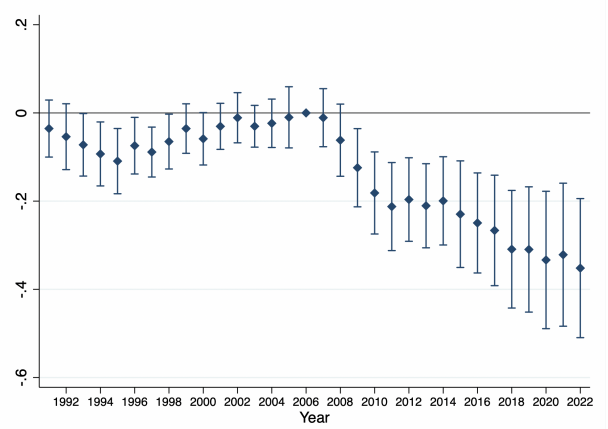
Notes: The figure reports event-study coefficients from Equation 1, using the decline in mortgage originations between 2006 and 2011 as the measure of housing-market exposure. The outcome variable is fertility rate at the MSA-by-race-by-age-group level, defined as the number of births per 1,000 women in that group. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure 6: Effect of Mortgage Origination Decline on Fertility Rate, By Parity

(a) First births



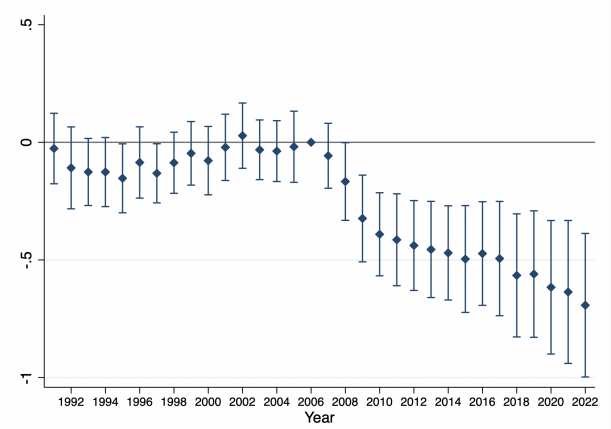
(b) Higher-order births



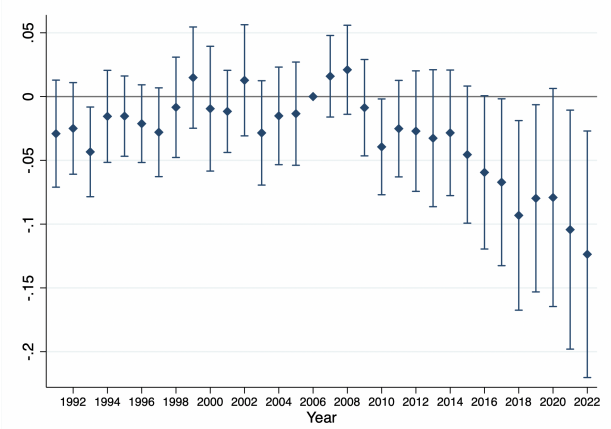
Notes: The figure reports event-study coefficients from Equation 1 separately by birth parity. The outcome variable is fertility rate at the MSA-by-race-by-age-group level, defined as the number of births per 1,000 women in that group. Panel (a) reports results for first births, and Panel (b) reports results for higher-order births. Housing-market exposure is measured by the decline in mortgage originations between 2006 and 2011. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure 7: Effect of Mortgage Origination Decline on Fertility Rate, By Age

(a) Ages 20–34

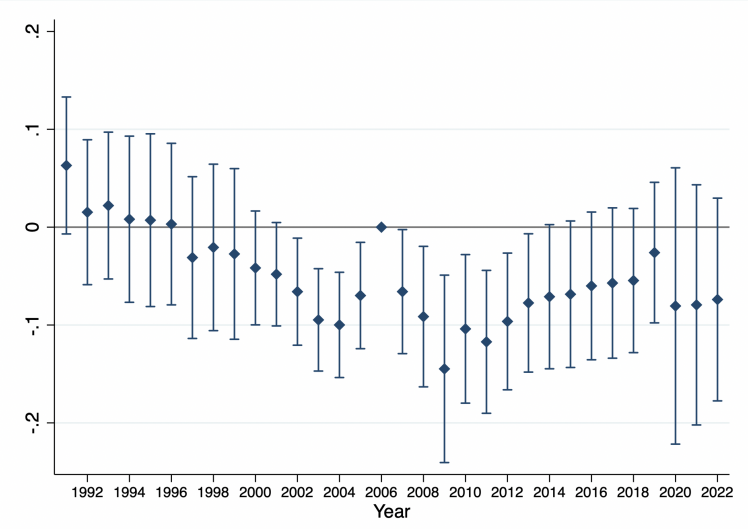


(b) Ages 35–44



Notes: The figure reports event-study coefficients from Equation 1 separately by age group. The outcome variable is fertility rate at the MSA-by-race-by-age-group level, defined as the number of births per 1,000 women in that group. Panel (a) reports results for women ages 20–34, and Panel (b) reports results for women ages 35–44. Housing-market exposure is measured by the decline in mortgage originations between 2006 and 2011. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

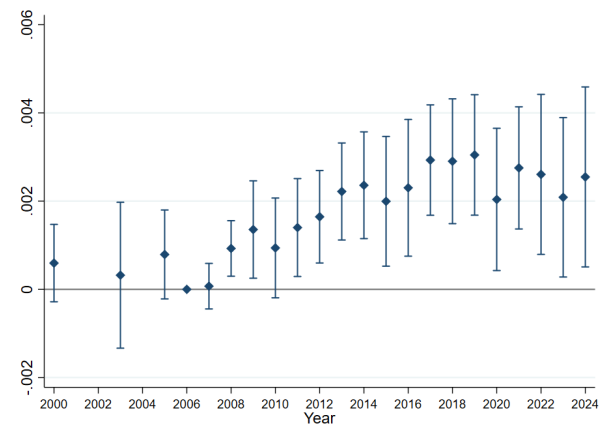
Figure 8: Effect of Mortgage Origination Decline on Employment Rate



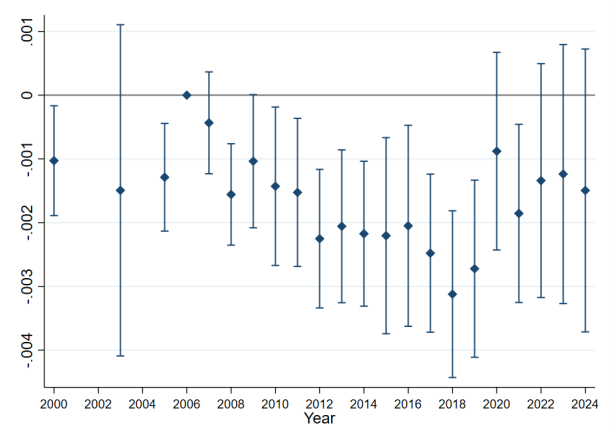
Notes: The figure reports event-study coefficients from a specification analogous to Equation 1. Housing-market exposure is measured by the decline in mortgage originations between 2006 and 2011. The outcome variable is employment rate at the MSA level, defined as the share of employed persons ages 16–64. The omitted year is 2006. The specification includes MSA and year fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by MSA population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure 9: Effect of Mortgage Origination Decline on Household Formation and Homeownership

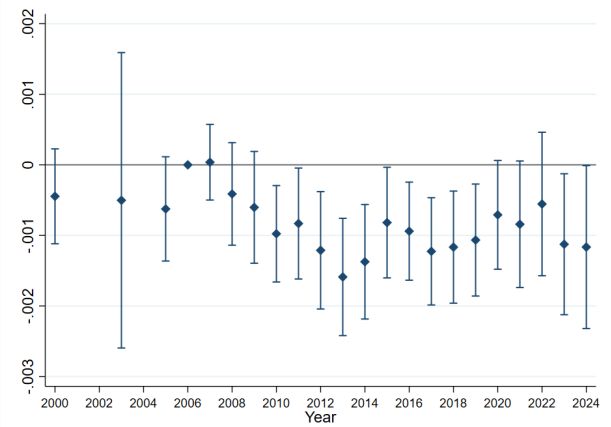
(a) Parent in Household



(b) Partnered Household



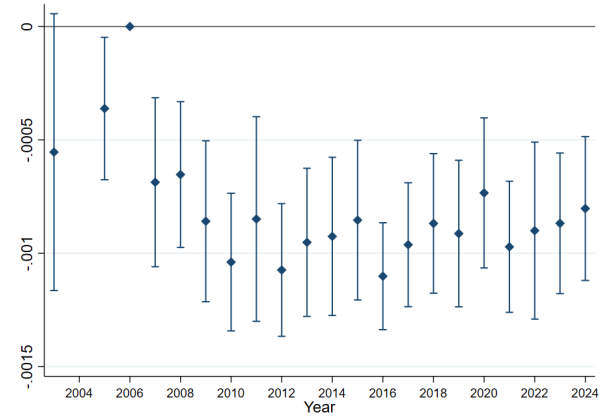
(c) Owns home



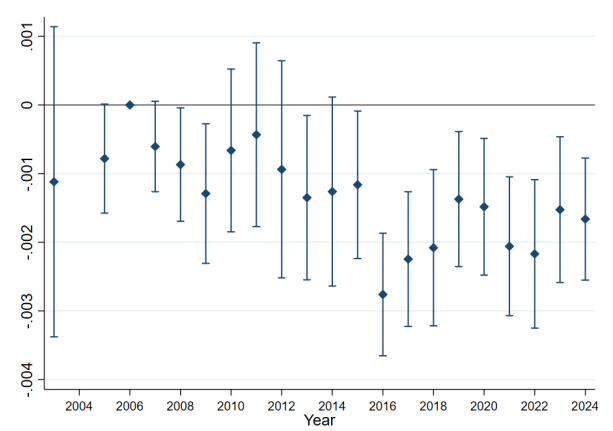
Notes: The figure reports event-study coefficients from Equation 3, using the decline in mortgage originations between 2006 and 2011 as the measure of housing-market exposure. The outcome variable for Panel (a) is an indicator variable for living in the same household with at least one parent; for Panel (b) an indicator variable for the respondent being a householder with a spouse or unmarried partner, or the spouse or unmarried partner of the householder; for Panel (c) an indicator variable for being a householder or partner living in an owner-occupied residence. The omitted year is 2006. The specification includes MSA, year, sex, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. The sample includes all respondents ages 20–34. Regressions are weighted by the ACS survey weights, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure 10: Effect of Mortgage Origination Decline on Residential Mobility

(a) Moved Within 1 Year & Owns Residence



(b) Moved Within 1 Year



Notes: The figure reports event-study coefficients from Equation 3, using the decline in mortgage originations between 2006 and 2011 as the measure of housing-market exposure. The outcome variable for Panel (a) is an indicator variable for the respondent living in an owner-occupied residence and having moved within one year; for Panel (b) an indicator variable for the respondent having moved within one year. The omitted year is 2006. The specification includes MSA, year, sex, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. The sample includes all respondents ages 20–34. Regressions are weighted by the ACS survey weights, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

A Supplementary Tables and Figures

Table A.1: Correlations Across Housing-Market Exposure Measures

	Δ Mortgage Origination Rate	Δ Permit Rate	Subprime Rate
Δ Permit Rate	0.7691		
Subprime Rate	0.3657	0.1658	
Δ HPI	0.4675	0.4539	0.1560

Notes: The table reports pairwise correlations across MSA-level housing-market exposure measures. Δ Mortgage Origination Rate is the decline in home-purchase mortgage originations per 1,000 residents between 2006 and 2011. Δ Permit Rate is the decline in single-family building permits per 1,000 residents between 2006 and 2011. Subprime Rate is the share of mortgage originations classified as subprime between 2004 and 2006. Δ HPI is the percentage decline in the housing price index between 2006 and 2011. Higher values indicate greater housing-market exposure.

Table A.2: Effect of Changes in Mortgage Origination Decline on Fertility Rate

VARIABLES	(1) No controls	(2) + Baseline controls	(3) + Time-varying controls
Post × Mortgage Origination Decline	-0.221***	-0.276***	-0.319***
	(0.0735)	(0.0735)	(0.110)
Observations	185,703	160,647	155,779
Mean dep var	64.27	64.10	63.95
25th percentile exposure	13.75	13.54	13.54
75th percentile exposure	22.51	22.48	22.48
25th–75th percentile difference	8.76	8.94	8.94
MSA FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Race × Age-Group FE	Yes	Yes	Yes
Baseline controls × Year FE	No	Yes	Yes
Time-varying controls	No	No	Yes
# MSAs	235	203	203

Notes: The table reports pooled estimates from Equation 2, using the decline in home-purchase mortgage originations per 1,000 residents between 2006 and 2011 as the measure of MSA exposure to the housing bust. The post indicator equals one in 2007 and subsequent years. Column (1) includes MSA, year, and race-by-age-group fixed effects. Column (2), the preferred specification, additionally interacts baseline MSA characteristics measured in 2000 with year fixed effects. Column (3) further controls for lagged MSA-level employment, personal income, and the housing price index, as well as the lagged state-level Medicaid enrollment rate. Regressions are weighted by the MSA race-by-age-group female population. Standard errors are clustered at the MSA level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.3: Effect of Alternative Housing-Market Exposures on Fertility Rate

VARIABLES	(1) Mortgage Origination Decline	(2) Mortgage Origination Expansion	(3) Permit Decline	(4) Subprime Share	(5) HPI Decline
Post $\times Exposure$	-0.276***	-0.266***	-0.365**	-0.116**	-14.51***
	(0.0735)	(0.0779)	(0.164)	(0.0456)	(2.361)
Observations	160,647	160,647	159,855	160,647	160,647
Mean dep var	64.10	64.10	64.09	64.10	64.10
25th percentile exposure	13.54	8.60	1.81	2.10	-0.01
75th percentile exposure	22.48	14.94	5.18	6.93	0.16
25th–75th percentile difference	8.94	6.34	3.37	4.83	0.17
MSA FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Race × Age-Group FE	Yes	Yes	Yes	Yes	Yes
Baseline controls × Year FE	Yes	Yes	Yes	Yes	Yes
Time-varying controls	No	No	No	No	No
# MSAs	203	203	202	203	203

Notes: The table reports pooled estimates from Equation 2, using alternative measures of MSA exposure to the housing bust. Column (1) measures exposure as the decline in home-purchase mortgage originations per 1,000 residents between 2006 and 2011. Column (2) uses the increase in home-purchase mortgage originations per 1,000 residents between 2000 and 2006. Column (3) uses the decline in single-family building permits per 1,000 residents between 2006 and 2011. Column (4) uses the share of mortgage originations classified as subprime between 2004 and 2006. Column (5) uses the decline in the housing price index between 2006 and 2011. The post indicator equals one in 2007 and subsequent years. All specifications include MSA, year, and race-by-age-group fixed effects and interact baseline MSA characteristics measured in 2000 with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population. Standard errors are clustered at the MSA level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.4: Effect of Changes in Mortgage Origination Decline on Fertility Rate, By Parity and Age

VARIABLES	(1) First Births	(2) Higher-order Births	(3) Ages 15–19	(4) Ages 20–24	(5) Ages 25–29	(6) Ages 30–34	(7) Ages 35–39	(8) Ages 40–44
Post × Mortgage Origination Decline	-0.0952***	-0.181***	-0.409**	-0.801***	-0.348***	-0.187**	-0.0716	-0.00163
	(0.0314)	(0.0524)	(0.162)	(0.177)	(0.117)	(0.0896)	(0.0443)	(0.0114)
Observations	160,647	160,647	26,777	26,770	26,780	26,780	26,780	26,760
Mean dep var	25.14	38.95	38.49	93.08	112.05	91.28	40.45	7.97
25th percentile exposure	13.54	13.54	13.54	13.54	13.54	13.54	13.54	13.54
75th percentile exposure	22.48	22.48	22.48	22.48	22.48	22.48	22.48	22.48
25th–75th percentile difference	8.94	8.94	8.94	8.94	8.94	8.94	8.94	8.94
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Race × Age-Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline controls × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying controls	No	No	No	No	No	No	No	No
# MSAs	203	203	203	203	203	203	203	203

Notes: The table reports pooled estimates from Equation 2, using the decline in home-purchase mortgage originations per 1,000 residents between 2006 and 2011 as the measure of MSA exposure to the housing bust. Columns (1) and (2) report results separately for first births and higher-order births. Columns (3)–(8) report results separately for women in each 5-year age group. The post indicator equals one in 2007 and subsequent years. All specifications include MSA, year, and group fixed effects and interact baseline MSA characteristics measured in 2000 with year fixed effects. Regressions are weighted by the corresponding MSA female population. Standard errors are clustered at the MSA level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.5: Housing-Market Shocks, Labor-Market Shocks, and Fertility

VARIABLES	(1) Employment Rate	(2) Fertility Rate	(3) Fertility Rate
Post × Mortgage Origination Decline	-0.0530*		-0.225***
	(0.0319)		(0.0736)
Post × Unemployment Rate Increase		-0.905***	-0.744***
		(0.223)	(0.231)
Observations	160,680	160,647	160,647
Mean dep var	72.99	64.10	64.10
MSA FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Race × Age-Group FE	Yes	Yes	Yes
Baseline controls × Year FE	Yes	Yes	Yes
Time-varying controls	No	No	No
# MSAs	203	203	203

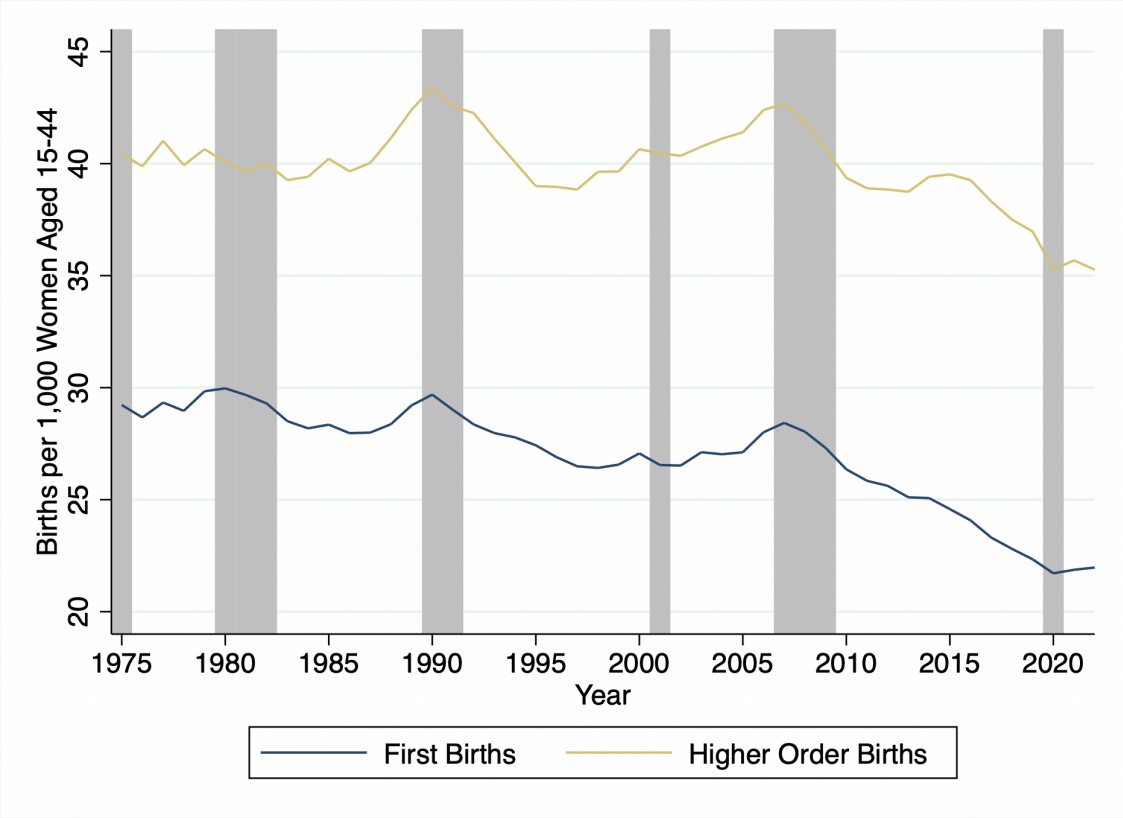
Notes: The table reports pooled estimates from Equation 2 and its MSA-level analogue, examining the relationships between housing-market shocks, labor-market conditions, and fertility. Column (1) reports the effect of housing-market exposure, measured as the decline in home-purchase mortgage originations per 1,000 residents between 2006 and 2011, on the employment rate, defined as the share of employed persons ages 16–64. Column (2) reports the effect of labor-market exposure, measured as the increase in the unemployment rate between 2006 and 2011, on fertility. Column (3) includes both exposure measures in the fertility regression. All specifications include MSA and year fixed effects and interact baseline MSA characteristics measured in 2000 with year fixed effects. Columns (2) and (3) additionally include race-by-age-group fixed effects. Regressions are weighted by MSA population in column (1) and the corresponding MSA female population in columns (2) and (3). Standard errors are clustered at the MSA level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.6: Effects of Changes in Mortgage Origination Decline on Household Formation and Residential Mobility

VARIABLES	(1) Parent in Household	(2) Partnered Household	(3) Owns Home	(4) Moved & Owns Home	(5) Moved
Post × Mortgage Origination Decline	0.00115***	-0.000976**	-0.000712***	-0.000650***	-0.000658**
	(0.000278)	(0.000380)	(0.000217)	(9.41e-05)	(0.000280)
Observations	2,651,213	2,651,213	2,651,213	2,543,538	2,543,538
Mean dep var	0.26	0.47	0.38	0.05	0.24
25th percentile exposure	17.32	17.32	17.32	17.32	17.32
75th percentile exposure	27.91	27.91	27.91	27.91	27.91
25th–75th percentile difference	10.59	10.59	10.59	10.59	10.59
MSA FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Race × Age-Group FE	Yes	Yes	Yes	Yes	Yes
Baseline controls × Year FE	Yes	Yes	Yes	Yes	Yes
Time-varying controls	No	No	No	No	No
# MSAs	60	60	60	60	60

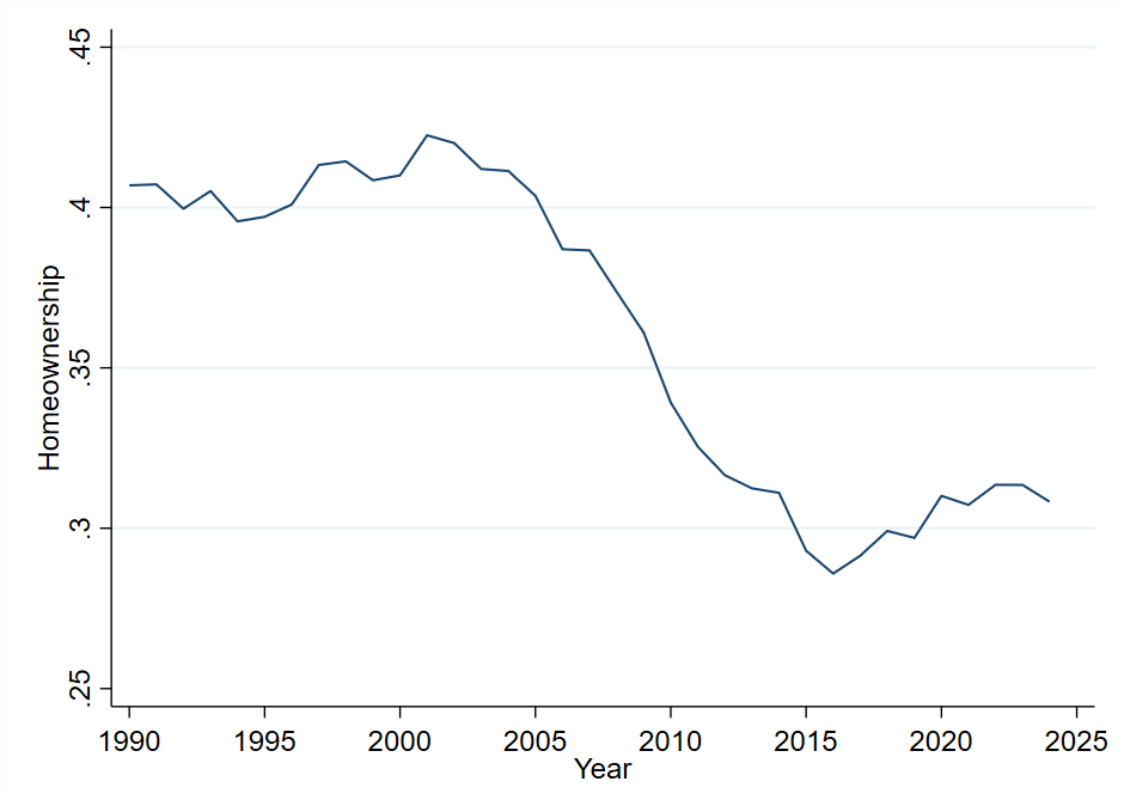
Notes: The table reports pooled estimates from Equation 4, using the decline in home-purchase mortgage originations per 1,000 residents between 2006 and 2011 as the measure of MSA exposure to the housing bust. The outcome variables are indicators for living with at least one parent, being a householder or the spouse or unmarried partner of a householder, being a householder or partner in an owner-occupied residence, having moved within the past year into an owner-occupied residence, and having moved within the past year. The post indicator equals one in 2007 and subsequent years. All specifications include MSA, year, sex, and race-by-age-group fixed effects and interact baseline MSA characteristics measured in 2000 with year fixed effects. The sample includes respondents ages 20–34. Regressions are weighted by ACS survey weights. Standard errors are clustered at the MSA level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure A.1: Births per 1,000 Women Aged 15–44



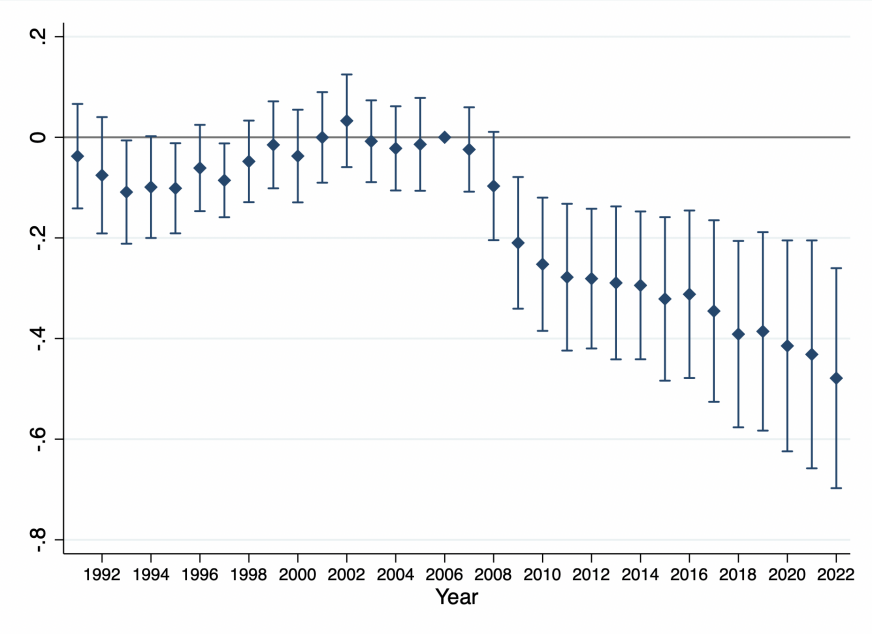
Notes: The figure reports the national fertility rate for first and higher-order births, measured as births per 1,000 women ages 15–44. Births are from the National Vital Statistics System (NVSS), and population denominators are from the Surveillance, Epidemiology, and End Results (SEER) Program. Shaded areas indicate NBER recession years.

Figure A.2: Trend in Homeownership



Notes: The figure reports the homeownership rate among women ages 15–44 in the Current Population Survey (CPS), where homeownership is defined as a householder or partner living in an owner-occupied residence. Estimates are weighted using CPS survey weights.

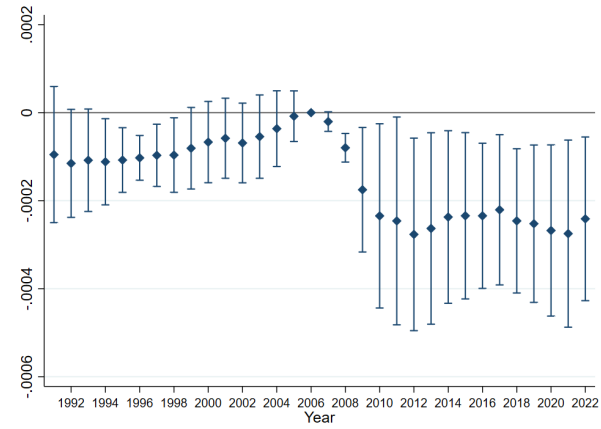
Figure A.3: Effect of Pre-Crisis Mortgage-Market Expansion on Fertility Rate



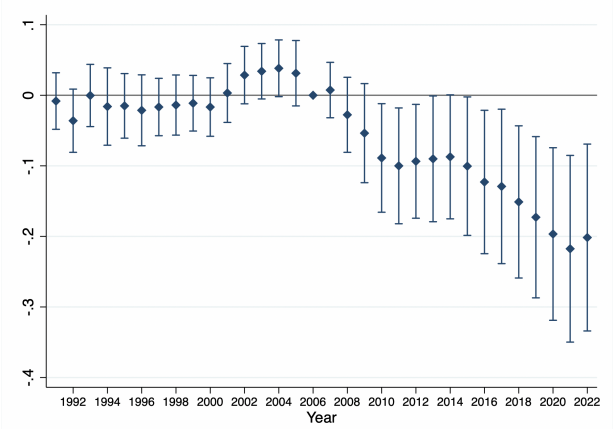
Notes: The figure reports event-study coefficients from Equation 1, using the increase in mortgage originations between 2000 and 2006 as the measure of housing-market exposure. The outcome variable is fertility rate at the MSA-by-race-by-age-group level, defined as the number of births per 1,000 women in that group. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure A.4: Effect of Alternative Housing-Market Exposures on Fertility Rate

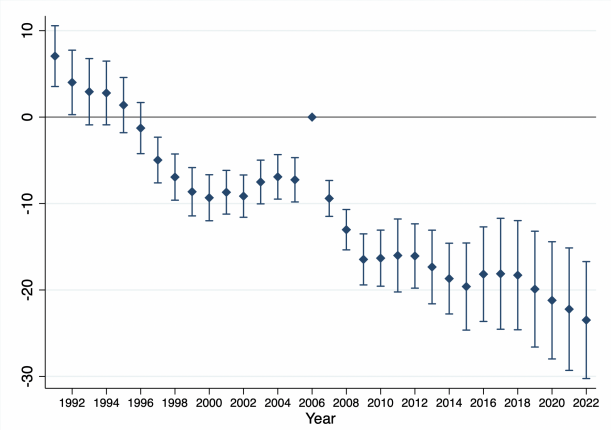
(a) Change in Building Permits



(b) Baseline Subprime Rates

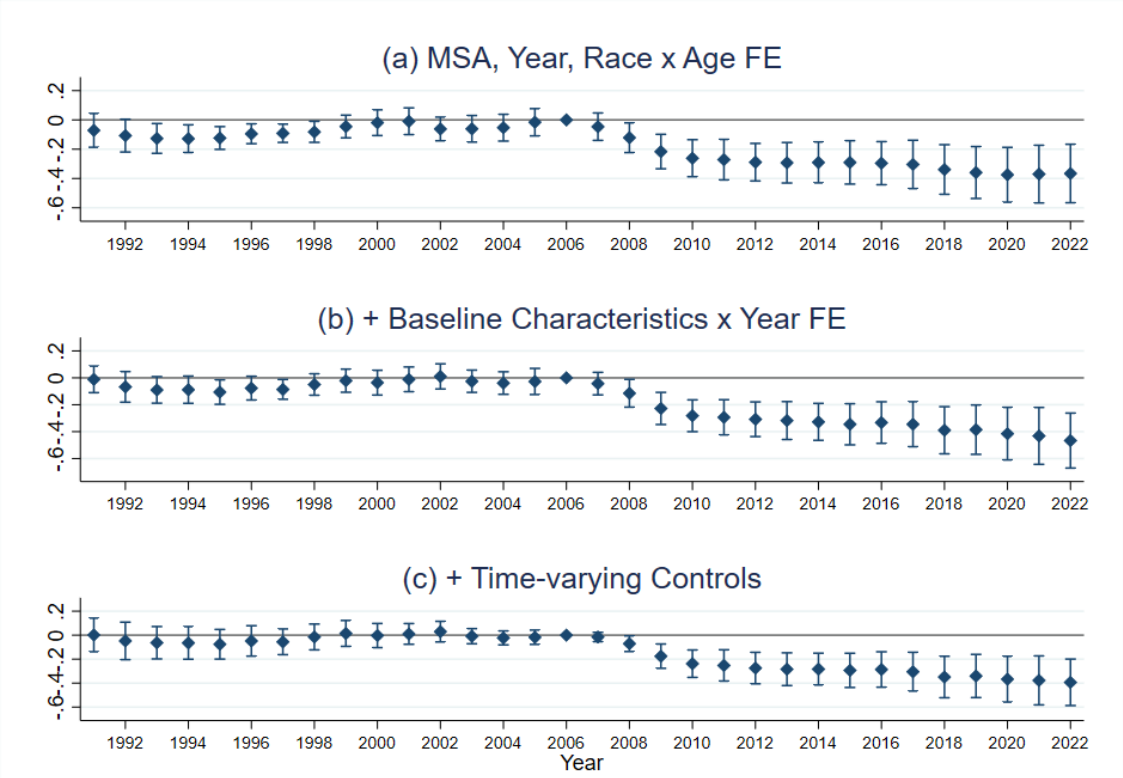


(c) Change in HPI



Notes: The figure reports event-study coefficients from Equation 1 using alternative measures of housing-market exposure. Panel (a) measures exposure using the decline in the single-family permit rate between 2006 and 2011, Panel (b) uses the share of mortgage originations classified as subprime between 2004 and 2006, and Panel (c) the decline in housing price index between 2006 and 2011. The outcome variable is fertility rate at the MSA-by-race-by-age-group level, defined as the number of births per 1,000 women in that group. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

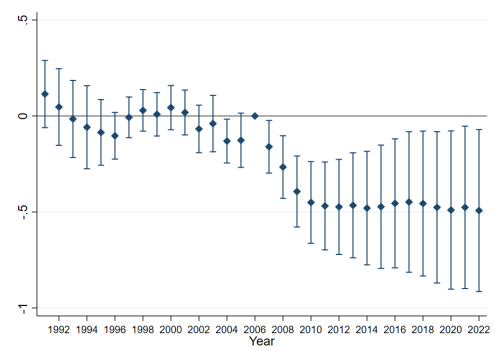
Figure A.5: Effect of Mortgage Origination Decline on Fertility Rate, Alternative Specifications



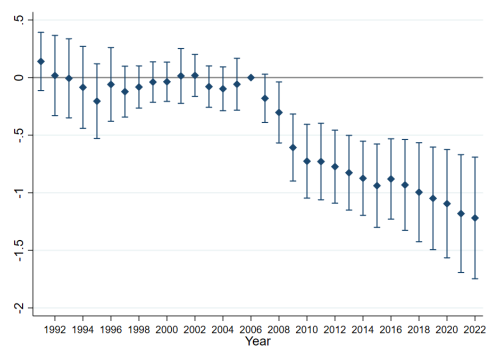
Notes: The figure reports event-study coefficients from Equation 1 under alternative sets of controls. Panel (a) includes only MSA, year, and race-by-age-group fixed effects. Panel (b) is the preferred specification which allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Panel (c) additionally controls for lagged MSA-level employment, personal income, and the housing price index, as well as the lagged state-level Medicaid enrollment rate. The omitted year is 2006. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure A.6: Effect of Mortgage Origination Decline on Fertility Rate, By Age Group

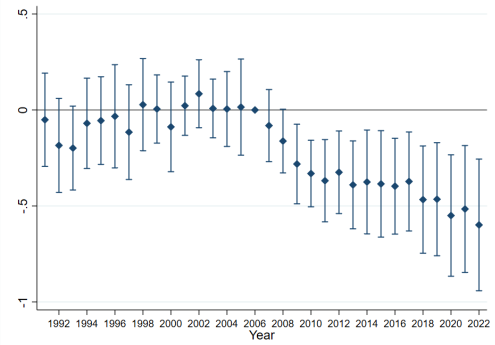
(a) Ages 15–19



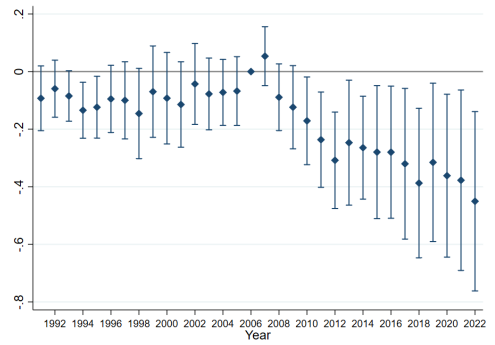
(b) Ages 20–24



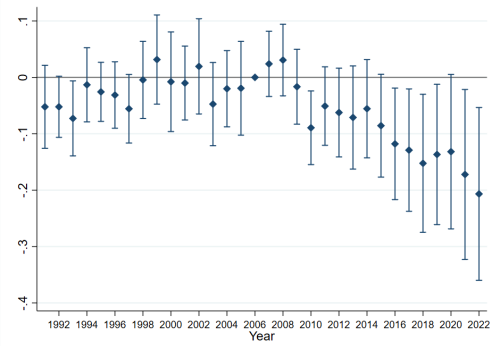
(c) Ages 25–29



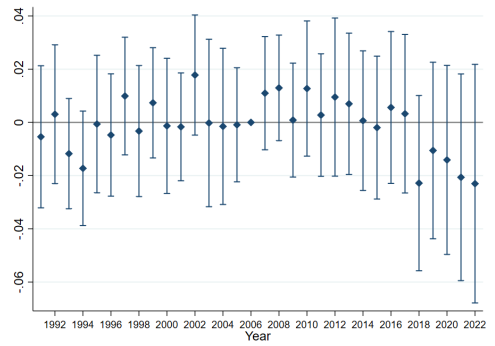
(d) Ages 30–34



(e) Ages 35–39

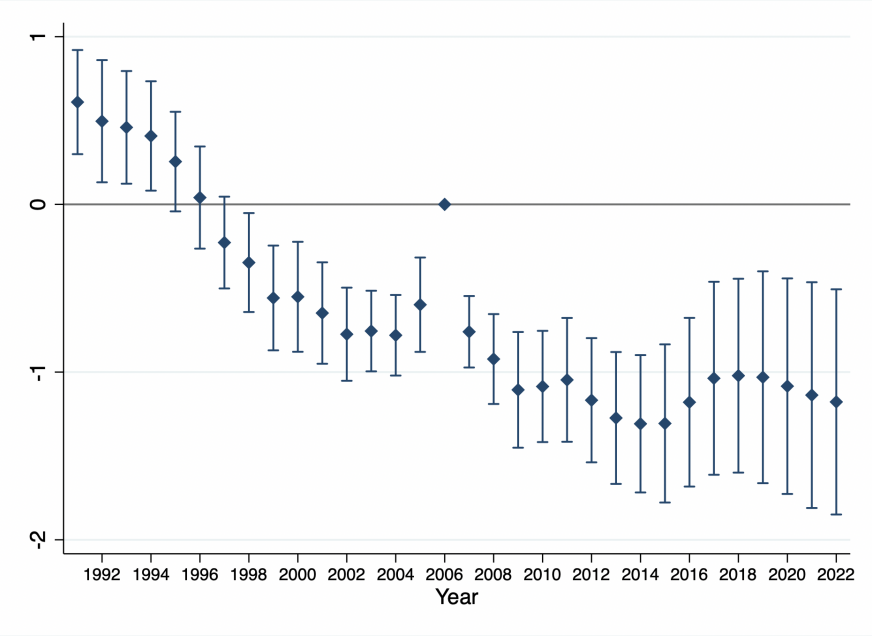


(f) Ages 40–44



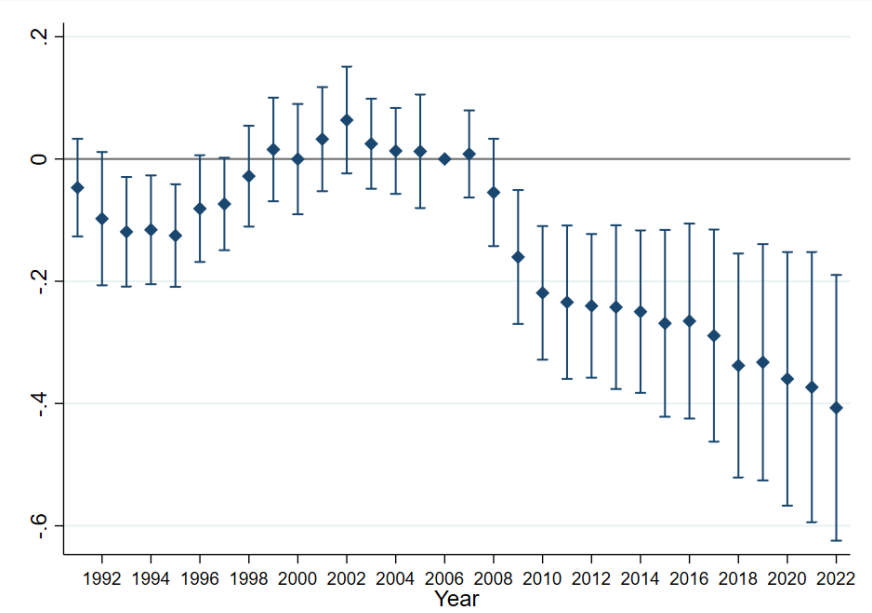
Notes: The figure reports event-study coefficients from Equation 1 separately by age group. The outcome variable is fertility rate at the MSA-by-race-by-age-group level, defined as the number of births per 1,000 women in that group. Panels (a)–(f) report results for women in each 5–year age bin respectively. Housing-market exposure is measured by the decline in mortgage originations between 2006 and 2011. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure A.7: Effect of Unemployment Rates Increase on Fertility Rates



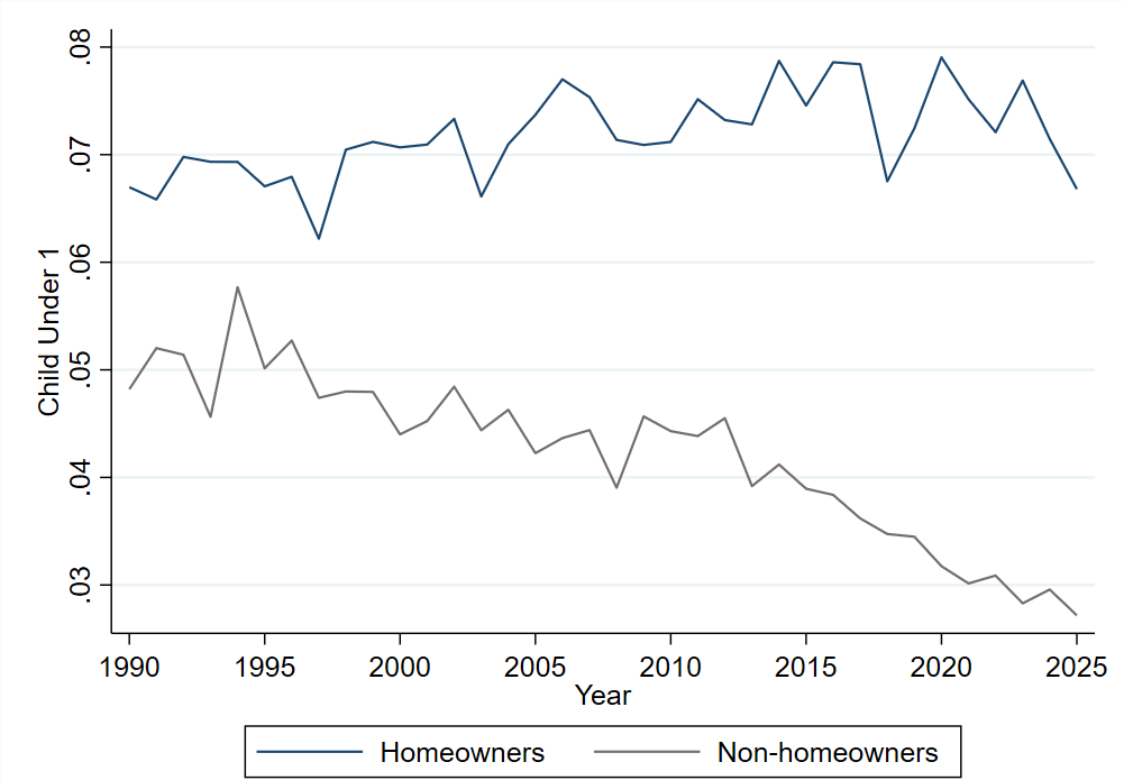
Notes: The figure reports event-study coefficients from Equation 1, using the increase in unemployment rate between 2006 and 2011 as the measure of exposure. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, and allows fertility trends to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA female population ages 15–44, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure A.8: Effect of Mortgage Origination Decline on Fertility Rate, Controlling for Labor Market Exposure



Notes: The figure reports event-study coefficients from Equation 1, using the decline in mortgage originations between 2006 and 2011 as the measure of housing-market exposure. The outcome variable is fertility rate at the MSA-by-race-by-age-group level, defined as the number of births per 1,000 women in that group. The omitted year is 2006. The specification includes MSA, year, and race-by-age-group fixed effects, the interactions between the increase in unemployment rate between 2006 and 2011 interacted with year fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. Regressions are weighted by the MSA race-by-age-group female population, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

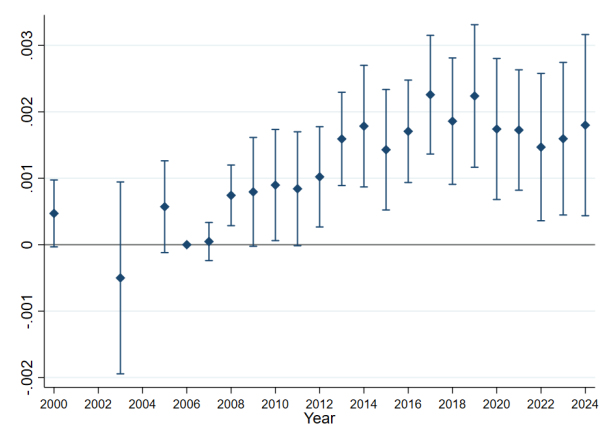
Figure A.9: Trends in Fertility, by Homeownership



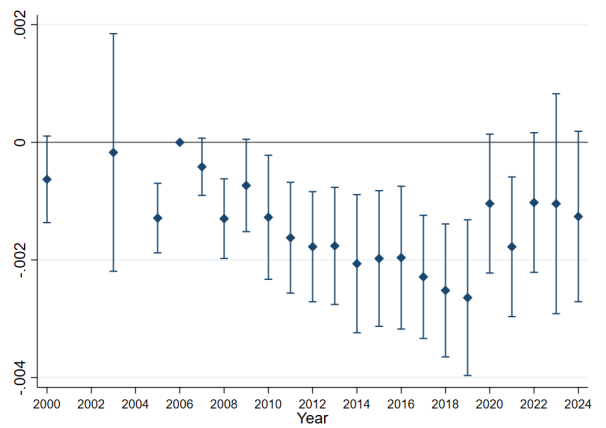
Notes: The figure reports the rate of births among women ages 15–44 in the Current Population Survey (CPS), by homeownership status. Births are identified by the respondent having an own child under age 1 in the household, and homeownership is defined as a householder or partner living in an owner-occupied residence. Estimates are weighted using CPS survey weights.

Figure A.10: Effect of Mortgage Origination Decline on Household Formation and Homeownership, Alternative Sample

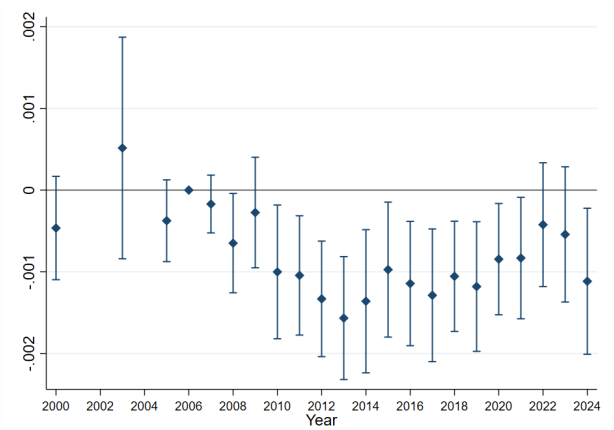
(a) Parent in Household



(b) Partnered Household



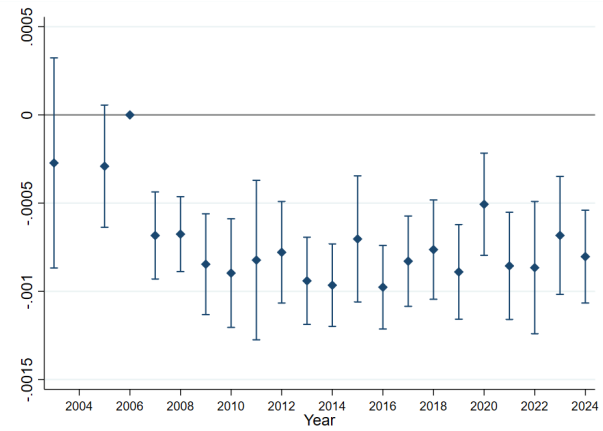
(c) Owns home



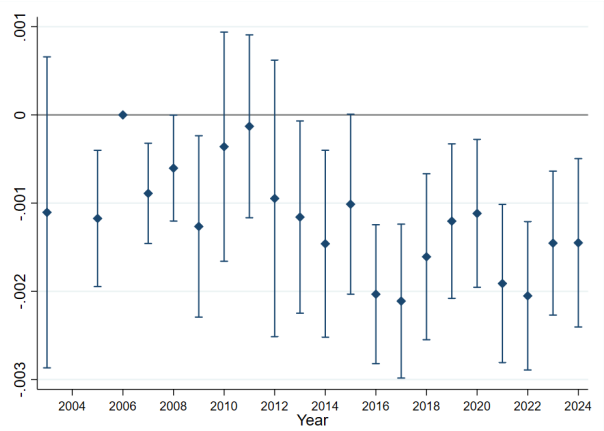
Notes: The figure reports event-study coefficients from Equation 3, using the decline in mortgage originations between 2006 and 2011 as the measure of housing-market exposure. The outcome variable for Panel (a) is an indicator variable for living in the same household with at least one parent; for Panel (b) an indicator variable for the respondent being a householder with a spouse or unmarried partner, or the spouse or unmarried partner of the householder; for Panel (c) an indicator variable for being a householder or partner living in an owner-occupied residence. The omitted year is 2006. The specification includes MSA, year, sex, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. The sample includes female respondents ages 15–44. Regressions are weighted by the ACS survey weights, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.

Figure A.11: Effect of Mortgage Origination Decline on Residential Mobility, Alternative Sample

(a) Moved Within 1 Year & Owns Residence



(b) Moved Within 1 Year



Notes: The figure reports event-study coefficients from Equation 3, using the decline in mortgage originations between 2006 and 2011 as the measure of housing-market exposure. The outcome variable for Panel (a) is an indicator variable for the respondent living in an owner-occupied residence and having moved within one year; for Panel (b) an indicator variable for the respondent having moved within one year. The omitted year is 2006. The specification includes MSA, year, sex, and race-by-age-group fixed effects, and allows the outcome variable to vary with baseline MSA characteristics by interacting mortgage originations, the single-family permit rate, the housing price index, personal income, the employment rate, and the construction share of employment, measured in 2000, with year fixed effects. The sample includes female respondents ages 15–44. Regressions are weighted by the ACS survey weights, and standard errors are clustered at the MSA level. Vertical bars indicate 95% confidence intervals.