# Parental Resources and College Major Choice

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**Abstract**

If parental resources insure children against negative labor market shocks, access to such informal safety nets might influence children's decisions of what to study in college. This paper examines how unexpected increases in housing prices affect children's college major choices. We do this by combining a large survey of United States first-year undergraduates with spatial variation in housing demand growth during the 2000s housing boom. Using variation in the size of the structural break in house prices as an instrument for price changes, we find that overall, unexpected increases in house prices induce first-year students to choose majors that earn more. These effects are concentrated among students from areas with low home-ownership rates, consistent with these students primarily facing a cost of living increase. In contrast, an unexpected increase in house prices induces students from areas with high home-ownership rates to choose majors associated with lower earnings. This pattern is consistent with these students responding to a wealth increase by enrolling in majors that lead to lower-paying careers but potentially better amenities.

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# 1. Introduction

Parental resources can play a large role in influencing the labor market decisions of their children. Beyond directly investing in their children's human capital (e.g., Caucutt and Lochner, 2020), parents can informally insure children against future labor market shocks. Parents might use their assets to help children weather adverse shocks (Boar, 2021; Kaila, Nix, and Riukula, 2021) or finance large asset purchases (Fagereng, Mogstad, and Rønning, 2021). If children are aware that their parents can provide a safety net, it might affect their decisions about what to study in college or what occupations to pursue. Given that financial constraints can prevent individuals from pursuing low-paying but rewarding jobs (Coffman et al., 2019; Luo and Mongey, 2019), more generous informal safety nets might push children to prioritize non-monetary factors in their career decisions, or choose occupations associated with greater earnings risk.

While previous work has studied how parental wealth plays an important role in whether a student attends college or the types of institutions that they attend (Lovenheim, 2011; Lovenheim and Reynolds, 2013), there is limited causal evidence on the role of parental wealth in the *types* of human capital that children invest in. While we have descriptive evidence that children from rich backgrounds are more likely to work in occupations with high non-pecuniary qualities and take more labor market risks (Ma, 2009; Berg and Hebous, 2021; Boar and Lashkari, 2021; Haeck and Laliberté, 2025) we have little causal evidence.[1] Given the large variation in the returns to field of study, understanding the role that parental resources play in sorting across field of study could have important implications for labor market inequality (Altonji, Blom, and Meghir, 2012; Kirkeboen, Leuven, and Mogstad, 2016; Bleemer and Mehta, 2022; Campos et al., 2026; Imberman et al., 2026).

In this paper, we study how unexpected increases in housing prices affect children's college major choices. We do this by combining spatial variation in housing demand growth with a large survey of first-year undergraduate students: the Higher Education Research Institute's "The Freshman Survey" (TFS).[2] This survey, which has rarely been used in economics (Bradley, 2012), crucially provides information on college majors and home zip codes for over 250,000 students each year. We focus on the United States' housing boom

[1] Most of the descriptive evidence is from the United States, where parental safety nets are likely important given that the government provides relatively less insurance than other similar countries (Pfeffer and Hällsten, 2012).

[2] The Higher Education Research Institute also runs a Senior Survey, but linking it with the Freshman Survey would decrease our sample size to one-tenth of the Freshman Survey; due to this data limitation, in this paper we only use the Freshman Survey

era between 2000 and 2006, when speculative forces created large differences in house price increases across the US. Following Charles, Hurst, and Notowidigdo (2018), we use the size of the structural break in house prices in an area as an instrument for house price changes. We construct structural breaks using a finer level of geographic disaggregation than the original paper so that we incorporate rural students into our analysis. We use this instrumental variable strategy in a difference-in-difference framework, comparing the change in major choice between 2000 and 2006 for students from three-digit zip codes (ZIP3) with smaller versus larger house price growth.

Despite the consensus that speculative motivation was the primary driver of house price increases (Shiller, 2007; Burnside, Eichenbaum, and Rebelo, 2016), we conduct additional exercises to assess whether the size of the structural break in house prices is a valid instrument. First, we limit our analysis sample to students entering four-year colleges, since prior research finds that the housing boom reduced enrollment at two-year colleges but not at four-year colleges (Charles, Hurst, and Notowidigdo, 2018). We show evidence that our housing boom instrument is not correlated with compositional changes in our sample of students entering four-year colleges. Second, we conduct a test in the spirit of assessing pre-trends and rule out that housing bubbles systematically arose in areas where students typically choose particular majors.

We characterize the life cycle earning profile of each college major using the 2009-2019 waves of the American Community Survey. We first run a Mincer regression to quantify individual earnings which cannot be explained by observable characteristics. We use the resulting residual to characterize the earnings profile of a major in three ways. First, we calculate how average residualized earnings evolve over the life-cycle by college majors, which we interpret as the earning power of choosing a given major. Then, for each college major we calculate the fraction of workers end up in the top and bottom third of the age-specific distribution of residualized earnings. We interpret each of these measures as the expected probability of earning a wage in the top and bottom third of the age-specific wage distribution. We use these three measures to quantify how rising house prices affected students' preferences for different earning profiles that different majors provide.

Overall, we find that a one standard deviation increase in ZIP3-level home prices increases the average annual earnings associated with a student's major in different age bins by $197 (age 31-35), $342 (age 36-40), and $402 (over age 40). Compared to the pre-boom averages, these estimates represent an increase of 24.3% (age 31-35), 27.4% (age 36-40), and 26.7% (over age 40). We then study whether these estimates differ by the likelihood of parental homeownership, a key factor in whether a housing price increase translates to

an increase in parental wealth. Students whose parents do not own homes would face the prospect of cost of living increases associated with housing prices while students whose parents own homes would also face the increased informal insurance value of a parental increase in housing wealth.

We find that unexpected house price increases induce students whose parents are very likely to own homes (as proxied by the rate of homeownership in their zip code) to choose majors associated with lower earnings and lower likelihood of ending up in the top third of the earnings distribution.[3] For these students, a one-standard-deviation growth in home prices changed the annual earnings associated with their majors by –$125 (or 14.3% of pre-boom average) between age 31-35, –$87 (or 6.7%) between age 36-40, and –$83 (or 5.3%) over age 40. In contrast, we find that students whose parents are unlikely to own homes choose higher-paying majors that would place them in the top third of the earnings distribution in response to rising house prices. For these students, a one-standard-deviation growth in home prices increases the annual earnings associated with their majors by $531 (or 61.6% of pre-boom average) between age 31-35, $832 (or 62.4%) between age 36-40, and 945$ (or 62.2%) over age 40.

We then examine how these effects differ by race and gender. We show that the overall direction of responses of female and male students was similar, but female students living in high-homeownership areas were more likely to switch to lower-paying majors. We also document that increases in house prices have different effects on the major choices of White and non-White students. Overall, White students tend to slightly increase their enrollment in higher-paying majors when house prices increase, but the change in their earnings is not statistically different from zero; meanwhile, non-White students switch to majors that increase their earnings throughout their whole life cycle. We then stratify White and non-White students by the likelihood of parental homeownership. First, we show that White and non-White students living in low-homeownership areas respond similarly to a house price increase. However, we document large racial differences in responses to rising house prices among students living in high-homeownership areas: while non-White students continue to switch to majors with higher career earnings, White students increase their enrollment in lower-paying majors.

This paper adds to the large literature studying how parental resources affect children's outcomes. Research studying how changes in parental resources affect children's outcomes has primarily focused on understanding how shocks to parental resources, for example

[3]Since the TFS does not include information on parental homeownership, we proxy for it using students' five-digit ZIP (ZIP5) codes' homeownership rates.

through job loss (Rege, Telle, and Votruba, 2011; Hilger, 2016), or changes in labor market conditions (Butikofer, Dalla Zuanna, and Salvanes, 2018; Stuart, 2022), affect the education and labor market outcomes of children.[4] Other than recent work showing how adverse shocks to parental resources informs how children make occupational choices (Riukula and Huttunen, 2019) and how parents use their social networks to help their children get desirable jobs (Staiger, 2023), we have limited causal evidence on how parental resources shape the choices children make about what to study or where to work.

This paper makes several contributions. First, we provide novel evidence of the causal impacts of parental wealth shocks on college major choice. We find that students whose parents likely own a home are induced to choose majors with lower career earnings and potentially better amenities. Meanwhile, students whose parents are unlikely to own a home are induced to choose majors with greater career earnings. These patterns are consistent with an unexpected house price increase yielding a more generous parental safety net for children of homeowners while generating a sharp increase in the future cost of living that children of non-homeowners expect. These findings are in line with increases in parental wealth creating a more generous parental safety net, which children of homeowners use as a hedge against future expenses or adverse shocks. We also add to the literature studying how students make decisions about what to study. Prior work has documented how students' consider employment probabilities, future wages, and labor market risk when making such decisions (Altonji, Arcidiacono, and Maurel, 2016; Blom, Cadena, and Keys, 2021; Hampole, 2022). Our results demonstrate how the potential insurance value of family resources can influence college major choice decisions.

The remainder of this paper is organized as follows. In section 2, we illustrate how increases in house prices affect college major choice through two channels: increased parental wealth and rising housing-cost expectations. In section 3, we summarize the data we use and how we construct the average earning characteristics of majors. In section 4, we discuss our empirical methodology and the calculation and validity of our structural break instrument. In section 5, we present our empirical findings and summarize how house price changes affect students differently by race, gender, and the likelihood of parental homeownership. Finally, section 6 summarizes our results.

[4]See Page, Stevens, and Lindo (2007) and Page (2024) for reviews.

## 2. Connection between home prices and major choice

In this section, we provide a conceptual framework for how students' college major choices could be affected by changes in the value of their family home and how housing price changes could affect students whose families do not own homes. We also discuss how these effects vary by the level of income and wealth a family possesses. Throughout this section, we consider how changes in housing prices shape students' beliefs about future opportunities and risks, and how these beliefs influence their major choices. In doing so, we abstract away from how other individuals in students' lives, e.g., parents and peers, influence college major choice (see Patnaik, Wiswall, and Zafar (2020) for a review).

Increasing home prices could directly influence college major choices through two channels: altering parental housing wealth, which we refer to as *wealth channel*, and raising expectations of future housing costs, which we call *price channel*. First, increasing parental wealth could allow students to choose majors with lower expected earnings, as it enables parents to provide financial help for future larger expenses. Thus, we expect that students whose parents experience a larger increase in their wealth would be more likely to choose college majors with lower earnings profiles than students whose parents experienced a modest increase in their wealth.[5] Second, experiencing a larger increase in house prices might raise expectations for future housing expenses and living costs, which could motivate students to choose majors with higher earning potential. If this is the case, increasing house prices might prompt students to consider higher-paying or less volatile career paths, which prepare them for future affordability challenges.

Thus, we expect to find different behavioral responses among students with and without parental homeownership. Students from families that do not own a home experience only the negative consequences of house price increases. Rising house prices affect these students' major choice only through the price channel by increasing their expectations of future expenses and potentially increasing current expenses (e.g., rent, through increased cost of living). Because of these changes, we expect that students whose parents do not own homes might switch to higher-paying majors if they experience increasing house prices, which prepares them better to cover increased current and future housing costs. In contrast, students whose parents own a home experience both the wealth and price channels.

[5]Note that the channels we discuss below are still relevant if we think that parents, who may be better informed about the labor market outcomes associated with each college major, dominate students' choices. For instance, even if a student's preferred major is not aligned with the major that the student's parents would like her to choose, increases in housing wealth may shape parental expectations and mitigate the parents' will to influence their child's major choice.

We should expect that the price channel will become less dominant as parental income and wealth increase. Students from more well-off families can expect more parental financial help as parental housing wealth increases, which lessens the importance of choosing a major with a more lucrative career-earning path. As a result, among these students, the wealth effect could dominate the price effect, leading to switches to lower-paying majors as house prices rise.

This discussion highlights that the overall effect of house price changes on college major choice is ambiguous and will depend on which of these two channels is dominant. Which channel is dominant will likely depend on whether students' parents own homes and their general wealth. In our empirical analysis, we assess the size of the effects of their parents' home ownership and socio-economic status on students.

## 3. Data on college major choice

### 3.1. CIRP Freshmen Survey

Our primary source of data on college students is The Freshmen Survey (TFS) administered by the Cooperative Institutional Research Program (CIRP) and available through the Higher Education Research Institute (HERI) at UCLA. The survey is administered to first-year students before classes begin. During the early 2000s, TFS collected between 265,000 and 290,000 unique responses annually from college freshmen at more than 1,000 institutions in the United States. The survey collects detailed information on family background, academic preparedness, college expectations, and demographics. TFS is the largest nationally representative survey that includes information on the key outcome of our interest, the intended college majors of freshmen students. The survey lists a broad range of majors (up to 84) and asks students to select only one option that indicates their probable field of study.[6]

The primary data in this paper comprise the responses of freshmen from the 1999-2001 and 2005-2007 waves of the study, which time intervals center on the start and peak years (2000 and 2006, respectively) of the housing boom before the 2008 financial crisis. We decided to exclude the 2002-2004 waves of TFS because, during these years, housing booms occurred at different times across ZIP3 areas. We narrow our sample to students entering four-year institutions that participated in all our waves, ensuring that our results are not

[6]Even if undecided is included as an option, in our sample, only 7.5% of students are undecided on their intended major.

affected by the selection of colleges for the TFS.[7]

TABLE 1. Student characteristics in the 1999-2001 and 2005-2007 waves of TFS

| Variable | Pre waves | Post waves | Difference |
|---|---|---|---|
| Real HH Income (2000 USD) | 72,948.273 | 75,112.844 | 2,164.569*** |
| | (55,399.711) | (60,739.992) | (672.329) |
| Female | 0.545 | 0.559 | 0.014*** |
| | (0.498) | (0.496) | (0.003) |
| Asian (pct of freshmen) | 0.079 | 0.085 | 0.007* |
| | (0.269) | (0.279) | (0.004) |
| Black (pct of freshmen) | 0.077 | 0.083 | 0.006 |
| | (0.267) | (0.276) | (0.004) |
| Hispanic (pct of freshmen) | 0.066 | 0.063 | -0.003 |
| | (0.247) | (0.243) | (0.007) |
| White (pct of freshmen) | 0.710 | 0.684 | -0.026*** |
| | (0.454) | (0.465) | (0.010) |
| College graduate: Father | 0.533 | 0.543 | 0.010* |
| | (0.499) | (0.498) | (0.006) |
| College graduate: Mother | 0.497 | 0.542 | 0.045*** |
| | (0.500) | (0.498) | (0.005) |
| First-generation student | 0.201 | 0.189 | -0.012*** |
| | (0.401) | (0.392) | (0.004) |
| Observations | 320,364 | 336,315 | 656,679 |

Note: Robust standard errors clustered at ZIP3-level.

Table 1 presents the main characteristics of the student body in the 1999-2001 and 2005-2007 waves, which we refer to as the pre- and post-boom waves, respectively. Compared to students in the pre-boom waves, post-boom students have higher real family income, are more likely to have college-educated parents, and are more likely to be female and non-White. While this suggests that students responding to the survey are different across waves, these differences are generally very small as a share of the pre-wave mean (except for Asian and having a mother who is a college graduate). However, these differences do not pose a threat to our strategy unless these pre/post changes vary by the size of the housing boom in each area, which we discuss further below.

[7]As discussed below, our empirical strategy takes advantage of variation across geographies in the size of the housing boom. To limit the potential for differential selection into college enrollment due to the housing boom, we limit to students at four-year institutions, which did not see drastic enrolment changes driven by the boom (Charles, Hurst, and Notowidigdo, 2018). We also conduct a number of validation exercises to ensure that this is the case in our data as well.

### 3.2. Characterizing the earning profiles of college majors

We measure the future earnings potential of college majors using the 2009-2019 waves of the American Community Survey (ACS), which includes individual-level information on wages and college majors.[8] Similar to Hampole (2022), we quantify the earning potential of college majors using the following Mincer regression, estimated on the sample of college-graduates:

$$(1) \qquad wage_{i,t} = \beta_0 + \beta_1 \times age_{i,t} + \beta_2 \times age_{i,t}^2 + \beta_3 \times race_{i,t} + \beta_4 \times year_t + \varepsilon_{i,t}$$

where *race* is the ACS' simplified race/ethnicity variable,[9] and *year* is a year fixed-effect. In this regression, our main variable of interest is $\widehat{\varepsilon_{i,t}}$, the predicted residual, which quantifies the earnings that cannot be explained by life-cycle patterns or racial differences in labor market trajectories.

We group these estimated residual earnings by college majors and age bins, and calculate the three main sets of outcome variables (see Table A1). First, we calculate average residual earnings by age bins, which tells us whether graduates of a given college major earn more or less than the average college-graduated worker in that age bin. We then calculate the fraction of graduates of a given college major in the bottom and top thirds of the age-specific wage distribution. We interpret these fractions as the probability of getting a job after graduation that puts the student in the bottom or top third of the wage distribution. These variables let us incorporate within-major heterogeneity in incomes, which the average residual income cannot capture. Finally, we merge this information to our main data by aggregating up intended college majors in the TFS into the 2-digit categorization of the Classification of Instructional Programs (CIP) system.

In Figure 1, we illustrate the earning profiles of four college majors, which are representative of the available college majors. First, in Panel A, Biology, chosen by most future medical doctors, is representative of majors that offer high future earnings but require a substantial initial investment. Biology offers a relatively low starting income with a steep wage increase over time; in fact, Biology majors earned the most among college graduates in our over-40 age bin. However, due to low starting salaries and the high cost of post-bachelor's education, many Biology majors must make a substantial upfront financial

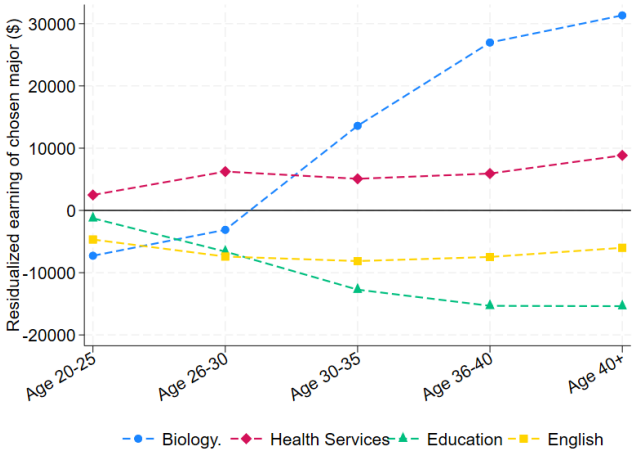
[8] We ideally would use information from ACS waves administered before the TFS survey waves in our sample to closely match the TFS survey participants' information set. Unfortunately, ACS waves from before 2009 do not ask respondents about their college major.

[9] The ACS' simplified race/ethnicity variable distinguishes the following race/ethnicity groups: White, Black / African American, American Indian / Alaska native, Asian / Pacific Islander, and Hispanic / Latino.

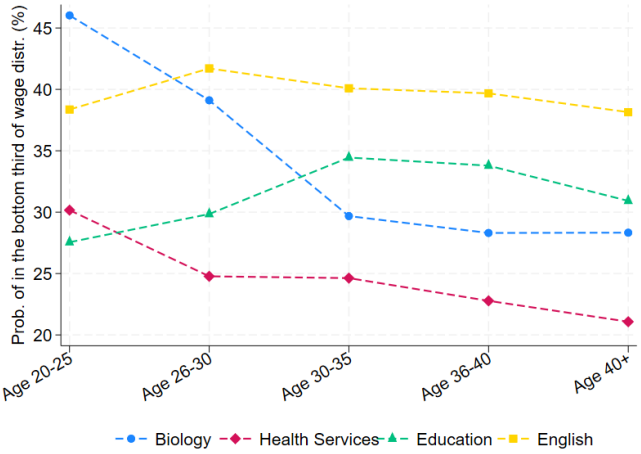
investment in tuition and foregone income, which is easier for students from wealthy families. College graduates in Physical Sciences and Social Sciences had a similar earnings profile, with low starting salaries and steep wage growth over the life cycle (see Table A1).

FIGURE 1. Earning profile of different college majors

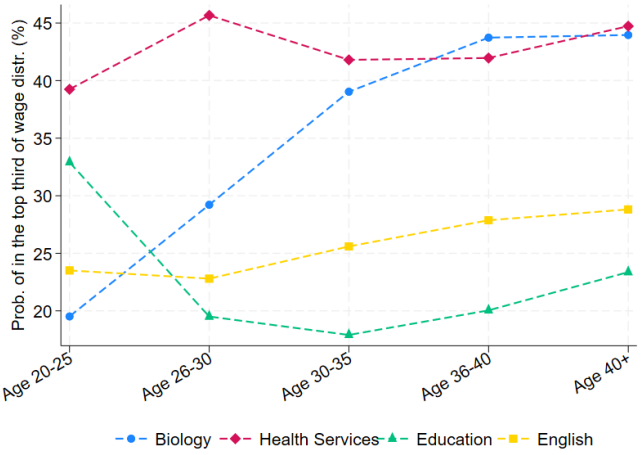
A. Average residualized earning




B. Fraction of graduates in the bottom third of wage distr.




C. Fraction of graduates in the top third of wage distr.




*Notes:* Own calculation, based on ACS.

Second, unlike Biology, the Education major offers relatively well-paid job opportunities without substantial financial investment in early career, but at the expense of slower earnings growth in later years. Graduates with Education degrees earn close to the average wage in their early career, but their wages fall behind the average wage over the life-cycle.[10] Based on Table A1, most majors (such as Criminal Justice and Fire Protection,

[10]Note that decreasing residual earning ($\widehat{\varepsilon_{i,t}}$) does not imply decreasing nominal wages as well, as the

Environmental and Natural Resources, Liberal Arts and Humanities, Fine Arts, among others) provide similar earnings profiles. Third, the earning profile of Health Services majors (primarily nurses and similar non-physician health-care workers) is representative of that of majors that lead to well-compensated jobs. The average earnings of graduates in Health Services majors are above the average in every age bin, but unlike in Biology, there is no steep increase in earnings over the life-cycle. Graduates of Business, Engineering, or Computer and Information Sciences majors have similar earning profiles (see Table A1). Finally, the English major is illustrative of a career path that does not provide above-average wages, but for which residual earnings do not decline over the life cycle; History and Linguistics have similar earning profiles.

As Panels B and C show, there is significant heterogeneity in incomes within each college major that the average residual cannot capture by itself. These panels depict the fraction of graduates of a given major that end up in the bottom/top third of the age-specific income distribution, which we interpret as the likelihood of earning an income in these part of the income distribution after graduation. Although the average wage is the highest among college graduates in the Biology major, the high average masks significant heterogeneity: as Panel B shows, almost 30 percent of them remain in the bottom third of the income distribution even after age 40. Based on Panel B and C, graduating in Health Services majors leads to more stable life cycle earning than Biology: Health Service graduates not only has lower probability of having an income in the bottom third of the income distribution, their share in the top third are almost always higher than the share of Biology graduates. As a result, we can characterize the Biology major as riskier than Health Services: because of the high earnings at the very top of the income distribution, the Biology major leads to higher average earnings, but with a higher probability of falling into the bottom part of the income distribution. We can see similar differences among graduates in English and Education majors: the average residual earnings of English graduates are higher than those of Education graduates (Panel A of Figure 1), mainly because English graduates have a higher share in the top third of the income distribution (Panel C). At the same time, a higher fraction of English graduates are in the bottom third of the income distribution.

This heterogeneity is a key feature of college major choice. All else equal, a student aiming for higher expected life cycle earnings would likely choose an English major over Education, while another student with a strong preference to avoid the bottom of the income distribution would prefer Education over English. Similarly, Health Services majors could be a better choice over Biology for students looking for a health care-related

increasing wages over the life-cycle is captured in our Mincer regression by the *age* and $age^2$ terms.

job with a well-paid and stable income profile, while Biology could be optimal for those who, besides the potentially higher debt from graduate school, could afford the higher income fluctuations and higher probability of placement at the bottom of the earning distribution to maximize their expected earnings. These preferences are likely linked to parental income and wealth, which could mitigate the effects of negative earnings outcomes; this also explains why students from low-income families are more likely to choose majors with lower income volatility (Patnaik, Wiswall, and Zafar, 2020; Hampole, 2022). In this paper, we study how these preferences toward future income profiles change as house prices, and through them, future expected expenses (*price effect*) and parental wealth (*wealth effect*) increase. As we show later in section 5, rising house prices change students' preferences toward majors providing more stable income profiles (higher average residual earnings, lower probability of reaching the bottom, and higher probability of reaching the top third of the income distribution) only in the case of a lower likelihood of parental homeownership.

## 4. Empirical methodology and the housing boom instrument

In this section, we describe the empirical methodology we use to establish the causal effect of increases in house prices on college major choices. Using an instrumental variable framework, we study how the housing price boom preceding the 2008 financial crisis influenced the college major choices of first-year students. Our empirical approach builds on the consensus of the housing literature, which concludes that house price changes among metropolitan areas (MSAs) between 2000 and 2006 were driven by speculative forces rather than fundamental economic changes (e.g., Shiller, 2007; Burnside, Eichenbaum, and Rebelo, 2016; Charles, Hurst, and Notowidigdo, 2018).

We use structural breaks in home price increases created by housing bubbles to instrument for increases in house prices, following Charles, Hurst, and Notowidigdo (2018). These structural breaks would be valid instruments if they were unrelated to the economic forces influencing freshmen students' college major choices. We assess the validity of such an instrument through a battery of tests below.

We define our instrument at the three-digit zip code (ZIP3) level, rather than at the MSA level (as in Charles, Hurst, and Notowidigdo (2018)), which has two advantages. First, there are more than three times as many ZIP3 areas (878) as MSAs (256) in our sample, which yields greater variation in house price increases. Second, by using a ZIP3-level instrument, our data also include rural areas outside MSAs. This allows us to draw more generalizable

conclusions about the relationship between house price increases and college major choice, as we do not need to limit our findings to students residing in urban areas.

### 4.1. Methodology

We measure the house price change in a ZIP3 area $c$ with $\Delta P_c$, which is the difference between the 2006 and 2000 log annual FHFA house price index. To obtain more easily interpretable results, we standardize $\Delta P_c$ using the population-weighted mean and standard deviation of ZIP3-level home price changes; we denote the standardized house price increase as $\widehat{\Delta P_c}$. We test the connection between $Y_{i,c,t}$, the characteristic of the chosen major of student $i$ from ZIP3 area $c$ at period $t$, and the standardized house price increase $\widehat{\Delta P_c}$ in the following difference-in-difference framework:

$$(2) \qquad Y_{i,c,t} = \alpha + \beta_1 \mathbf{1}(t = post) + \beta_2 \widehat{\Delta P_c} + \eta \mathbf{1}(t = post) \times \widehat{\Delta P_c} + \Gamma_1 \mathbf{X}_{i,t} + \Gamma_2 \mathbf{X}_{c,2000} + \varepsilon_{i,c,t}$$

in which the vectors of $\mathbf{X}_{i,t}$ and $\mathbf{X}_{c,2000}$ represent controls for individual and ZIP3-level characteristics. Individual controls include indicators for gender, high-school GPA, college selectivity, and parental educational attainment. The vector of ZIP3-level controls includes the log of population, the share of college-educated adults aged 25-64, the share of foreign-born residents, and the share of women in the labor force, all measured in 2000. Our regressions are weighted using TFS's student weights, and we cluster robust standard errors at the ZIP3 level. The main variable of our interest is $\eta$, which represents a one-standard-deviation increase in ZIP3-level house prices affects different characteristics of the chosen college major.

We also implement a second strategy to unpack the overall effects of a sharp increase in house prices. In section 2, we discussed how the effects of a sharp housing price increase could differ by whether students families actually owned homes or not. Unlike Lovenheim (2011) and Lovenheim and Reynolds (2013), our main dataset provides limited information on students' families' economic conditions and lacks data on parental homeownership. Given this data limitation, we proxy parental homeownership with the homeownership rate of students' five-digit ZIP codes (ZIP5). This approximation assumes that students' parents are more likely to be homeowners in areas with high rates of homeownership than in those with low rates. We then quantify whether our baseline results differ across zip codes with low and high homeownership rates, which proxy for how parental homeownership affects major choices in the face of rising house prices. We test the statistical significance of differences in the estimated effects between low and high homeownership areas in the

following triple-difference specification:

$$
\begin{aligned}
Y_{i,c,t,z} = \alpha &+ \beta_1 \, \mathbf{1}(t = \textit{post}) + \beta_2 \, \widehat{\Delta P_c} + \beta_3 \, HH_z \\
&+ \kappa_1 \, \mathbf{1}(t = \textit{post}) \times \widehat{\Delta P_c} + \kappa_2 \, \mathbf{1}(t = \textit{post}) \times HH_z + \kappa_3 \, \widehat{\Delta P_c} \times HH_z \\
&+ \mu \, \mathbf{1}(t = \textit{post}) \times \widehat{\Delta P_c} \times HH_z \\
&+ \Gamma_1 \, \mathbf{X}_i + \Gamma_2 \, \mathbf{X}_{c,2000} + \varepsilon_{i,c,t,z}
\end{aligned} \tag{3}
$$

in which $z$ represents the zip code of student $i$'s permanent address, $HH_{i,z}$ is a dummy variable indicating high-homeownership zip codes, while the vectors of $\mathbf{X}_i$ and $\mathbf{X}_{c,2000}$ contain the same set of controls as our diff-in-diff model. In our analysis, $HH_z$ equals 1 if a student's ZIP5 code is among the top 25% of ZIP5 codes by homeownership rate, and 0 if it is in the bottom 25% of ZIP5 codes.[11] In this way, we compare the effect of house price increases on students with the lowest and highest likelihood of parental homeownership. The primary variable of interest in the triple-diff specification is $\mu$, which indicates how a one-standard-deviation increase in ZIP3-level house prices affects the college major choice among students residing in high-homeownership ZIP5 codes compared to those living in low-homeownership zip codes. Table A2 in the appendix summarizes how student characteristics differ among freshmen living in low and high-homeownership areas. On average, students living in low-homeownership areas are less likely to be White, have lower family income, and, in line with Patnaik, Wiswall, and Zafar (2020) and Imberman et al. (2026), choose college majors with higher life-cycle earning profile.

### 4.2. Housing bubble instrument

We follow Charles, Hurst, and Notowidigdo (2018) and instrument our standardized ZIP3-level house price increase variable $\widehat{\Delta P_c}$ with the magnitude of the structural break in ZIP3-level house prices. We interpret these structural breaks as housing bubbles, and our identification strategy builds on the assumption that the magnitude of these bubbles across ZIP3s was unrelated to changes in fundamentals that determine house prices. Our assumption is supported by the housing literature, which finds that speculative motivation was the primary driver of house price increases (Shiller, 2007; Burnside, Eichenbaum, and Rebelo, 2016; Charles, Hurst, and Notowidigdo, 2018).

[11] The housing unit-weighted cutoffs of the bottom and top 25% of zip codes by homeownership rate are 57.4% and 78.9%; Table A2 shows that the average homeownership rates in these areas are 42.6% and 85.8%, respectively.

FIGURE 2. Validity of housing break instrument: Correlation with house price change


Note: Each dot depicts a ZIP3 area; the vertical axis represents the increase in log house price index between 2000 and 2006.

We quantify the structural break parameter $\lambda_c$ of each ZIP3 area by estimating the following regression using quarterly house price index data between 2000:I and 2005:IV:

$$P_c(t) = \omega_c + \tau_c\, t + \lambda_c\, (t - t_c^*)\, 1\{t > t_c^*\} \tag{4}$$

where $P_c(t)$ is the log of the quarterly FHFA house price index at ZIP3 area $c$. Variable $t_c^*$ is the assumed quarter in which the structural break took place at ZIP3 area $c$, while $t$ and $(t - t_c^*)$ are ZIP3-specific linear time trends before and after the structural break. To have sufficient observations before and after the structural break, we assume that the structural break occurred between 2001:I and 2005:I. We estimate the above regression with OLS for each ZIP3 separately across different structural break times $t^*$, and select the specification that maximizes the model's fit to the data, measured by $R^2$. Finally, we interpret the estimated structural break parameter $\hat{\lambda_c}$ as the magnitude of the housing bubble before the 2008 financial crisis in ZIP3 $c$, and we use it as an instrument for our standardized ZIP3-level house price increase variable $\widehat{\Delta P_c}$.

Our identification strategy requires that (1) our housing break instrument has a strong correlation with house price increases, and (2) our instrument affects college major choice only through house price change. Figure 2 depicts that there is a strong positive correlation

TABLE 2. Correlation between housing bubble instrument and changes in ZIP3-level outcome variables

| | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 |
|---|---|---|---|---|---|
| *Panel A: Change in average residualized earning (USD)* | | | | | |
| Structural break instrument (Sample: 1990s) | -1160.732 | 866.850 | 5971.136 | 10272.290 | 11815.713 |
| | (2701.676) | (3856.206) | (5408.649) | (7388.475) | (8467.025) |
| Observations | 878 | 878 | 878 | 878 | 878 |
| Structural break instrument (Sample: 2000s) | 1304.656 | 5519.715** | 13519.396*** | 19217.586*** | 21006.211*** |
| | (1978.545) | (2380.050) | (3795.769) | (5768.642) | (6735.831) |
| Observations | 879 | 879 | 879 | 879 | 879 |
| *Panel B: Change in the prob. of being in the bottom third of income dist. (pp)* | | | | | |
| Structural break instrument (Sample: 1990s) | 4.385 | 0.268 | -4.052 | -5.402 | -4.440 |
| | (3.153) | (3.938) | (4.060) | (4.388) | (4.056) |
| Observations | 878 | 878 | 878 | 878 | 878 |
| Structural break instrument (Sample: 2000s) | 1.366 | -1.945 | -5.386** | -4.929* | -2.507 |
| | (2.313) | (2.313) | (2.435) | (2.637) | (2.492) |
| Observations | 879 | 879 | 879 | 879 | 879 |
| *Panel C: Change in the prob. of being in the top third of income dist. (pp)* | | | | | |
| Structural break instrument (Sample: 1990s) | -3.220 | 2.425 | 4.924 | 6.349 | 6.340 |
| | (4.789) | (6.170) | (5.325) | (4.983) | (4.857) |
| Observations | 878 | 878 | 878 | 878 | 878 |
| Structural break instrument (Sample: 2000s) | 2.163 | 7.514* | 10.121*** | 10.026*** | 8.216** |
| | (3.523) | (3.925) | (3.405) | (3.383) | (3.317) |
| Observations | 879 | 879 | 879 | 879 | 879 |

Note: Each observation is a ZIP3 area.

between our structural break instrument $\lambda_c$ and our standardized house price increase variable $\widehat{\Delta P_c}$. Regressing our structural break instrument on house price increases yields an F-statistic exceeding 270, suggesting that the instrument is relevant. Our second assumption requires that housing bubbles did not emerge in ZIP3s in which, for unknown underlying economic reasons, students increasingly pursue higher-paying majors. We validate this assumption by examining the relationship between our structural break parameter and the change in college major choice in the early 1990s.

To analyze the existence of this pre-trend, we test whether our structural break instrument is correlated with changes in our outcome variables during the 1990s, a decade before the housing price boom. First, we restrict our TFS dataset to students entering college in waves 1989-91 or 1995-97, at institutions with observations in each year during this period. Each of these periods corresponds to a 10-year lag relative to the pre-boom (1999-2001)

and post-boom (2005-2007) periods in our main analysis. Then, using the student survey weights, we first calculate ZIP3-level averages of earnings characteristics for college majors and then their changes between the pre- and post-periods. Finally, we test the correlation with the following reduced form regression

$$\Delta\overline{Y}_c = \beta_0 + \beta_1 \lambda_c + \epsilon$$

where $\Delta\overline{Y_c}$ is the change in the ZIP3-level average of our outcome variables between the 1990's "pre-boom" and "post-boom" periods, and $\lambda_c$ is our housing bubble instrument. Finding significant $\beta_1$ coefficients would undermine the validity of our instrument, as, in theory, a persistent trend in changes in college major choice across different ZIP3 areas could have created different levels of housing bubbles.

Our reduced form estimates confirm the absence of this potential channel. As Table 2 shows, our instrument is not significantly correlated with either of our ZIP3-level aggregates, meaning that the emergence of housing bubbles was not related to long-term changes in college major choices. To strengthen this conclusion, in Table 2 we also show that our instrument is correlated with changes in college major choice between 1999-2001 and 2005-2007, the period in which the housing boom took place. As our housing bubble instrument should affect our outcome variables through changes in house prices in the 2000s, it is reassuring that we find statistically significant correlations in most of these reduced form estimations.

### 4.3. College attendance and house price increase

Finally, before presenting our findings on the relationship between house price increases and college major choices, we provide evidence that enrollment in four-year colleges did not change with rising house prices during the 2000s' housing boom. Studying house price change and college enrollment, Charles, Hurst, and Notowidigdo (2018) finds that enrollment decreased in two-year institutions, but remained unchanged in four-year colleges as house prices increased. Due to this finding, we narrow our sample down to four-year institutions to rule out any selection into college education. Stable attendance in four-year institutions at this time ensures that our findings on college major choice were driven by changing preferences toward majors, which we are interested in, rather than by changing selection into college education with unchanged preferences toward majors. We demonstrate the absence of this extensive margin response by showing that student characteristics and ZIP3-level enrollment in our HERI data do not correlate with house

price changes.

TABLE 3. Composition of student body

| | White | Female | HS GPA | First gen. | Age | Numb. of students |
|---|---|---|---|---|---|---|
| *Panel A: Change in student characteristics (Diff-in-Diff, 2SLS)* | | | | | | |
| Housing Shock x Post | -0.016*** | -0.003 | -0.002 | 0.006 | -0.011** | |
| | (0.006) | (0.004) | (0.007) | (0.004) | (0.005) | |
| CM | 0.710 | 0.535 | 3.384 | 0.203 | 18.284 | |
| Observations | 292757 | 292757 | 292757 | 292757 | 292757 | |
| *Panel B: Percent change in number of students at ZIP3-level (2SLS)* | | | | | | |
| Housing Shock | | | | | | -2.770 |
| | | | | | | (3.642) |
| Observations | | | | | | 866 |

Note: The baseline controls include the log of ZIP3 population in 2000, the share of college-educated adults between age 25-64, the share of foreign-borns, and the share of women in the labor force. The unit of observation in Panel A is students, and in Panel B is ZIP3 areas. Robust standard errors are in parentheses, clustered at the ZIP3 level in Panel A. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

We examine whether average student characteristics and the number of students at ZIP3 areas changed due to rising house prices in our TFS sample, which could imply that the house price increase changed selection into college education. Table 3 summarizes our results on student characteristics (Panel A) and the number of enrolled students at the ZIP3 Level (Panel B). Panel A shows the estimated interaction terms from our baseline Diff-in-Diff regressions (Equation 2) on different student characteristics, in which we instrumented house price changes with our structural break variable. We do not find significant point estimates on gender, high-school GPA, or first-gen status, while we find statistically significant, but economically less relevant, effects on age and race. Based on our results, students living in ZIP3-areas with a standard deviation higher house price increases tend to be slightly younger (by 0.011 years, or by 4 days) and 1.6 p.p. less likely to be White. Based on our results, the average freshmen characteristics in our sample remain stable despite large differences in house price changes, suggesting that house price increases did not affect selection into 4-year college education, conditional on our ZIP3-level controls.

In addition to the unchanged student characteristics, Panel B of Table 3 provides a direct test of whether the housing increases differentially changed enrollment in 4-year colleges in our TFS survey data. We examine whether ZIP3-level growth in freshmen enrollment is correlated with house price changes by regressing the percent growth in

the number of students in each ZIP area on house price changes (instrumented with the housing bubble instrument) and ZIP3-level controls. Our estimation results indicate no significant relationship between changes in house prices and freshmen enrollment in 4-year colleges at the ZIP3-level.

In summary, our empirical findings on the relationship between house price changes and college major choice are unlikely to be biased by changes in selection into college. We do not find a systematic relationship between changes in house prices and enrollment in 4-year colleges. Furthermore, to ensure our results are not biased by selection into 4-year colleges, we narrow our sample to first-year students entering four-year colleges, whose enrollment was unaffected by house price increases, as reported in Charles, Hurst, and Notowidigdo (2018).

# 5. Results

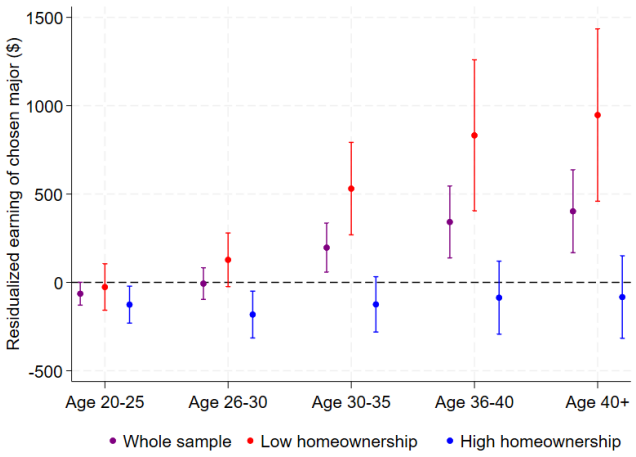
In this section, we present our results on how experiencing a house price increase affects college major choices, and the expected earnings profiles of first-year students. In the main text, we focus on the point estimate and its 95% confidence interval of the interaction terms of our difference-in-difference specification ($\eta$ in Equation 2). The appendix contains all of our difference-in-difference and triple-difference estimation results in table format, as well as our estimated impacts on the probability of enrolling in each major category. First, we present our estimated treatment effect on all freshmen. We then describe the heterogeneity of our results by race and gender.

## 5.1. Impact of house price increases on all freshmen

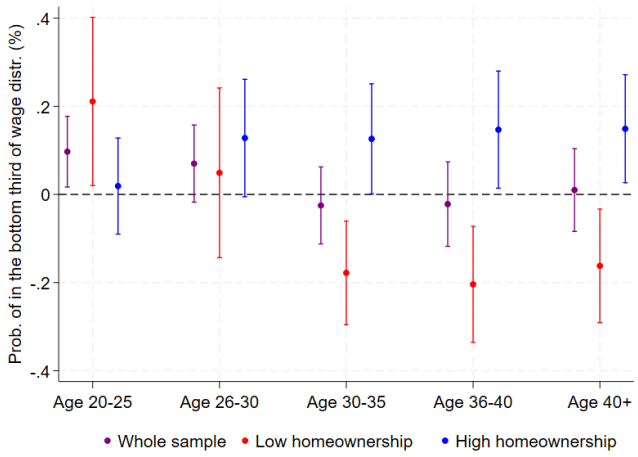
Figure 3 presents how a standard deviation increase in ZIP3-level house prices affected future earning profiles (described in subsection 3.2) of freshmen through their changing college major choice. Panel A shows how changes in enrollment across majors affected average residualized earnings by age bins. Similarly, Panels B and C present how enrolling in a different major changes the expected probability of being in the bottom or top third of the age-specific wage distribution, respectively. To gain further insight into how parental homeownership (or higher socioeconomic status and parental wealth) influences our treatment effect, we present our estimation results for the whole sample (purple bars) and for students living in low- and high-homeownership areas (red and blue bars, respectively).

FIGURE 3. Estimated effect of home price increase

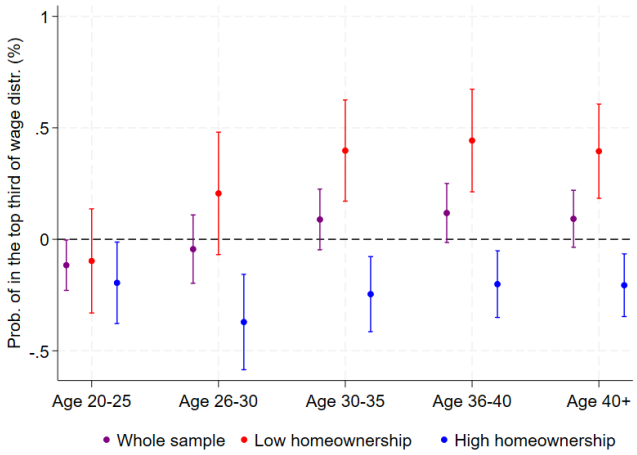
A. Average residualized earning




B. Fraction of graduates in the bottom third of wage dist.




C. Fraction of graduates in the top third of wage dist.




*Notes:* The graph depicts the estimated interaction term ($\mu$) and its 95% confidence interval from our Diff-in-Diff specification (Equation 2). ZIP3-level controls include the log of population, the share of college-educated adults aged 25-64, the share of foreign-born, and the share of women in the labor force, all measured in 2000. Individual controls include indicators for gender, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are clustered at the ZIP3 level.

As shown in the purple bars in Panel A, experiencing a larger house price increase motivated students to enroll in majors that, on average, provided slightly less income under age 26, but higher earnings over age 30. We find that a one-standard-deviation increase in ZIP3-level house prices raised the average residual earnings by $197 (age 31-35), $342 (age 36-40), and $402 (over age 40). Compared to the pre-boom averages, these estimates represent an increase of 24.3% (age 31-35), 27.4% (age 36-40), and 26.7% (over age 40); see Table A3 for more details. Meanwhile, Panels B and C of Figure 3 show that experiencing a larger house price increase did not affect the probability of landing in the bottom or top of

the wage distribution through changing college major choice.

Meanwhile, estimates by our proxy of parental homeownership (the red and blue bars) in Figure 3 show that the aggregate estimates mask considerable heterogeneity. We find a substantially larger treatment effects on students' expected future earnings in low-homeownership areas. Due to their changing major choice enrollment, their average residualized earnings increased by $531 (or 61.6%) between age 31-35, $832 (or 62.4%) between age 36-40, and 945$ (or 62.2%) over age 40. These students' changing college major choice also reduced their probability of having a job in the bottom third and increased their probability of having one in the top third of the income distribution after age 30 (Panels B and C). Our estimates also indicate that increases in house prices reduce students' average residual earnings in high-homeownership areas, although these effects are not significant over the life cycle. Students from high-homeownership areas are also more likely to enroll in majors with a slightly higher probability of landing in the bottom third and a lower probability of landing in the top third of the income distribution.

Overall, we find that students living in low- and high-homeownership areas behave quite differently when house prices increase. Consistent with our expectations, as detailed in section 2, our empirical results show that students from low-homeownership areas select higher-paying majors when house prices rapidly increase. In contrast, students living in high-homeownership areas tend to choose majors that are more likely to place them at the bottom of the wage distribution and less likely to put them at the top. As highlighted in section 2, students living in high-homeownership areas are more likely to live in a home owned by their parents, and, for them, rising house prices could theoretically provide a hedge against uncertain future income by increasing parental wealth. In other words, rising home prices could allow some of these students to pursue careers with lower earnings but potentially better non-pecuniary characteristics. In contrast, because of their lower level of parental homeownership, house price increases do not provide this hedge for the majority of students living in low-homeownership areas. For them, rising house prices only increase their expected future expenses, which, consistent with our empirical findings, should motivate them to switch to higher-paying majors.

### 5.2. Heterogeneity by race and gender

We now examine how the effect of a home price increase on major choice varies by race and gender. We quantify these effects by restricting our sample to the subpopulation of interest.

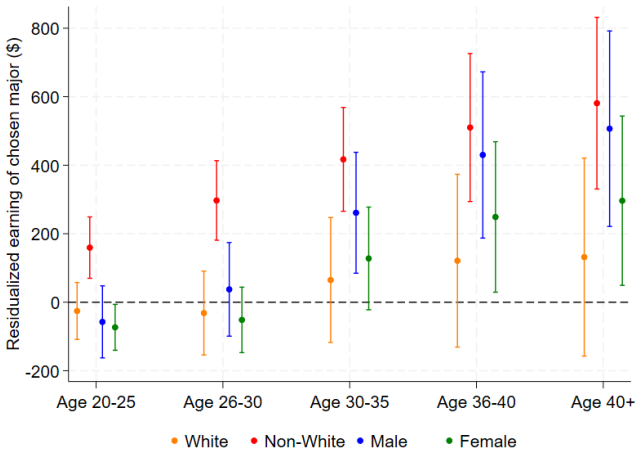
For our heterogeneity analysis by race, we divide the sample into White and non-White students. The 2001 wave of the Survey of Consumer Finances reveals that, compared to White households, non-White households have a lower homeownership rate (75.1% vs. 47.0%), a lower average income ($97,518 vs. $54,350), and a lower median wealth ($163,801 vs. $23,303). These differences suggest that non-White students are less likely to live in households with parental homeownership. Based on our discussion in section 2, in the case of rising house prices, we expect to see a shift toward higher-paying majors among non-White students, but not necessarily among White students. Instead of using the overall homeownership rate, we define low- and high-homeownership areas based on the homeownership rates of White and non-White families in each ZIP5 code in these regressions.

**All ZIP5s**

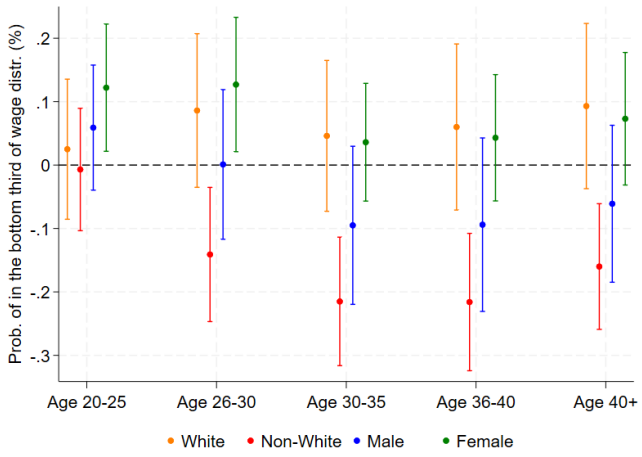
First, we present our heterogeneity results without conditioning on the ZIP5-level homeownership rate; later, we narrow our sample to students living in low- and high-homeownership areas. As Figure 4 shows, we find substantial heterogeneity in the treatment effect by race. Based on our results, White students' future earnings profile did not change due to changes in college major enrollment if house prices increased faster, as the estimated treatment effect across all three outcome variables is not statistically different from zero. Meanwhile, in line with our expectations, the same shock motivated non-White students to switch to majors that provide higher lifetime earnings and reduce their probability of employment in the bottom third and increase their probability of employment in the top third of wage earners. Table A9, which presents our estimated treatment effect on enrolling in a given major in the case of experiencing a one-standard-deviation higher house price increase, shows that the majority of this change is due to the increased enrollment in Engineering, and reduced enrollment in two majors, Education and Fine Arts. Our results suggest that, as an unexpected consequence, the housing boom preceding the Great Recession induced changes in major choice that may have implied a lower earnings gap between White and non-White students (assuming that students graduated with these majors and that the future earnings we estimate for each major holds throughout their labor market careers).

FIGURE 4. Estimated effect by race and gender - All students

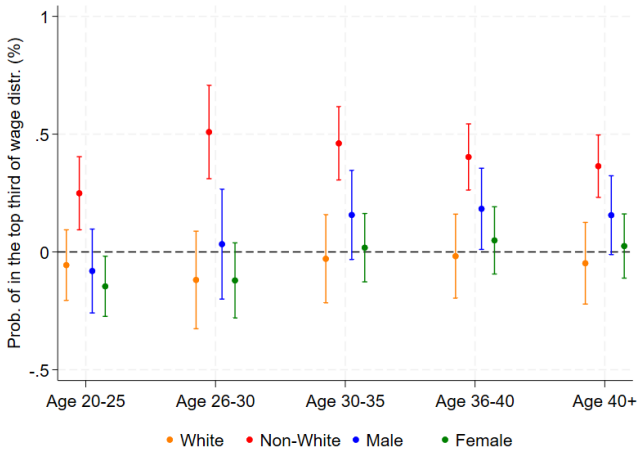
A. Average residualized earning




B. Fraction of graduates in the bottom third of wage dist.




C. Fraction of graduates in the top third of wage dist.



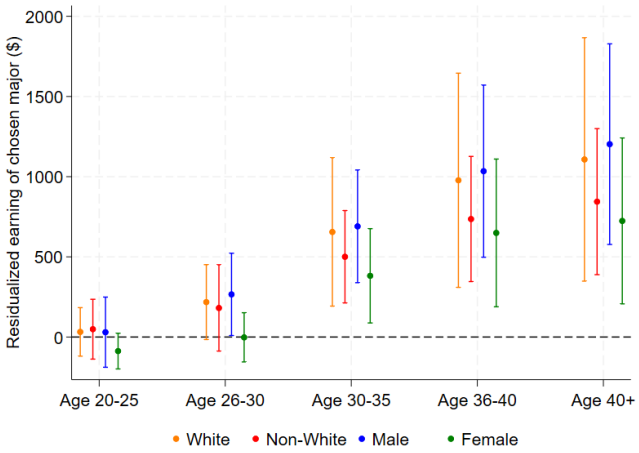

*Notes:* The graph depicts the estimated interaction term ($\mu$) and its 95% confidence interval from our Diff-in-Diff specification (Equation 2). ZIP3-level controls include the log of population, the share of college-educated adults aged 25-64, the share of foreign-born, and the share of women in the labor force, all measured in 2000. Individual controls include indicators for gender, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are clustered at the ZIP3 level.

Compared with the treatment differences between White and non-White students, we find substantially lower, and in most cases, statistically not significant differences between Female and Male students. Figure 4 indicates that both Female and Male students switch to better-paying careers (Panel A) that provide a higher probability of reaching the top third of the income distribution (Panel C) in the case of experiencing a higher house price increase. Panel B presents the only notable difference in treatment effect by gender: the point estimates indicate that Male students switch to majors that reduce, while Female students change to majors that slightly increase the probability of having a wage in the

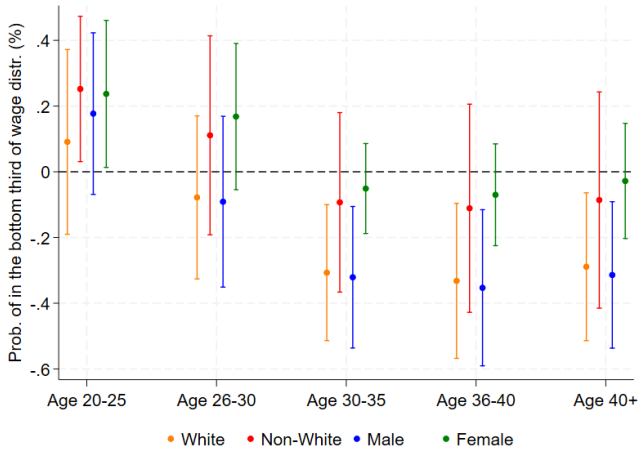
bottom third of the income distribution; however, neither of these point estimates is statistically different from zero.

FIGURE 5. Estimated effect by race and gender - Students from low-homeownership ZIP5s

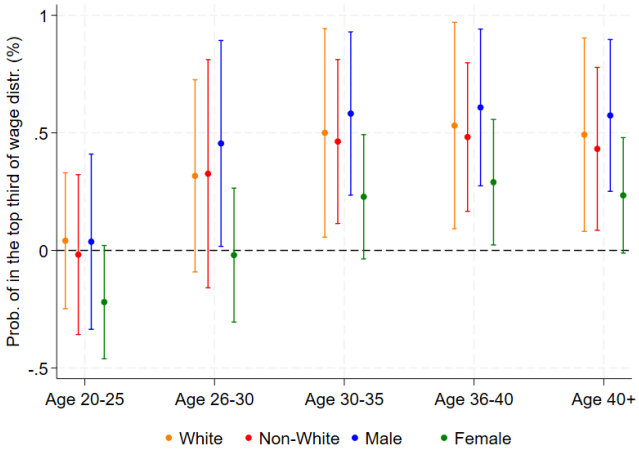
A. Average residualized earning




B. Fraction of graduates in the bottom third of wage dist.




C. Fraction of graduates in the top third of wage dist.




*Notes:* The graph depicts the estimated interaction term (μ) and its 95% confidence interval from our Diff-in-Diff specification (Equation 2). The sample consists of only freshmen living in the bottom quarter of ZIP5s by homeownership rate. ZIP3-level controls include the log of population, the share of college-educated adults aged 25-64, the share of foreign-born, and the share of women in the labor force, all measured in 2000. Individual controls include indicators for gender, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are clustered at the ZIP3 level.

## Low and high-homeownership ZIP5s

We now focus on students living in the bottom or top 25% of ZIP5s by homeownership rate and narrow our sample to these areas in two separate estimations. This distinction

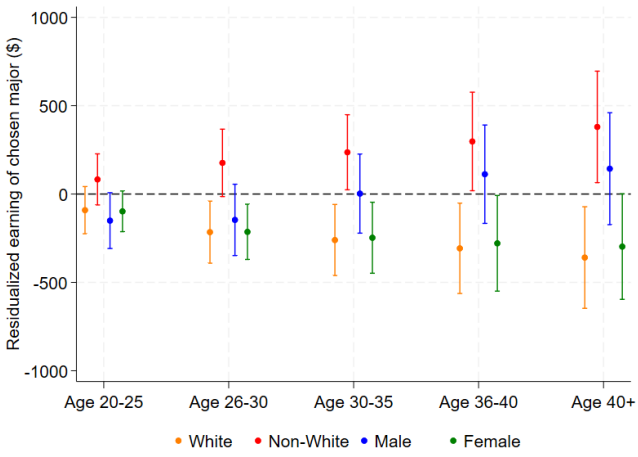
helps us determine whether the racial and gender differences we previously presented are associated with the likelihood of parental homeownership.

Figure 5 shows that, regardless of race or gender, students living in low-homeownership areas react to house price increases in a very similar way. Panel A indicates that there are no racial or gender differences in the change in future earnings profiles, as students shift to higher-paying careers as house prices increase. Panels B and C present point estimates that are quite similar for White and non-White students; these panels also show gender differences similar to those we noted previously in Figure 4. While, in most cases, the difference between Female and Male students' point estimates is not statistically significantly different from zero in Figure 5, compared to Female students, Male students' changing college enrollment yields higher average earnings (Panel A), and a greater probability of avoiding the bottom and reaching the top third of the wage distribution. Despite these differences, the point estimates suggest that all students living in low-homeownership areas switch to higher-paying college majors in response to larger increases in house prices.

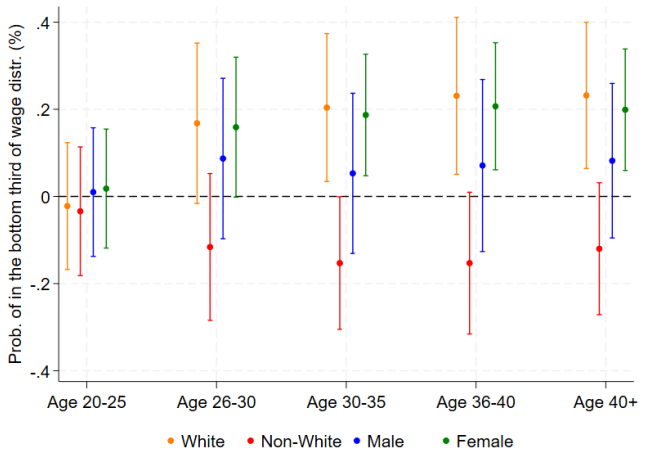
Figure 6 shows that this uniform behavior is not present among students with a higher probability of parental homeownership. We find substantial heterogeneity by race and, to a lesser extent, by gender among students living in high-homeownership areas. In the case of a larger increase in house prices, non-White students enroll in majors that yield higher earnings after age 30, leading to jobs that are less likely in the bottom third and more likely in the top third of the wage distribution. Given similar responses among non-White students living in low-homeownership areas, the potential hedge of parental housing wealth appears to play a smaller role in non-White students' college major choices.

FIGURE 6. Estimated effect by race and gender - Students from high-homeownership ZIP5s

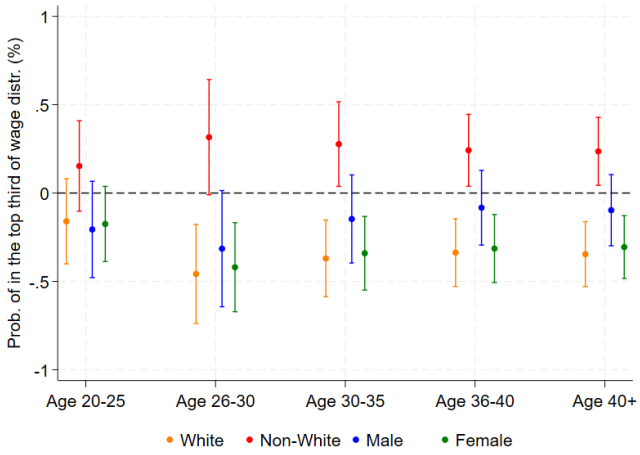
A. Average residualized earning




B. Fraction of graduates in the bottom third of wage dist.




C. Fraction of graduates in the top third of wage dist.




*Notes:* The graph depicts the estimated interaction term (μ) and its 95% confidence interval from our Diff-in-Diff specification (Equation 2). The sample consists of only freshmen living in the top quarter of ZIP5s by homeownership rate. ZIP3-level controls include the log of population, the share of college-educated adults aged 25-64, the share of foreign-born, and the share of women in the labor force, all measured in 2000. Individual controls include indicators for gender, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are clustered at the ZIP3 level.

Meanwhile, experiencing the same shock, an average White student is more likely to enroll in a major that leads to the exact opposite future earnings trajectory. We find that, in response to rising house prices, White students are more likely to enter majors that pay less over their lifetimes, with a higher probability of getting into the bottom and a lower probability of reaching the top third of the wage distribution. Table A10 shows that most of this change could be explained by the increased enrollment in the Education and decreased enrollment in Medical and Health Services and Sciences majors. In subsection 3.2, we show

that while graduates in Health Services majors earn higher-than-average earnings over the entire lifecycle, Education graduates earn below-average wages. Given these differences in lifetime income, the observed change in college major enrollment might be explained by compensating differentials, assuming that the Education major provides better non-pecuniary amenities (e.g., shorter work shifts and more flexible work arrangements). In this way, rising house prices, through increased parental housing wealth, could have enabled White students to switch to lower-paying majors with better amenities.

We find smaller differences in their response between Female and Male students in high-homeownership areas. Our point estimates suggest that, in response to rising housing prices, Female students in these ZIP5 codes enroll in lower-paying majors, whereas male students enroll in higher-paying ones. Also, while both Female and Male students enrolled in majors leading to jobs that were more likely in the bottom third and less likely in the top third of the wage distribution, the magnitude of these changes was more modest among Male students. Given these small magnitudes, our point estimates for Male students are not statistically different from zero, whereas we find significant effects among Female students. These gender differences in college major choice might be explained by known gender differences in preferences for work amenities (Patnaik, Wiswall, and Zafar, 2020). Rising house prices, and through them, rising parental housing wealth, could have allowed students living in these ZIP5 codes to choose majors that lead to lower-paying jobs with more workplace amenities, which Female students have a higher valuation for (Campos et al., 2026). This motivation could explain why switching from Health Services to Education was especially prevalent among Female, but not among Male students.

Overall, we find stark differences in college major choice between students living in low- and high-homeownership areas, underscoring the importance of parental resources in this decision. Students living in high-homeownership areas are more likely to live in homes owned by their parents and, as we presented earlier, to live in higher-income families. In the case of a house price increase, we find evidence that they switch to majors that lead to lower lifetime earnings but likely more satisfying workplace amenities. One possible explanation for this behavior is that parental wealth hedges against future negative income shocks or expenses, and that this hedging ability increases with home prices when parents are homeowners. This explanation could account for the observed increases in Education and decreases in Health Services enrollment among White students, but not among non-White students, whose parents are less wealthy and less likely to own a home.

# 6. Conclusion

This paper provides novel evidence on the causal impact of unexpected increases in house prices on children's college major choices. We do this by combining spatial variation in housing demand growth during the housing boom in the 2000s with a large survey of first-year US undergraduate students. Following prior work, our identification strategy takes advantage of the speculative nature of the housing boom—we instrument for house price growth in an area with the size of the structural break in house prices in that area (Charles, Hurst, and Notowidigdo, 2018). We limit our analysis sample to students entering four-year colleges. This is to limit any potential compositional changes in the set of students entering college—we do not find evidence that the housing boom affected enrolment at four-year colleges.

We find that an unexpected increase in house prices in parents' three-digit zip codes induces their children to choose majors associated with higher annual earnings, but that this effect varies by the likelihood that a students' parents own a home. We find that students whose parents likely own a home are induced to choose majors with lower career earnings and potentially better amenities. Meanwhile, students whose parents are unlikely to own a home are induced to choose majors with greater career earnings. These patterns are consistent with an unexpected house price increase yielding a more generous parental safety net for children of homeowners while generating a sharp increase in the expected future cost of living for children of non-homeowners.

While we find that changes in parental resources affect the types of majors that children choose, our results only speak to the majors that students choose when they enter college. Our results do not tell us if the changes in major choice we find persist until the end of college and into the labor market. Fruitful next steps might involve implementing similar strategies as we do using large-scale survey or administrative data that capture the majors that students graduate with, as well as their occupations and earnings during their careers. Such a data infrastructure would help understand whether the changes in labor market trajectories implied by our estimated effects on first-year major choice are actually realized and the implications for occupational sorting in the labor market.

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# Appendix

## TABLE A1. Earning potential and income volatility of majors

| | | Average residualized earning (USD) | | | | | Prob. of being in the bottom third of income dist. (pp) | | | | | Prob. of being in the top third of income dist. (pp) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 |
| Agriculture | 66,671 | -2,521 | -5,004 | -10,229 | -15,936 | -18,374 | 33.368 | 36.520 | 40.932 | 43.281 | 44.268 | 28.855 | 26.019 | 24.276 | 22.895 | 22.828 |
| Architecture | 41,609 | -2,583 | -3,048 | -9,322 | -12,012 | -11,160 | 38.484 | 32.850 | 36.575 | 38.047 | 39.608 | 30.000 | 31.000 | 26.163 | 27.210 | 28.377 |
| Area Ethnic and Civilization Studies | 19,778 | -3,603 | -3,881 | -1,624 | 855 | 3,936 | 36.156 | 39.320 | 35.447 | 34.629 | 36.188 | 27.326 | 27.314 | 31.098 | 33.168 | 33.905 |
| Biology and Life Sciences | 288,813 | -7,279 | -3,116 | 13,593 | 26,969 | 31,333 | 46.030 | 39.110 | 29.682 | 28.306 | 28.330 | 19.515 | 29.212 | 39.035 | 43.733 | 43.961 |
| Business | 1,175,501 | 4,426 | 4,751 | 3,988 | 3,437 | 2,920 | 26.012 | 27.775 | 30.794 | 32.036 | 32.913 | 42.831 | 38.679 | 36.493 | 35.305 | 33.970 |
| Communications | 252,385 | -380 | -1,511 | -4,106 | -6,339 | -9,157 | 29.138 | 32.090 | 35.619 | 39.011 | 39.359 | 33.201 | 30.673 | 30.653 | 29.632 | 27.608 |
| Computer and Information Sciences | 196,330 | 9,685 | 9,258 | 7,561 | 5,863 | 3,852 | 31.704 | 29.468 | 28.447 | 27.737 | 28.342 | 44.949 | 47.074 | 42.974 | 40.873 | 40.209 |
| Criminal Justice and Fire Protection | 105,135 | -1,321 | -3,529 | -8,204 | -12,739 | -17,485 | 30.053 | 31.156 | 33.819 | 33.022 | 37.002 | 30.626 | 26.165 | 24.877 | 24.635 | 24.025 |
| Education Administration and Teaching | 594,840 | -1,260 | -6,606 | -12,728 | -15,321 | -15,381 | 27.552 | 29.848 | 34.447 | 33.788 | 30.921 | 32.909 | 19.507 | 17.909 | 20.044 | 23.364 |
| Engineering | 434,206 | 8,798 | 12,586 | 13,243 | 14,437 | 15,965 | 29.296 | 25.160 | 23.661 | 23.510 | 26.808 | 47.593 | 55.800 | 50.292 | 46.434 | 44.654 |
| Engineering Technologies | 43,939 | 2,968 | 3,476 | -1,663 | -5,135 | -11,295 | 32.531 | 30.135 | 30.029 | 30.977 | 36.039 | 39.533 | 43.202 | 34.947 | 31.901 | 27.761 |
| English Lang Lit and Comp | 171,946 | -4,673 | -7,408 | -8,132 | -7,471 | -6,003 | 38.361 | 41.707 | 40.090 | 39.679 | 38.149 | 23.511 | 22.797 | 25.595 | 27.872 | 28.812 |
| Environment and Natural Resources | 40,845 | -3,463 | -8,037 | -12,372 | -14,057 | -16,347 | 35.016 | 40.057 | 40.615 | 40.814 | 40.249 | 25.088 | 20.717 | 21.345 | 23.115 | 23.887 |
| Family and Consumer Sciences | 48,016 | -3,633 | -7,298 | -12,755 | -14,155 | -13,847 | 31.906 | 36.417 | 40.495 | 39.107 | 34.242 | 25.195 | 21.283 | 20.764 | 22.124 | 23.607 |
| Fine Arts | 244,028 | -5,216 | -10,736 | -15,989 | -20,501 | -23,565 | 40.312 | 46.718 | 47.799 | 49.063 | 48.092 | 22.678 | 19.067 | 19.389 | 19.468 | 19.166 |
| History | 111,890 | -4,929 | -5,504 | -3,479 | -807 | -732 | 40.818 | 41.759 | 38.950 | 38.719 | 40.079 | 23.669 | 23.826 | 27.000 | 29.279 | 29.839 |
| Interdisc and Multi-Disc Studies | 53,207 | -3,242 | -3,961 | -2,738 | -2,038 | -3,697 | 36.432 | 36.776 | 35.105 | 32.876 | 33.102 | 26.075 | 27.436 | 30.388 | 31.204 | 29.948 |
| Law | 9,964 | -2,683 | -2,430 | 513 | 2,099 | -6,291 | 38.592 | 33.608 | 30.083 | 28.937 | 34.246 | 28.980 | 28.332 | 31.365 | 32.303 | 29.395 |
| Liberal Arts and Humanities | 77,637 | -4,537 | -9,586 | -11,908 | -13,794 | -12,079 | 38.029 | 43.934 | 43.470 | 42.080 | 39.149 | 24.633 | 20.543 | 22.785 | 24.429 | 26.862 |
| Linguistics and Foreign Languages | 57,353 | -4,930 | -7,250 | -6,605 | -6,228 | -6,475 | 38.847 | 42.425 | 40.549 | 39.315 | 37.284 | 23.847 | 24.460 | 27.356 | 28.623 | 29.214 |
| Mathematics and Statistics | 76,063 | 2,763 | 5,642 | 7,708 | 9,677 | 11,096 | 33.055 | 33.319 | 31.354 | 30.670 | 30.080 | 35.889 | 38.105 | 38.589 | 39.579 | 40.255 |
| Medical and Health Sciences and Services | 413,111 | 2,484 | 6,245 | 5,082 | 5,924 | 8,844 | 30.165 | 24.775 | 24.630 | 22.779 | 21.078 | 39.249 | 45.668 | 41.804 | 41.964 | 44.730 |
| Philosophy and Religious Studies | 38,567 | -6,593 | -8,105 | -9,740 | -7,705 | -11,101 | 46.330 | 49.961 | 46.860 | 46.709 | 47.051 | 20.019 | 21.451 | 22.759 | 25.194 | 24.647 |
| Physical Fitness and Leisure | 60,741 | -6,824 | -6,041 | -8,931 | -13,368 | -17,505 | 42.782 | 38.093 | 39.165 | 40.445 | 41.347 | 18.989 | 23.947 | 24.092 | 22.048 | 21.682 |
| Physical Sciences | 159,678 | -3,013 | -2,788 | 2,817 | 7,716 | 15,041 | 38.625 | 39.010 | 33.907 | 31.433 | 30.737 | 27.275 | 29.985 | 35.570 | 37.947 | 40.196 |
| Psychology | 285,351 | -4,148 | -5,725 | -5,256 | -5,926 | -7,580 | 35.180 | 36.657 | 34.384 | 34.235 | 35.852 | 23.608 | 24.477 | 28.468 | 29.690 | 28.543 |
| Public Affairs Policy and Social Work | 77,946 | -2,514 | -4,666 | -7,875 | -11,039 | -11,439 | 30.418 | 31.648 | 31.195 | 31.255 | 30.160 | 28.168 | 22.337 | 23.751 | 22.977 | 25.608 |
| Social Sciences | 418,911 | 119 | 2,647 | 7,415 | 9,359 | 8,711 | 34.084 | 33.691 | 32.441 | 33.288 | 35.123 | 32.570 | 34.372 | 36.976 | 36.818 | 35.130 |
| Theology and Religious Vocations | 34,663 | -7,389 | -16,993 | -27,662 | -35,959 | -39,514 | 40.896 | 55.559 | 63.192 | 65.129 | 59.603 | 16.884 | 9.742 | 8.697 | 9.455 | 9.852 |
| Vocational | 33,270 | 4,717 | 582 | -4,412 | -8,832 | -8,901 | 26.571 | 30.139 | 35.044 | 37.075 | 39.735 | 41.879 | 35.988 | 31.785 | 28.827 | 28.836 |

Source: Own calculation, based on ACS.

## TABLE A2. Student characteristics in low and high homeownership ZIP5 areas

| Variable | Low homeownership ZIP5 | High homeownership ZIP5 | Difference (High-Low) |
|---|---|---|---|
| Homeownership rate (zip code) | 0.430 | 0.857 | 0.427*** |
| | (0.131) | (0.046) | (0.011) |
| HH Income: bottom 35pct | 0.445 | 0.248 | -0.198*** |
| | (0.497) | (0.432) | (0.020) |
| HH Income: 36-89th pct | 0.381 | 0.530 | 0.149*** |
| | (0.486) | (0.499) | (0.015) |
| HH Income: top 10pct | 0.085 | 0.132 | 0.047*** |
| | (0.279) | (0.338) | (0.008) |
| Female | 0.574 | 0.543 | -0.031*** |
| | (0.495) | (0.498) | (0.006) |
| Asian (pct of freshmen) | 0.125 | 0.053 | -0.073*** |
| | (0.331) | (0.223) | (0.013) |
| Black (pct of freshmen) | 0.173 | 0.044 | -0.130*** |
| | (0.379) | (0.204) | (0.018) |
| Hispanic (pct of freshmen) | 0.131 | 0.022 | -0.109*** |
| | (0.338) | (0.148) | (0.027) |
| White (pct of freshmen) | 0.477 | 0.831 | 0.353*** |
| | (0.499) | (0.375) | (0.030) |
| Resid. income: below age 26 (USD) | 616.867 | 576.174 | -40.693 |
| | (5,190.328) | (5,065.964) | (73.347) |
| Resid. income: age 26-30 (USD) | 706.230 | 541.903 | -164.328 |
| | (6,899.807) | (6,946.701) | (107.951) |
| Resid. income: age 31-35 (USD) | 967.644 | 552.627 | -415.017*** |
| | (9,288.767) | (9,459.824) | (148.727) |
| Resid. income: age 36-40 (USD) | 1,479.260 | 918.763 | -560.497*** |
| | (12,693.907) | (12,807.076) | (190.855) |
| Resid. income: over age 40 (USD) | 1,696.894 | 1,165.430 | -531.464** |
| | (14,487.662) | (14,594.528) | (212.339) |
| Share with bottom third earning: below age 26 (pct) | 32.811 | 32.585 | -0.225*** |
| | (6.152) | (6.115) | (0.070) |
| Share with bottom third earning: age 26-30 (pct) | 32.443 | 32.379 | -0.064 |
| | (6.674) | (6.714) | (0.091) |
| Share with bottom third earning: age 31-35 (pct) | 32.244 | 32.398 | 0.154 |
| | (6.393) | (6.513) | (0.097) |
| Share with bottom third earning: age 36-40 (pct) | 32.238 | 32.427 | 0.189* |
| | (7.054) | (7.182) | (0.109) |
| Share with bottom third earning: over age 40 (pct) | 32.445 | 32.559 | 0.114 |
| | (6.896) | (6.982) | (0.104) |
| Share with top third earning: below age 26 (pct) | 34.073 | 34.137 | 0.064 |
| | (9.320) | (9.189) | (0.120) |
| Share with bottom third earning: age 26-30 (pct) | 34.342 | 34.033 | -0.308* |
| | (11.206) | (11.371) | (0.186) |
| Share with bottom third earning: age 31-35 (pct) | 34.096 | 33.684 | -0.412** |
| | (9.360) | (9.647) | (0.163) |
| Share with bottom third earning: age 36-40 (pct) | 34.191 | 33.767 | -0.424*** |
| | (8.648) | (8.888) | (0.150) |
| Share with bottom third earning: over age 40 (pct) | 34.222 | 33.875 | -0.347** |
| | (8.450) | (8.598) | (0.141) |
| Observations | 83,150 | 179,742 | 262,892 |

Note: Own calculation based on the TFS and ACS. Standard errors in parentheses are clustered at the ZIP3-level.

## TABLE A3. Effect of the 2000s housing boom on major choice, Full sample

| | Average residualized earning (USD) | | | | | Prob. of being in the bottom third of income dist. (pp) | | | | | Prob. of being in the top third of income dist. (pp) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 |
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -64.179* | -6.999 | 196.594*** | 341.798*** | 402.456*** | 0.097** | 0.070 | -0.025 | -0.022 | 0.010 | -0.116** | -0.044 | 0.089 | 0.118* | 0.092 |
| | (32.994) | (45.611) | (70.826) | (103.803) | (119.634) | (0.041) | (0.045) | (0.045) | (0.049) | (0.048) | (0.058) | (0.078) | (0.069) | (0.068) | (0.065) |
| Observations | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 |
| CM | 615.806 | 674.761 | 809.836 | 1250.652 | 1505.118 | 32.792 | 32.477 | 32.371 | 32.398 | 32.611 | 34.128 | 34.351 | 33.997 | 34.039 | 34.080 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -26.312 | 127.688* | 530.670*** | 832.174*** | 946.861*** | 0.211** | 0.049 | -0.178*** | -0.204*** | -0.162** | -0.097 | 0.206 | 0.398*** | 0.443*** | 0.395*** |
| | (67.008) | (77.417) | (133.556) | (218.090) | (248.815) | (0.097) | (0.098) | (0.060) | (0.067) | (0.066) | (0.119) | (0.140) | (0.116) | (0.117) | (0.108) |
| Observations | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 |
| CM | 590.292 | 637.323 | 862.869 | 1333.157 | 1519.666 | 32.895 | 32.586 | 32.391 | 32.410 | 32.663 | 34.002 | 34.263 | 34.008 | 34.074 | 34.063 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -126.077** | -182.123*** | -124.533 | -86.616 | -83.188 | 0.019 | 0.128* | 0.126** | 0.147** | 0.149** | -0.195** | -0.371*** | -0.246*** | -0.201*** | -0.206*** |
| | (53.322) | (67.599) | (79.801) | (105.456) | (119.030) | (0.056) | (0.068) | (0.064) | (0.068) | (0.063) | (0.093) | (0.109) | (0.086) | (0.076) | (0.072) |
| Observations | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 |
| CM | 709.071 | 786.159 | 875.602 | 1290.538 | 1557.432 | 32.667 | 32.374 | 32.324 | 32.372 | 32.599 | 34.327 | 34.523 | 34.096 | 34.097 | 34.124 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | -27.996 | -226.147** | -613.706*** | -905.758*** | -1021.378*** | -0.262** | -0.004 | 0.254*** | 0.306*** | 0.273*** | 0.036 | -0.435** | -0.567*** | -0.595*** | -0.559*** |
| | (82.355) | (107.103) | (164.288) | (239.850) | (271.755) | (0.105) | (0.109) | (0.097) | (0.107) | (0.100) | (0.141) | (0.182) | (0.162) | (0.156) | (0.147) |
| Observations | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 |
| CM | 666.177 | 732.411 | 871.004 | 1305.929 | 1543.794 | 32.749 | 32.451 | 32.348 | 32.386 | 32.622 | 34.210 | 34.429 | 34.064 | 34.088 | 34.102 |

Note: ZIP3-level controls include the log of population, share of college-educated adults between the ages of 25 and 64, share of foreign-borns, share of women in the labor force, all measured in 2000. Individual controls include indicators for gender, race, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A4. Effect of the 2000s housing boom on major choice, White students

| | Average residualized earning (USD) | | | | | Prob. of being in the bottom third of income dist. (pp) | | | | | Prob. of being in the top third of income dist. (pp) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 |
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -25.636 | -31.655 | 64.873 | 121.220 | 131.711 | 0.025 | 0.086 | 0.046 | 0.060 | 0.093 | -0.056 | -0.119 | -0.029 | -0.018 | -0.048 |
| | (42.438) | (62.442) | (93.023) | (128.685) | (147.499) | (0.056) | (0.062) | (0.061) | (0.067) | (0.066) | (0.076) | (0.106) | (0.095) | (0.091) | (0.088) |
| Observations | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 |
| CM | 424.019 | 296.806 | 215.387 | 505.637 | 714.297 | 32.799 | 32.703 | 32.737 | 32.801 | 32.953 | 33.838 | 33.720 | 33.388 | 33.470 | 33.555 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | 31.908 | 217.745* | 655.326*** | 977.440*** | 1107.437*** | 0.091 | -0.078 | -0.307*** | -0.332*** | -0.289** | 0.041 | 0.317 | 0.500** | 0.531** | 0.492** |
| | (77.182) | (119.164) | (236.141) | (340.757) | (387.195) | (0.143) | (0.127) | (0.106) | (0.120) | (0.115) | (0.148) | (0.209) | (0.226) | (0.224) | (0.210) |
| Observations | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 |
| CM | 97.931 | -161.015 | -219.284 | 42.907 | 156.522 | 33.147 | 33.250 | 33.239 | 33.340 | 33.476 | 33.203 | 32.986 | 32.874 | 33.039 | 33.090 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -91.331 | -215.832** | -260.303** | -307.268** | -359.501** | -0.022 | 0.168* | 0.204** | 0.231** | 0.232*** | -0.160 | -0.458*** | -0.370*** | -0.337*** | -0.346*** |
| | (68.091) | (89.592) | (102.618) | (130.474) | (146.676) | (0.074) | (0.094) | (0.087) | (0.092) | (0.086) | (0.123) | (0.143) | (0.111) | (0.098) | (0.094) |
| Observations | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 |
| CM | 615.813 | 549.335 | 470.288 | 766.186 | 988.979 | 32.608 | 32.491 | 32.556 | 32.631 | 32.823 | 34.196 | 34.096 | 33.674 | 33.697 | 33.745 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | -88.027 | -376.176*** | -846.145*** | -1207.654*** | -1381.669*** | -0.146 | 0.188 | 0.458*** | 0.513*** | 0.479*** | -0.133 | -0.689*** | -0.799*** | -0.811*** | -0.786*** |
| | (99.693) | (142.698) | (266.777) | (388.840) | (445.501) | (0.175) | (0.161) | (0.136) | (0.156) | (0.148) | (0.188) | (0.251) | (0.262) | (0.261) | (0.249) |
| Observations | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 |
| CM | 447.271 | 318.156 | 245.871 | 530.800 | 718.061 | 32.784 | 32.738 | 32.778 | 32.862 | 33.035 | 33.873 | 33.735 | 33.414 | 33.483 | 33.532 |

Note: ZIP3-level controls include the log of population, share of college-educated adults between the ages of 25 and 64, share of foreign-borns, share of women in the labor force, all measured in 2000. Individual controls include indicators for gender, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A5. Effect of the 2000s housing boom on major choice, non-White students

| | Average residualized earning (USD) | | | | | Prob. of being in the bottom third of income dist. (pp) | | | | | Prob. of being in the top third of income dist. (pp) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 |
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post | 159.430*** | 297.036*** | 417.018*** | 510.107*** | 581.134*** | -0.007 | -0.141*** | -0.215*** | -0.216*** | -0.160*** | 0.249*** | 0.509*** | 0.461*** | 0.403*** | 0.364*** |
| | (45.684) | (59.221) | (77.335) | (110.266) | (127.851) | (0.049) | (0.054) | (0.052) | (0.055) | (0.051) | (0.079) | (0.101) | (0.079) | (0.072) | (0.068) |
| Observations | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 |
| CM | 1085.730 | 1600.837 | 2266.371 | 3076.106 | 3442.808 | 32.776 | 31.924 | 31.474 | 31.413 | 31.772 | 34.840 | 35.896 | 35.489 | 35.435 | 35.368 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | 48.752 | 181.301 | 500.532*** | 735.753*** | 844.154*** | 0.252** | 0.111 | -0.093 | -0.111 | -0.086 | -0.018 | 0.326 | 0.463*** | 0.482*** | 0.432** |
| | (95.146) | (137.356) | (146.937) | (199.133) | (232.276) | (0.113) | (0.155) | (0.139) | (0.162) | (0.168) | (0.174) | (0.248) | (0.178) | (0.161) | (0.177) |
| Observations | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 |
| CM | 1010.741 | 1318.011 | 1792.426 | 2441.610 | 2693.438 | 32.760 | 32.087 | 31.709 | 31.655 | 32.010 | 34.652 | 35.377 | 34.993 | 34.965 | 34.909 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | 82.719 | 176.368* | 236.301** | 297.572** | 379.863** | -0.034 | -0.116 | -0.153** | -0.153* | -0.120 | 0.153 | 0.316* | 0.277** | 0.242** | 0.236** |
| | (73.744) | (97.362) | (108.352) | (142.229) | (160.992) | (0.075) | (0.086) | (0.078) | (0.083) | (0.077) | (0.131) | (0.166) | (0.122) | (0.104) | (0.098) |
| Observations | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 |
| CM | 1154.040 | 1792.064 | 2594.470 | 3502.586 | 3922.319 | 32.840 | 31.888 | 31.371 | 31.313 | 31.695 | 34.958 | 36.248 | 35.830 | 35.745 | 35.651 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | -15.696 | -37.196 | -235.221 | -367.983 | -389.243 | -0.234* | -0.204 | -0.061 | -0.050 | -0.062 | 0.086 | -0.074 | -0.200 | -0.232 | -0.176 |
| | (114.950) | (157.878) | (177.328) | (237.011) | (271.623) | (0.122) | (0.160) | (0.146) | (0.170) | (0.177) | (0.206) | (0.281) | (0.209) | (0.188) | (0.199) |
| Observations | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 |
| CM | 1107.195 | 1637.095 | 2332.280 | 3155.751 | 3520.595 | 32.814 | 31.953 | 31.482 | 31.425 | 31.798 | 34.858 | 35.963 | 35.556 | 35.490 | 35.408 |

Note: ZIP3-level controls include the log of population, share of college-educated adults between the ages of 25 and 64, share of foreign-borns, share of women in the labor force, all measured in 2000. Individual controls include indicators for gender, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A6. Effect of the 2000s housing boom on major choice, Male students

| | Average residualized earning (USD) | | | | | Prob. of being in the bottom third of income dist. (pp) | | | | | Prob. of being in the top third of income dist. (pp) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 |
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -57.486 | 37.543 | 261.208*** | 429.985*** | 506.610*** | 0.059 | 0.001 | -0.095 | -0.094 | -0.061 | -0.081 | 0.033 | 0.157 | 0.183** | 0.156* |
| | (53.637) | (69.712) | (90.035) | (123.841) | (145.614) | (0.050) | (0.060) | (0.064) | (0.070) | (0.063) | (0.091) | (0.119) | (0.096) | (0.088) | (0.085) |
| Observations | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 |
| CM | 2140.089 | 2660.327 | 2919.509 | 3331.296 | 3518.191 | 32.389 | 31.782 | 31.585 | 31.710 | 32.495 | 36.474 | 37.615 | 36.527 | 35.907 | 35.459 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | 30.130 | 265.963** | 690.215*** | 1034.297*** | 1202.697*** | 0.177 | -0.091 | -0.321*** | -0.353*** | -0.314*** | 0.037 | 0.455** | 0.582*** | 0.608*** | 0.574*** |
| | (111.607) | (130.934) | (179.231) | (273.820) | (319.147) | (0.125) | (0.133) | (0.110) | (0.121) | (0.114) | (0.190) | (0.223) | (0.177) | (0.170) | (0.165) |
| Observations | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 |
| CM | 2188.772 | 2657.028 | 2906.618 | 3288.391 | 3385.192 | 32.491 | 31.894 | 31.636 | 31.749 | 32.545 | 36.450 | 37.597 | 36.524 | 35.908 | 35.427 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -150.436* | -146.245 | 2.393 | 112.231 | 143.413 | 0.010 | 0.087 | 0.053 | 0.071 | 0.082 | -0.206 | -0.315* | -0.147 | -0.083 | -0.097 |
| | (80.547) | (102.953) | (114.164) | (142.030) | (161.656) | (0.075) | (0.094) | (0.094) | (0.101) | (0.090) | (0.139) | (0.168) | (0.127) | (0.108) | (0.103) |
| Observations | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 |
| CM | 2225.597 | 2765.676 | 3001.656 | 3403.844 | 3612.698 | 32.229 | 31.656 | 31.518 | 31.665 | 32.471 | 36.675 | 37.759 | 36.619 | 35.968 | 35.502 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | -110.822 | -339.116* | -645.284*** | -904.756*** | -1044.516*** | -0.219 | 0.132 | 0.355** | 0.415** | 0.398** | -0.116 | -0.646** | -0.656*** | -0.647*** | -0.640*** |
| | (140.036) | (179.446) | (227.192) | (308.671) | (352.579) | (0.137) | (0.155) | (0.156) | (0.173) | (0.155) | (0.230) | (0.303) | (0.246) | (0.222) | (0.212) |
| Observations | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 |
| CM | 2212.922 | 2728.280 | 2968.944 | 3364.106 | 3534.392 | 32.319 | 31.738 | 31.559 | 31.694 | 32.496 | 36.598 | 37.703 | 36.586 | 35.947 | 35.477 |

Note: ZIP3-level controls include the log of population, share of college-educated adults between the ages of 25 and 64, share of foreign-borns, share of women in the labor force, all measured in 2000. Individual controls include indicators for race, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A7. Effect of the 2000s housing boom on major choice, Female students

| | Average residualized earning (USD) | | | | | Prob. of being in the bottom third of income dist. (pp) | | | | | Prob. of being in the top third of income dist. (pp) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 | Below age 26 | Age 26-30 | Age 31-35 | Age 36-40 | Over age 40 |
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -73.263** | -51.634 | 127.815* | 248.839** | 296.347** | 0.122** | 0.127** | 0.036 | 0.043 | 0.073 | -0.146** | -0.121 | 0.018 | 0.049 | 0.025 |
| | (34.144) | (48.807) | (76.499) | (112.037) | (126.091) | (0.051) | (0.054) | (0.047) | (0.051) | (0.053) | (0.065) | (0.081) | (0.074) | (0.073) | (0.070) |
| Observations | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 |
| CM | -657.163 | -983.438 | -952.007 | -486.950 | -176.053 | 33.129 | 33.057 | 33.028 | 32.973 | 32.708 | 32.169 | 31.624 | 31.884 | 32.480 | 32.929 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -87.683 | -1.972 | 381.693** | 649.208*** | 723.861*** | 0.237** | 0.168 | -0.051 | -0.070 | -0.028 | -0.220* | -0.020 | 0.228* | 0.290** | 0.234* |
| | (56.805) | (78.275) | (149.993) | (234.989) | (263.872) | (0.114) | (0.114) | (0.070) | (0.079) | (0.089) | (0.123) | (0.145) | (0.135) | (0.136) | (0.125) |
| Observations | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 |
| CM | -639.178 | -916.132 | -709.078 | -170.709 | 84.798 | 33.205 | 33.118 | 32.971 | 32.919 | 32.754 | 32.120 | 31.698 | 32.073 | 32.663 | 33.015 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | |
| Housing Shock x Post | -97.972* | -213.934*** | -247.359** | -278.884** | -297.411* | 0.018 | 0.159* | 0.187*** | 0.207*** | 0.199*** | -0.175 | -0.420*** | -0.341*** | -0.314*** | -0.306*** |
| | (58.763) | (79.697) | (102.486) | (138.080) | (152.376) | (0.070) | (0.082) | (0.071) | (0.074) | (0.071) | (0.109) | (0.129) | (0.106) | (0.098) | (0.091) |
| Observations | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 |
| CM | -626.280 | -956.871 | -996.459 | -570.298 | -252.298 | 33.052 | 33.007 | 33.033 | 32.994 | 32.712 | 32.260 | 31.673 | 31.875 | 32.449 | 32.909 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | 51.005 | -127.443 | -584.428*** | -905.538*** | -1000.995*** | -0.294** | -0.114 | 0.169* | 0.210* | 0.161 | 0.171 | -0.256 | -0.489*** | -0.547*** | -0.483*** |
| | (71.754) | (101.028) | (173.201) | (257.936) | (291.848) | (0.126) | (0.126) | (0.099) | (0.110) | (0.116) | (0.146) | (0.173) | (0.166) | (0.167) | (0.159) |
| Observations | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 |
| CM | -631.121 | -941.581 | -888.598 | -420.322 | -125.777 | 33.110 | 33.048 | 33.010 | 32.966 | 32.728 | 32.207 | 31.683 | 31.949 | 32.529 | 32.949 |

Note: ZIP3-level controls include the log of population, share of college-educated adults between the ages of 25 and 64, share of foreign-borns, share of women in the labor force, all measured in 2000. Individual controls include indicators for race, high-school GPA, college selectivity, and parental educational attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A8. Effect of the 2000s housing boom on the probability of enrolling in a given major, Full sample

| | Ethnic | Bio | Busi | Comm | CS | Educ | Engi | English | FineA | Hist | Multi | LibArt | Math | Med | PE | PhysicalS | Psychology | PubAff | SocialS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.002** | 0.006*** | 0.003 | -0.001 | -0.004*** | -0.001 | 0.003 | 0.002*** | -0.005*** | 0.001 | 0.001 | -0.002*** | 0.001 | -0.009*** | 0.002** | 0.003*** | -0.001 | -0.000 | 0.002*** |
| | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) | (0.000) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Observations | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 | 651699 |
| CM | 0.004 | 0.080 | 0.184 | 0.045 | 0.053 | 0.087 | 0.099 | 0.026 | 0.072 | 0.013 | 0.001 | 0.013 | 0.008 | 0.105 | 0.013 | 0.029 | 0.052 | 0.012 | 0.050 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | -0.003** | 0.014*** | 0.000 | -0.000 | -0.000 | -0.004 | 0.007* | 0.002 | -0.009*** | 0.001 | 0.002 | -0.001 | 0.001 | -0.008** | 0.002 | 0.004** | 0.003 | -0.002** | 0.002 |
| | (0.001) | (0.005) | (0.005) | (0.002) | (0.003) | (0.004) | (0.004) | (0.002) | (0.002) | (0.001) | (0.003) | (0.001) | (0.001) | (0.004) | (0.001) | (0.002) | (0.002) | (0.001) | (0.002) |
| Observations | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 | 105407 |
| CM | 0.005 | 0.084 | 0.186 | 0.044 | 0.060 | 0.085 | 0.088 | 0.027 | 0.072 | 0.012 | 0.001 | 0.015 | 0.006 | 0.100 | 0.012 | 0.025 | 0.065 | 0.012 | 0.053 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.003*** | 0.002 | 0.002 | 0.001 | -0.008*** | 0.007*** | -0.000 | 0.001 | 0.000 | 0.001 | -0.001 | -0.002** | 0.002** | -0.012*** | 0.000 | 0.001 | 0.000 | 0.001 | 0.003* |
| | (0.001) | (0.002) | (0.003) | (0.002) | (0.002) | (0.003) | (0.003) | (0.001) | (0.003) | (0.001) | (0.001) | (0.001) | (0.001) | (0.003) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) |
| Observations | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 | 248818 |
| CM | 0.004 | 0.075 | 0.190 | 0.045 | 0.048 | 0.083 | 0.110 | 0.026 | 0.075 | 0.013 | 0.001 | 0.012 | 0.009 | 0.104 | 0.011 | 0.030 | 0.047 | 0.013 | 0.049 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | 0.005*** | -0.014*** | 0.004 | 0.001 | -0.006* | 0.012** | -0.005 | -0.002 | 0.009*** | -0.000 | -0.003 | -0.001 | 0.001 | -0.002 | -0.001 | -0.003 | -0.003 | 0.003* | -0.001 |
| | (0.001) | (0.005) | (0.007) | (0.003) | (0.004) | (0.005) | (0.005) | (0.002) | (0.003) | (0.001) | (0.003) | (0.001) | (0.001) | (0.004) | (0.002) | (0.002) | (0.003) | (0.001) | (0.003) |
| Observations | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 | 354225 |
| CM | 0.004 | 0.079 | 0.188 | 0.044 | 0.053 | 0.084 | 0.102 | 0.026 | 0.074 | 0.013 | 0.001 | 0.013 | 0.008 | 0.103 | 0.011 | 0.028 | 0.054 | 0.012 | 0.051 |

Note: The baseline controls include: log of ZIP3 population in 2000, share of college-educated adults between age 25-64, share of foreign-borns, share of women in the labor force, and indicators for gender, race, HS GPA, college selectivity, first-generation status, and parental education attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A9. Effect of the 2000s housing boom on the probability of enrolling in a given major, Non-White students

| | Ethnic | Bio | Busi | Comm | CS | Educ | Engi | English | FineA | Hist | Multi | LibArt | Math | Med | PE | PhysicalS | Psychology | PubAff | SocialS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | -0.001 | -0.000 | -0.002 | 0.000 | 0.001 | -0.006*** | 0.013*** | 0.003*** | -0.007*** | 0.001* | -0.000 | -0.001 | 0.000 | -0.000 | 0.001 | 0.002 | -0.002 | -0.001** | 0.003** |
| | (0.001) | (0.003) | (0.003) | (0.001) | (0.002) | (0.002) | (0.004) | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.001) | (0.003) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Observations | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 | 167416 |
| CM | 0.003 | 0.097 | 0.190 | 0.039 | 0.071 | 0.066 | 0.103 | 0.019 | 0.063 | 0.008 | 0.001 | 0.012 | 0.006 | 0.127 | 0.010 | 0.022 | 0.060 | 0.011 | 0.053 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | -0.001 | 0.007 | -0.003 | 0.003 | 0.011*** | -0.011** | 0.003 | 0.003 | -0.006 | -0.000 | 0.003 | -0.000 | -0.001 | -0.006 | 0.001 | 0.007** | -0.001 | -0.004** | 0.005 |
| | (0.002) | (0.005) | (0.009) | (0.003) | (0.004) | (0.005) | (0.005) | (0.003) | (0.004) | (0.002) | (0.005) | (0.002) | (0.001) | (0.010) | (0.003) | (0.003) | (0.004) | (0.002) | (0.004) |
| Observations | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 | 28574 |
| CM | 0.004 | 0.091 | 0.190 | 0.039 | 0.069 | 0.088 | 0.102 | 0.017 | 0.058 | 0.006 | 0.000 | 0.012 | 0.005 | 0.116 | 0.007 | 0.018 | 0.069 | 0.014 | 0.051 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | -0.001 | -0.002 | -0.007 | 0.002 | -0.005** | -0.001 | 0.013** | 0.001 | -0.005** | 0.002** | -0.001 | -0.001* | 0.001 | 0.001 | -0.001 | 0.004* | -0.001 | -0.000 | 0.003 |
| | (0.001) | (0.004) | (0.005) | (0.002) | (0.002) | (0.002) | (0.006) | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.001) | (0.004) | (0.002) | (0.002) | (0.002) | (0.001) | (0.002) |
| Observations | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 | 67738 |
| CM | 0.003 | 0.100 | 0.186 | 0.036 | 0.074 | 0.053 | 0.109 | 0.019 | 0.067 | 0.008 | 0.000 | 0.012 | 0.007 | 0.137 | 0.010 | 0.021 | 0.052 | 0.008 | 0.053 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | -0.001 | -0.005 | -0.003 | -0.001 | -0.016*** | 0.010** | 0.007 | -0.002 | 0.002 | 0.002 | -0.003 | -0.001 | 0.002 | 0.010 | -0.001 | -0.004 | -0.001 | 0.005** | -0.001 |
| | (0.002) | (0.005) | (0.009) | (0.004) | (0.004) | (0.005) | (0.007) | (0.004) | (0.004) | (0.002) | (0.004) | (0.002) | (0.001) | (0.011) | (0.003) | (0.004) | (0.005) | (0.002) | (0.005) |
| Observations | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 | 96312 |
| CM | 0.003 | 0.097 | 0.188 | 0.037 | 0.072 | 0.066 | 0.107 | 0.018 | 0.064 | 0.008 | 0.000 | 0.012 | 0.006 | 0.129 | 0.009 | 0.020 | 0.058 | 0.011 | 0.053 |

Note: The baseline controls include: log of ZIP3 population in 2000, share of college-educated adults between age 25-64, share of foreign-borns, share of women in the labor force, and indicators for gender, HS GPA, college selectivity, first-generation status, and parental education attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A10. Effect of the 2000s housing boom on the probability of enrolling in a given major, White students

| | Ethnic | Bio | Busi | Comm | CS | Educ | Engi | English | FineA | Hist | Multi | LibArt | Math | Med | PE | PhysicalS | Psychology | PubAff | SocialS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.004*** | 0.001 | 0.006** | -0.002* | -0.002 | 0.002 | 0.002 | 0.002* | -0.003 | 0.001 | 0.000 | -0.003*** | 0.002* | -0.012*** | 0.002* | 0.003* | -0.001 | -0.000 | 0.002** |
| | (0.001) | (0.002) | (0.003) | (0.001) | (0.001) | (0.003) | (0.003) | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.001) | (0.003) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Observations | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 | 484283 |
| CM | 0.004 | 0.074 | 0.182 | 0.047 | 0.046 | 0.095 | 0.098 | 0.029 | 0.076 | 0.015 | 0.001 | 0.013 | 0.009 | 0.097 | 0.013 | 0.032 | 0.049 | 0.013 | 0.048 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.001 | 0.015*** | 0.005 | -0.000 | -0.001 | -0.001 | 0.007 | -0.002 | -0.009** | -0.001 | -0.002 | -0.002 | 0.002 | -0.004 | 0.002 | 0.004 | 0.003 | -0.002 | 0.001 |
| | (0.002) | (0.006) | (0.008) | (0.003) | (0.003) | (0.007) | (0.005) | (0.002) | (0.004) | (0.002) | (0.002) | (0.002) | (0.003) | (0.004) | (0.002) | (0.003) | (0.002) | (0.002) | (0.003) |
| Observations | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 | 74391 |
| CM | 0.006 | 0.074 | 0.174 | 0.050 | 0.046 | 0.087 | 0.080 | 0.037 | 0.088 | 0.020 | 0.001 | 0.017 | 0.008 | 0.085 | 0.016 | 0.030 | 0.058 | 0.011 | 0.056 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.005*** | -0.003 | 0.002 | -0.001 | -0.003 | 0.011*** | -0.002 | 0.002 | 0.005 | 0.001 | -0.001 | -0.002** | 0.004*** | -0.015*** | 0.000 | -0.000 | 0.001 | 0.000 | 0.003* |
| | (0.001) | (0.003) | (0.004) | (0.002) | (0.002) | (0.003) | (0.004) | (0.002) | (0.003) | (0.001) | (0.002) | (0.001) | (0.001) | (0.004) | (0.001) | (0.002) | (0.002) | (0.001) | (0.002) |
| Observations | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 | 183072 |
| CM | 0.004 | 0.071 | 0.194 | 0.047 | 0.045 | 0.087 | 0.107 | 0.028 | 0.076 | 0.015 | 0.001 | 0.013 | 0.009 | 0.095 | 0.011 | 0.032 | 0.046 | 0.014 | 0.047 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | 0.004** | -0.018** | 0.000 | -0.001 | -0.002 | 0.012 | -0.008 | 0.003 | 0.012** | 0.002 | 0.000 | -0.001 | 0.002 | -0.011** | -0.001 | -0.004 | -0.002 | 0.002 | 0.001 |
| | (0.002) | (0.007) | (0.010) | (0.004) | (0.003) | (0.008) | (0.007) | (0.003) | (0.005) | (0.002) | (0.002) | (0.002) | (0.003) | (0.006) | (0.002) | (0.004) | (0.003) | (0.002) | (0.003) |
| Observations | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 | 257463 |
| CM | 0.005 | 0.072 | 0.187 | 0.048 | 0.045 | 0.087 | 0.098 | 0.031 | 0.080 | 0.016 | 0.001 | 0.014 | 0.009 | 0.092 | 0.013 | 0.032 | 0.050 | 0.013 | 0.050 |

Note: The baseline controls include: log of ZIP3 population in 2000, share of college-educated adults between age 25-64, share of foreign-borns, share of women in the labor force, and indicators for gender, HS GPA, college selectivity, first-generation status, and parental education attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A11. Effect of the 2000s housing boom on the probability of enrolling in a given major, Female students

| | Ethnic | Bio | Busi | Comm | CS | Educ | Engi | English | FineA | Hist | Multi | LibArt | Math | Med | PE | PhysicalS | Psychology | PubAff | SocialS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.002** | 0.006** | 0.003 | -0.001 | -0.002* | -0.000 | 0.002* | 0.002** | -0.003* | 0.001** | 0.001 | -0.002** | 0.001* | -0.012*** | 0.002*** | 0.004*** | -0.002 | -0.000 | 0.001 |
| | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) | (0.003) | (0.001) | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.001) | (0.003) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Observations | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 | 367285 |
| CM | 0.005 | 0.095 | 0.150 | 0.057 | 0.019 | 0.131 | 0.033 | 0.034 | 0.078 | 0.010 | 0.001 | 0.016 | 0.007 | 0.145 | 0.010 | 0.019 | 0.077 | 0.021 | 0.050 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | -0.001 | 0.013** | 0.002 | 0.001 | 0.001 | -0.004 | 0.003 | 0.001 | -0.008*** | 0.002* | 0.001 | 0.001 | 0.001 | -0.012* | 0.002* | 0.005** | 0.006* | -0.003** | 0.001 |
| | (0.001) | (0.005) | (0.006) | (0.003) | (0.002) | (0.007) | (0.002) | (0.002) | (0.003) | (0.001) | (0.004) | (0.001) | (0.001) | (0.007) | (0.001) | (0.002) | (0.003) | (0.001) | (0.003) |
| Observations | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 | 61429 |
| CM | 0.006 | 0.098 | 0.163 | 0.053 | 0.025 | 0.122 | 0.029 | 0.035 | 0.071 | 0.010 | 0.001 | 0.016 | 0.006 | 0.134 | 0.009 | 0.017 | 0.092 | 0.019 | 0.055 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.003** | -0.001 | -0.001 | -0.001 | -0.004 | 0.012*** | 0.003 | 0.001 | 0.002 | 0.002** | -0.000 | -0.001 | 0.002** | -0.015*** | 0.001 | 0.001 | -0.000 | 0.002 | -0.000 |
| | (0.001) | (0.003) | (0.004) | (0.003) | (0.002) | (0.004) | (0.002) | (0.002) | (0.003) | (0.001) | (0.002) | (0.001) | (0.001) | (0.004) | (0.001) | (0.002) | (0.003) | (0.002) | (0.002) |
| Observations | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 | 137261 |
| CM | 0.005 | 0.093 | 0.151 | 0.057 | 0.014 | 0.128 | 0.036 | 0.035 | 0.084 | 0.010 | 0.001 | 0.016 | 0.008 | 0.147 | 0.009 | 0.019 | 0.071 | 0.022 | 0.049 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | 0.004*** | -0.015*** | -0.001 | -0.001 | -0.005* | 0.016** | 0.002 | -0.000 | 0.009** | 0.000 | -0.002 | -0.002 | 0.001 | 0.001 | -0.001 | -0.005* | -0.007 | 0.004 | -0.002 |
| | (0.001) | (0.006) | (0.006) | (0.004) | (0.002) | (0.007) | (0.003) | (0.003) | (0.004) | (0.001) | (0.004) | (0.002) | (0.001) | (0.007) | (0.002) | (0.003) | (0.004) | (0.002) | (0.004) |
| Observations | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 | 198690 |
| CM | 0.006 | 0.095 | 0.156 | 0.056 | 0.019 | 0.126 | 0.033 | 0.035 | 0.079 | 0.010 | 0.001 | 0.016 | 0.007 | 0.142 | 0.009 | 0.018 | 0.080 | 0.021 | 0.051 |

Note: The baseline controls include: log of ZIP3 population in 2000, share of college-educated adults between age 25-64, share of foreign-borns, share of women in the labor force, and indicators for race, HS GPA, college selectivity, first-generation status, and parental education attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

## TABLE A12. Effect of the 2000s housing boom on the probability of enrolling in a given major, Male students

| | Ethnic | Bio | Busi | Comm | CS | Educ | Engi | English | FineA | Hist | Multi | LibArt | Math | Med | PE | PhysicalS | Psychology | PubAff | SocialS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A: Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.001* | 0.006*** | 0.002 | 0.000 | -0.008*** | -0.000 | 0.006 | 0.002* | -0.007*** | -0.000 | 0.001* | -0.002*** | 0.001 | -0.006*** | 0.001 | 0.002 | 0.000 | 0.000 | 0.004*** |
| | (0.001) | (0.002) | (0.004) | (0.001) | (0.002) | (0.001) | (0.004) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) |
| Observations | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 | 284414 |
| CM | 0.002 | 0.063 | 0.224 | 0.030 | 0.094 | 0.035 | 0.179 | 0.016 | 0.066 | 0.017 | 0.001 | 0.009 | 0.009 | 0.058 | 0.015 | 0.041 | 0.023 | 0.002 | 0.049 |
| *Panel B: Diff-in-Diff, Low homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | -0.004** | 0.014** | -0.001 | -0.002 | -0.005 | -0.005* | 0.013* | 0.003 | -0.009*** | -0.000 | 0.002 | -0.003 | 0.002 | -0.002 | 0.001 | 0.003 | -0.001 | -0.001 | 0.004* |
| | (0.002) | (0.006) | (0.008) | (0.002) | (0.005) | (0.003) | (0.007) | (0.002) | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) | (0.003) | (0.002) | (0.001) | (0.002) |
| Observations | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 | 43978 |
| CM | 0.003 | 0.065 | 0.218 | 0.031 | 0.107 | 0.034 | 0.169 | 0.016 | 0.072 | 0.016 | 0.001 | 0.012 | 0.006 | 0.055 | 0.015 | 0.036 | 0.028 | 0.002 | 0.052 |
| *Panel C: Diff-in-Diff, High homeownership areas* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post | 0.002** | 0.004 | 0.004 | 0.003* | -0.012*** | 0.004** | -0.003 | 0.000 | -0.002 | 0.000 | -0.001 | -0.002** | 0.002* | -0.007** | -0.001 | 0.003 | 0.001 | 0.000 | 0.007*** |
| | (0.001) | (0.003) | (0.005) | (0.002) | (0.003) | (0.002) | (0.005) | (0.001) | (0.003) | (0.002) | (0.001) | (0.001) | (0.001) | (0.003) | (0.002) | (0.002) | (0.001) | (0.001) | (0.002) |
| Observations | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 | 111557 |
| CM | 0.002 | 0.057 | 0.232 | 0.031 | 0.085 | 0.034 | 0.192 | 0.015 | 0.065 | 0.016 | 0.001 | 0.008 | 0.010 | 0.057 | 0.013 | 0.042 | 0.021 | 0.002 | 0.049 |
| *Panel D: Diff-in-Diff-in-Diff* | | | | | | | | | | | | | | | | | | | |
| Housing Shock x Post x High h.ownership | 0.006*** | -0.012** | 0.011 | 0.004 | -0.006 | 0.007** | -0.014 | -0.003 | 0.008* | -0.000 | -0.004** | 0.000 | -0.000 | -0.006 | -0.003 | 0.001 | 0.001 | 0.001 | 0.001 |
| | (0.002) | (0.006) | (0.010) | (0.003) | (0.006) | (0.003) | (0.009) | (0.002) | (0.004) | (0.002) | (0.002) | (0.002) | (0.002) | (0.004) | (0.003) | (0.004) | (0.003) | (0.001) | (0.003) |
| Observations | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 | 155535 |
| CM | 0.002 | 0.060 | 0.227 | 0.031 | 0.093 | 0.034 | 0.184 | 0.015 | 0.067 | 0.016 | 0.001 | 0.010 | 0.009 | 0.056 | 0.014 | 0.040 | 0.024 | 0.002 | 0.050 |

Note: The baseline controls include: log of ZIP3 population in 2000, share of college-educated adults between age 25-64, share of foreign-borns, share of women in the labor force, and indicators for race, HS GPA, college selectivity, first-generation status, and parental education attainment. Observations are weighted with the student's weight from TFS. Robust standard errors are in parentheses, clustered at the ZIP3 level. CM displays the average of the outcome variables in the 1999-2001 waves. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.