Land Use Regulation, Homeownership and Wealth Inequality

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Abstract

We examine the role that housing market regulatory restrictiveness plays in differentially affecting the net wealth of owners and renters over time, and its contribution to wealth inequality. In tightly regulated desirable cities, house prices and rents rise strongly in response to growing demand. Rising prices financially benefit existing homeowners. Rising rents hurt renters. Because credit constraints prevent many households from becoming homeowners, this can lead to growing differences in wealth accumulation between homeowners and renters and, consequently, rising wealth inequality. Employing the confidential version of the Panel Study of Income Dynamics (PSID), we explore to what extent changes in household net wealth can be explained by regulatory restrictiveness and demand shock-induced spatial differences in house price growth. We find that, accounting for sorting, a household with average characteristics that owns instead of rents in a tightly regulated location accumulates 56% more in net wealth between 1999 and 2019. This effect explains 59% of the observed difference in net wealth accumulation between actual owners and renters in these locations, consistent with an observed increase in the Gini-coefficient of wealth inequality during our sample period of 13%. In less regulated metro areas, we do not find a difference in wealth accumulation by homeownership status nor rising wealth inequality. Examining homeowners only and accounting for sorting, our findings suggest that if a homeowner with average characteristics had resided in a tightly rather than loosely regulated metro area, their predicted twenty-year net wealth increase would be 81% higher. We examine transition and timing effects and find theoretically plausible results that the housing boom yielded net wealth changes that varied by regulatory status, but the housing bust did not. We conduct robustness checks that examine the potential endogeneity of initial homeownership, account for unobserved heterogeneity and test for homeowner cash-out/reinvest behaviour. In a falsification test, we show that our findings cannot be explained by correlations between local house price growth, a rising college premium and local variation in stock investment behaviour. Taken as a whole, our findings imply that expected gains provide powerful financial incentives to existing homeowners in tightly regulated markets to maintain regulatory stringency, further exacerbating housing unaffordability and wealth inequality.

JEL Classification: R11, R21, R31, R52, G12.

Keywords: Land use regulation, wealth accumulation, wealth inequality, house prices, housing rents, housing supply, housing affordability

1 Introduction

It is well established that local land use regulations constrain housing supply. Local demand shocks in such markets amplify house price growth and cycles.[1] Figure 1 illustrates this for the twenty-year period ending in 2019. At the extremes, San Francisco demonstrates strong cycles and value growth (173%); Cleveland has negligible price cycles and value growth (32%). The cyclicality and long-term growth rate of house prices can be explained by labor demand shocks in conjunction with local housing supply constraints. San Francisco and Cleveland are, respectively, markets with extremely tight and relaxed land use regulations (Saks, 2008; Gyourko et al. 2007). As Figure 1 illustrates, in many US metro areas with tightly constrained housing supply, including cities such as Portland and Salt Lake City, housing showed more volatility and values rose more on average than the S&P 500.[2]

In this paper, we investigate if the restrictiveness of land use regulation in housing markets has a casual impact on net wealth, financially benefitting homeowners in tightly regulated markets and, because not all households have access to homeownership due to credit constraints, contributing to an increase in wealth inequality. Two facts about homeowners and renters motivate our question. First, the share of net wealth invested in housing exceeds the share invested in financial equity for all US households except the upper ten percentile of the wealth distribution (Goldsmith Pinkham and Shue, 2020), and renters typically have no exposure to housing assets. In a hypothetical comparison of a homeowner and a similarly situated renter, if house prices rise more than the value of alternative investments, then the homeowner will experience a relative increase in wealth. In the US, renters and homeowners are not on average similarly situated. To control for homeowner-renter heterogeneity, we thus employ a combination of household controls and fixed effects (including individual fixed effects in a panel setting). Second, at the time of house purchase, homeowners substitute financial assets for illiquid housing stock (i.e., Gomes et al. 2021; Chetty et al. 2017). Unlike a stock or bond portfolio, owner-occupied housing is indivisible, illiquid and not easily diversifiable and performs differently depending on location. A portfolio shift towards owner-occupied housing implies that homeowners in high performing markets accumulate more wealth than homeowners in low performing markets, all else equal, accounting for alternative investments and sorting.

Identifying a causal impact of homeownership on wealth is complicated by issues of simultaneity and unobserved heterogeneity. Firstly, there is simultaneity in contemporaneous

[1] Local land use regulation reduces the housing stock supply elasticity (e.g., Harter-Dreiman, 2004; Green et al., 2005; Quigley and Raphael, 2005; or Saiz, 2010).

[2] The S&P 500 increased by 120% during this time period. Of the 83 large and mid-size MSAs studied by Saks (2008), we observe that 40% outperformed the S&P 500 (i.e., experienced nominal house price increases that exceeded 120%). Most of these high-value-growth markets have above median regulatory restrictiveness, including San Francisco (173%), Portland (148%), Charleston (137%) and Salt Lake City (134%). Data source: Federal Housing Finance Agency (FHFA) metropolitan all-transactions, repeat-sales, single-family-home house price indexes (HPI) from 2000Q1 to 2020Q1 and the December 2019 over December 1999 percentage increase in the S&P 500 index (end-of-the-month, adjusted close).

homeownership and wealth. Due to down payment constraints, wealth is required to become a homeowner, and homeownership increases household wealth via growth in home equity. In addition to simultaneity, unobserved differences across households may be associated with the level of household wealth and wealth accumulation. Different propensities to save confounds a cross-sectional study of wealth. Households with a high propensity to save are more likely to invest in all assets, generating a positive correlation between homeownership and wealth accumulation that may be spurious. Unobserved heterogeneity may be present due to selection in an analysis using an identification technique that relies on variation across locations. Secondly, house price growth may plausibly be endogenous in a wealth regression: house price growth increases total net wealth, all else equal; increases in local homeowner wealth may fuel the local economy (Guren et al., 2021) and thereby increase local house prices.

To address these issues, we make use of a twenty-year household panel from the Panel Study of Income Dynamics with household geographic identifiers as our primary dataset and a fourfold estimation strategy. First, we associate the within-household change in wealth at time t + *s* with a rich set of household controls at time *t*, the initial year of observation, as well as MSA-level controls. To fix an example, we use 1999 initial investments and household characteristics, house price growth and metro fixed effects to explain future wealth accumulation. We identify the impact of land use regulatory-stringency comparing homeowners living in regulatory-stringent locations relative to homeowners living in less-regulated locations. To examine the role of homeownership, we control for homeownership in the initial year of observation only. This approach allows us to examine long-run wealth accumulation and lessens homeownership simultaneity concerns by avoiding the association of contemporaneous homeownership and contemporaneous wealth.[3] We nonetheless conduct robustness checks addressing the concern of potential endogeneity of homeownership. Second, we address household unobserved heterogeneity concerns using a panel of renters and new homeowners and a fixed effects approach. We rule out the possibility of heterogeneity that may otherwise cause positive bias in the estimated impact of homeownership in highly regulated places on accumulated wealth. As an additional robustness check to alleviate concerns regarding uncontrolled heterogeneity, we estimate a first-difference model of future wealth accumulation using the full sample of renters and homeowners.

Third, to address the possibility of endogenous house price growth, we estimate specifications that use a Bartik-style exogenous labor demand shock interacted with a measure of regulatory restrictiveness to instrument for local price growth. The IV exclusion restriction stipulates that, conditional on covariates (including the metro area-level demand shock itself or metro area fixed effects, respectively), housing market regulatory restrictiveness affects the impact of the labor demand shock on total net wealth accumulation only through house price growth. Fourth, selection bias may be present due to household sorting. Households sort across locations based on preferences and constraints. Stringent regulations on housing supply limit

[3] Our long-run wealth accumulation modelling approach associates an initial condition with future outcomes; this structure has been applied in other settings. For example, Mian and Sufi (2011) and Bhutta and Keys (2016) associate a measure of past homeownership to identify the effect of house price growth on future home equity extraction.

access to high productivity MSAs, resulting in higher house prices and lower employment growth and economic output in such locations (Hsieh and Moretti, 2019; Duranton and Puga 2023). To address sorting, we decompose the total effect of regulation on wealth accumulation via homeownership into a housing market effect and a sorting effect. To generate a total effect, we compute the weighted average predicted wealth increase of actual residents in MSAs with relatively high/low regulatory restrictiveness. To identify a housing market effect, we compute the average predicted household wealth increase (i) setting household characteristics to their sample values, (ii) assuming own or rent status and (iii) setting MSA characteristics to high/low regulation.[4]

We conduct a number of robustness checks. We estimate alternative model specifications to account for the positive skew in the empirical wealth distribution, conducting OLS, IV and quantile estimations on trimmed, full and Winsorized samples. We examine if 1999 homeownership in our cross-sectional baseline models is potentially endogenous to future wealth using measures of future gifts (including inheritances) and earnings in a tenure choice model and as controls in the baseline wealth accumulation models. We check if households experiencing sizable increases in house prices "cash out" equity (Mian and Sufi, 2011; Bhutta and Keys, 2016). If households extract equity for consumption purchases, then our econometric approach may underestimate the true effect of an increase in house values on long-run net wealth. In this case, a positive impact of house price growth on long-run total net wealth would be a lower bound estimate. Alternatively, households may withdraw home equity to invest in business or financial assets. In this case, the growth in net wealth from a home price increase would be overestimated if we fail to account for portfolio shifting. Finally, we conduct a falsification test to determine if correlations between local house price growth, a rising college premium and local variations in stock investment behaviour explain the main findings of the paper rather that homeownership in highly regulated locations.

As a preview of our findings, homeowners living in regulatory-restrictive locations experience the greatest twenty-year house price growth and sizable increases in net wealth compared to observationally equivalent renters or homeowners living in less regulated locations. In the most regulatory-stringent locations (top 15% regulated places), our estimated twenty-year difference in wealth accumulation of owners versus renters is on the order of 400 thousand dollars controlling for initial-year household characteristics and location. Consistent with Figure 1, at the highest percentiles of the house price growth distribution, the marginal effect of homeownership on twenty-year wealth accumulation exceeds that of stock market participation. When we account for sorting, the net housing market effect is 231.3 thousand dollars, which explains 59% of the actual renter-owner wealth accumulation gap. In less regulated metro areas, we do not find a difference in wealth accumulation by renter-owner status. When we examine homeowners only across metro areas by regulatory stringency, accounting for sorting, household characteristics and alternative investments, we find that

[4] As described in the empirical results section, we define high/low regulation in two ways: (i) above/below the median level of regulatory restrictiveness and (ii) top/bottom 15 percent for regulatory restrictiveness. We use the Saks (2008) measure of regulatory restrictiveness, and conduct a robustness check of our key findings using the Wharton Regulatory Land Use Index (WRLURI) (Gyourko et al.; 2008).

nearly all of the difference in wealth accumulation by regulatory restrictiveness is attributable to the housing market. To control for unobserved heterogeneity and examine timing effects, we use a panel setting to examine the six-year total net wealth accumulation of new homeowners relative to existing renters. We find a large estimated effect of wealth acquired by new homeowners in 2001 relative to renters over the housing boom period (relative to the post-financial crisis period). That effect is increasing in regulatory restrictiveness: a one standard deviation in regulatory restrictiveness is associated with an additional $228 thousand in wealth accumulation. We observe a loss from becoming a homeowner at the start of the US housing bust that is not altered by location in a high-regulation city. This is theoretically sensible since the impacts of regulation are asymmetric. Our key finding that homeowners' experience long-run sizeable wealth gains due to stringent regulations on housing supply in high productivity locations is robust to alternative specifications, an alternative measure of regulatory restrictiveness, exclusion of renters from the estimation, controlling for expected gifts and earnings, a test for locally correlated returns to human, stock and housing investment, and a test for homeowner cash-out/reinvest behaviour. Finally, our data allow us to provide a cursory glance at the change in wealth inequality. Evidence suggests that it has risen in the last twenty years but only in the most tightly regulated MSAs.

2 Literature Review

We contribute to two stands of the literature: the impact of local housing market regulations on house price dynamics and affordability, and, separately, the role of homeownership in household wealth accumulation. The literature examining homeownership and household financial well-being is extensive.[5] A smaller subset of papers attempt to examine a causal effect of homeownership on wealth accumulation. The endogeneity of homeownership and wealth is the primary challenge; causality is difficult to establish. The literature most closely related to our study finds a positive association between homeownership and wealth accumulation (i.e., Di et al., 2007). Turner and Luea (2009) do not resolve the issue of simultaneity but make progress by using panel methods and wealth accumulation conditional on the number of years as a homeowner. They find that homeowners accumulate more wealth over time than similarly situated renters and wealth accumulation is larger in magnitude for high-income than low-income households.[6] Non-black households accumulate more wealth via homeownership than black households (Newman and Holupka, 2016). Recent evidence suggests that wealth accumulation via homeownership is more likely during periods of relative economic stability (Wainer and Zabel, 2020). Evidence that market volatility and timing matters is found in Newman and Holupka (2016), who examine entry into first-time homeownership during the 2000s and impact on the subsequent short-run wealth status. Using propensity score matching and difference in difference models, Newman and Holupka find that whites who purchased early in the decade had a short-term increase in net wealth by 2009; in contrast, total net wealth declines for blacks regardless of purchase timing in the 2000s. A number of mechanisms for a causal effect of homeownership on wealth accumulation have been proposed including "mandatory" savings via mortgage payments, high leverage in

[5] See Newman and Holupka (2016) and Wainer and Zabel (2020) for literature reviews.
[6] Also see Di et al. (2007) and Wainer and Zabel (2020).

markets where the *ex post* asset returns exceed borrowing costs, and extensive federal and local income homeownership tax subsidies that primarily benefit high-income households (Hilber and Turner, 2014). In addition, owner-occupied housing provides a hedge against fluctuating housing costs (Sinai and Souleles, 2005).[7]

Numerous studies find that local land use regulation reduces the building stock supply elasticity (Harter-Dreiman, 2004; Green *et al.*, 2005; Quigley and Raphael, 2005; Saiz, 2010; Büchler et al., 2021, or Baum-Snow & Han, 2022). In a simple supply-demand context, a nearly vertical supply curve (driven by tight land use regulation will yield price effects rather than quantity effects in response to demand shocks. Indeed, locations with tight regulatory constraints and inelastic housing supply experience greater price sensitivity to demand shocks and higher long-run price growth (Glaeser & Gyourko, 2003; Glaeser et al., 2005a, 2005b, 2008; Quigley & Raphael, 2005; Saks, 2008; Saiz 2010; Gyourko et al., 2013; Hilber and Vermeulen 2016; and Gyourko and Molloy, 2015 and Molloy, 2020 for excellent reviews). In section 3, we make use of measures of regulatory restrictiveness pre-dating our sample period combined with exogenous employment shocks to instrument for house price growth.

Our contributions to the literature include the following. First, we hypothesize that house price dynamics may fuel wealth accumulation over time and only for owners of housing in supply constrained locations. Second, in addition to shorter horizons, we take a long-run view, examining the change in net wealth over a twenty-year period. Third, we disentangle the housing market effect from the sorting effect. Fourth, we observed that within-MSA wealth inequality varies by regulatory restrictiveness. Finally, we provide evidence on the relative importance of three key investment vehicles for future long-run wealth growth: human capital attainment, ownership of the primary residence and participation in the stock market.

3 Data and Empirical Approach

Our primary data source is the Panel Study of Income Dynamics (PSID), a longitudinal survey of households conducted since 1968. The dataset provides a unique opportunity to follow households over time. We examine two decades of PSID panel data: 1999 to 2019. The 1999 PSID cross-section includes roughly 7000 unique household units who are re-interviewed biennially. Detailed information is collected regarding household finances, education, labor force participation and compensation and family-composition characteristics. Wealth information is collected in each biennial interview from 1999 forwards. Total net wealth (TNW) is generated by summing home equity and the net value of other real estate, vehicles, farm or business, stocks, cash accounts and other assets; and subtracting debts such as credit card and student loan debt. The PSID wealth data do not include expected social security wealth or private pensions (Hurst, Luoh and Stafford; 1998).[8] However, the household survey questions include labor earnings and whether the head/spouse has employer provided retirement plans. Using labor force variables, we

[7] In particular, the risk of homeowning depends on the covariance of the sale price of the current house with the purchase price of the likely future house (Sinai and Souleles, 2013). To the extent that households move between highly correlated metro areas, they can raise the "moving-hedge" value of owning.
[8] In Appendix Table A1 we list the PSID wealth survey questions.

indirectly control for these sources of wealth. The data include year-of-survey sample weights to generate results that are US representative.

We use the geocoded confidential version of the PSID to merge secondary, publicly available data sources to PSID households based on location of residence.[9] First, we measure single-family home prices using the Federal Housing Finance Agency (FHFA) all transactions repeat-sales metropolitan-level house price index (HPI). Second, we measure the local housing supply inelasticity using the regulatory index generated by Saks (2008). We use the measure by Saks (2008) as our primary measure rather than the Wharton Regulatory Land Use Index (WRLURI) as the former, in contrast to the latter, predates our sample period, so is more plausibly exogenous. In doing this we follow Hilber and Turner (2014). We also conduct robustness checks using the WRLURI regulatory stringency measure (Gyourko et al., 2008). Third, we use employment data from the US Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) to construct a Bartik-style labor-demand shock measure. The QCEW data are employer reported and cover more than 95 percent of US jobs. Data are available for every NAICS industry at the NAICS 3-digit level of disaggregation from 1990 to present (which includes roughly 111 industries).[10]

3.1 Long-run total net wealth

To examine long-run changes in net wealth, we select the 1999 cross-section of PSID households and track wealth accumulation, metro location and house price growth over time. The 1999 cross section includes 6976 households for whom we observe the household location of residence. We select PSID households observable in both the 1999 to 2019 panels in order to identify starting and ending net wealth. We retain PSID households in the sample if they have had no change in marital status or a change from married to single or single to married, which we control for econometrically. We exclude households reporting a change in head unrelated to marital status (i.e., a child becomes the head of household). The PSID does not gather data on unmarried partners prior to 2019. Households with co-habitation are reported as single. We examine all households and a trimmed sample in which we drop the top and bottom 1% of the sample wealth distribution. We select households in MSAs for which we can generate a Bartik measure and have a regulatory restrictiveness measure. The final sample has roughly 1300 households whom we observe in 1999 and 2019.

In the context of a basic life-cycle model of intertemporal utility maximization, the household chooses consumption in each period to maximize lifetime utility subject to a lifetime budget constraint. Household's save to smooth the lifetime consumption profile. The choice and manner of saving at any point in time is dependent on initial endowments, preferences and

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[9] The PSID household location indicators are confidential data from the PSID GEOCODE data files and can be obtained from the PSID under special contract. These data are not available from the authors.

[10] The US industry classification system was changed in 1997 from the Standard Industrial Classification (SIC) system to the North American Industry Classification System (NAICS); this affected the availability of comparable employment information at the industry-level across time periods. However, the BLS constructs and makes publicly available a version the QCEW data by NAICS code from 1990 forward.

risk tolerance.[11] We model "initial endowments" empirically as a snapshot of wealth in 1999: stock market participation, human capital attainment and housing decision, controlling for other factors, to explain twenty-year-ahead wealth outcomes. That is, we explore how the household's initial wealth portfolio in 1999 affects the growth in household wealth between 1999 and 2019, controlling for 1999 household characteristics and MSA fixed effects. For household *i* in 1999 in MSA *j*:

$$Total\ net\ worth\ change_{i,j,2019} = \beta_0 + \beta_1 HPIg_{j,2019} + \beta_2[HPIg_{j,2019} * OWN_{i,t}] + \beta_3 OWN_{i,t} + X'_{i,t}\delta + \sum \theta_j MSAj + e_i \quad (1)$$

where the dependent variable, *total net wealth change*, is household *i* change in total net wealth from 1999 to 2019. *HPIg* denotes house price growth from 1999 to 2019 in the MSA in which the household resides in 1999. The *OWN* variable denotes homeownership status in 1999. Our key variable is the interaction between house price growth and ownership status in 1999 in MSA *j*. Equation (1) expresses of our two key econometric specifications: (ii) including non-varying variables at the MSA level, such as *HPIg* in equation (1); (ii) excluding MSA non-varying variables and controlling for MSA fixed effects instead. The vector *X* includes household-level "endowments" which we define as past, exogenous or pre-determined characteristics (in this case 1999) such as age and age-squared to capture linear and non-linear lifecycle effects, initial total net wealth to control for an endowment effect, and initial wealth interacted with age. The vector *X* also includes control for marital status, employment, labor income and employer-sponsored pension or retirement saving plans. In addition to initial homeownership status, we control for the other primary category of wealth holdings: college degree and stock market participation in 1999. All models control for MSA location indicators.

Equation (1) is also considered a lag model wherein a future outcome is predicted by initial or predetermined values. By avoiding associating contemporaneous homeownership and contemporaneous wealth, we are able to lessen concerns of reverse causation. The dependent variable, as the first-difference change in wealth, is regressed on initial values, thus the main specification cannot be viewed as solving the possibility unobserved heterogeneity. As a robustness check, we also estimate a first-difference model using a shorter time span for wealth accumulation.

Since the wealth distribution is skewed, our main results are estimated on a trimmed sample (we delete the top and bottom 1% of the wealth distribution.[12] We also report model results for the full and Winsorized (top and bottom 1% of the net wealth distribution) samples and quantile regressions as robustness checks. We estimate equation (1) with heteroscedastic-robust standard errors clustered on MSA. Depending on location, the return on an alternative investment may (or may not) exceed the return on typically leveraged owner-occupied housing, thus the sign of the 'own' variable is ambiguous, all else equal. However, we expect the

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[11] Theoretical models of portfolio choice that incorporate housing include Chetty et al. (2017), who provides a review.

[12] While a log-linear model would account for skew, the data include negative net wealth, and we do not want to drop households from the sample.

interaction term 'own × local house price growth' to have a positive effect on future household wealth.

We next address the possible endogeneity of house price growth and an identification strategy: the concern is reverse causation. In a local market with strong wage growth or wealth accumulation for reasons unrelated to housing, the demand for housing increases and thus, particularly in markets with inelastic supply price elasticities, house prices increase. If we regress the change in total net wealth on house price growth and house price growth interacted with 'own', we may find a positive correlation, but, due to the possibility of reverse causation, we cannot interpret this effect as causal.

To address this concern and identify the causal effect of house price growth on net wealth, we employ an IV strategy. Particularly relevant to our analysis are Saks (2008) and Hilber and Vermeulen (2016). Saks (2008) proposed that shocks to local labor demand should shift the demand for both housing and labor. Employing a Bartik (1991) shift-share measure, she documented that US metro areas with few barriers to construction experience smaller increases in house prices in response to an increase in housing demand. Hilber and Vermeulen (2016) also employ a Bartik-style shift-share measure in the context of a panel fixed effects and an instrumental variable strategy. They find that labor demand shocks lead to larger increases in house prices in more tightly regulated areas. The exclusion restriction requires that the labor demand shock impacts total net wealth activity only through house price growth.

We follow Hilber and Vermeulen and adapt a Bartik-style shift-share measure of predicted local employment growth as an exogenous demand shifter of local housing demand. We construct the measure to capture shocks to labor demand due to the local industry composition of employment in 1994 and changes in employment by industry at the national level. Note that the base period (1994) pre-dates our sample period by 5 years. In the Appendix Table A2 shows the national employment industry composition at the two-digit NAICS code in our baseline year, 1994. Appendix Figure A1 shows the evolution of US industry employment from 1994 to 2019.

We instrument house price growth in a metro area with the 'predicted local employment growth' interacted with 'local regulatory restrictiveness.' In our primary specifications, we use the Saks index to capture local regulatory restrictiveness. The index is derived as a 'combined' measure of regulatory restrictiveness, using the simple average of six independent surveys conducted during the late 1970s and the 1980s. The index has a mean of 0 and a standard deviation of 1. It ranges from 2.21 for New York (most restrictive) to -2.40 for Bloomington-Normal, IL.[13] The interaction of the two measures (i.e., the Bartik measure and the Saks index) captures the idea that a positive demand shock (as proxied by predicted local employment growth) will have a greater positive effect on house prices in more tightly regulated markets. We thus expect our interaction-instrument to be strongly correlated with house price growth. The exclusion restriction requires that the labor demand shock impacts total net wealth only through house price growth. This is plausible in our set up since we control for household labor earnings in the model. Thus, while a labor-demand shock affects wages and employment levels, we control for the

[13] See Saks (2008; Table A2) for details.

effects on earnings directly. In robustness checks, we also control for local earnings growth at the county level using county earnings flow data from the US Bureau of Economic Analysis, Regional Economic Accounts data.[14] The local population growth due to the demand shocks circuitously impacts net wealth by increasing demand for housing units and thereby house price and not household net wealth via a direct channel.

In the case of including non-varying MSA-level controls, Equation (1) arguably contains two endogenous variables: 'house price growth' and 'own × house price growth'. While the source of endogeneity is the same for both variables (i.e., house price growth), technically they are two endogenous variables that require two instruments. We discuss our instrument for 'local house price growth' above. Our instrument for 'own × house price growth' is simply 'own × predicted employment growth × Saks-index'. This is because, as Wooldridge (2002) demonstrates, the product of an instrument for a given endogenous variable and an exogenous component of an interaction term is also a valid instrument. The identifying assumption is that, conditional on local earnings growth, predicted employment growth interacted with regulatory restrictiveness will only explain individual wealth accumulation through local house price growth. All analysis is weighted using the 2019 PSID combined family weight. We use heteroscedastic-robust standard errors and we cluster on MSA. In section 4, we report OLS results and IV estimation results using the Bartik-style shift-share measure.

3.2 Timing model

The macroeconomic conditions of the 2000s present a unique opportunity to study timing effects: as exhibited in Figure 2, local house price cycles were strongly synchronized during the 2000 to 2007 and 2007 to 2013 housing cycles. Prior to 2000, US house price dynamics were typically asynchronized with a strong local or regional component (as documented in Guren et al., 2021). To examine homeownership-entry timing effects on household net wealth, we use the PSID to create a three-period panel of renters and new homeowners. The dependent variable is the six-year change in thousands of dollars in total net wealth from (i) 2001 to 2007, (ii) 2007 to 2013 and (iii) 2013 to 2019. Explanatory variables are observed at time t, t=2001, 2007 and 2013 corresponding to the start of the 2002-2007 macroeconomic expansion, 2007-2009 recession and post-2009 recovery. In essence, we examine the change in net wealth as in equation (1) for a shorter time period and in a panel setting accounting for unobserved heterogeneity and initial conditions at the start of the wealth accumulation period. Other variables are similarly defined as in equation (1) pertaining to the designated initial time periods. The approach takes advantage of nationally synchronized business cycle and housing cycles during the 2000 housing boom and bust. We employ panel fixed effects and IV estimation using the Bartik-style shift-share measure and a quantile regression. While nationally housing markets synchronously trended upwards and then downwards, employment shocks materialized locally and differently in different housing markets.

[14] Adding in a local earnings control mitigates concerns that a demand shock may impact wealth accumulation directly. The county earnings data are collected on a place-of-work basis. The BEA makes an adjustment to those components of earnings and employee contributions to convert them to a place-of-residence basis reflecting the net flow of income of interarea commuters.

3.3 Cash-out behaviour

To examine the possibility of "cash out-reinvest" behavior in highly regulated markets, we select a PSID panel of homeowners observed during the time period 1999 to 2019. We examine whether homeowners experiencing increases in home equity due to house price growth "cash out" via refinancing. We model cash out behavior for household i at time t in MSA j,

$$CASHOUT_{ijt} = \beta_0 + \beta_1 HPIg_{jt} + X'_{ijt}\delta + hhFE + yrFE + e_i \quad (2)$$

where *CASHOUT* variable equals 1 if, in the prior twelve months, total mortgage has increase by $1000 or more and the homeowner has not moved or purchased other real estate. Due to the possible endogeneity of house price growth, we employ the IV strategy of equation (1). The concern is reverse causation. If households cash out to renovate their residence, for example, house prices may be expected to rise. We instrument house price growth in a metro area with the predicted local-employment-growth Bartik measure interacted with the Saks measure of local regulatory restrictiveness. The exclusion restriction requires that the labor demand shock impacts cash out activity only through house price growth. We estimate two versions of equation (2): (i) controlling for predicted employment growth rate and instrumenting for the house price growth rate; (ii) controlling for predicted employment in millions and instrumenting for the house price index. We also estimate a version of (ii) that controls for house price growth interacted with stock market participation. We do so as a measure of financial savvy: households that invest in stocks may be more likely to take advantage of increases in home equity to invest in other relatively higher-performing assets. The time-varying household controls include head age, presence of children, marital status and head and spouse employment status. We control for household and year fixed effects. Year fixed effects important macroeconomics factors such as the 30-year fixed mortgage rate.

3.4 Housing market versus sorting effect

Households sort across cities. Stringent regulations on housing supply limit access to high productivity MSAs, resulting in higher house prices and lower employment growth in such cities, all else equal (Hsieh and Moretti, 2019). If households with high ability are sorting to housing markets that eventually become high-performing, then we have an omitted variable and too much importance is attributed to house price growth per se. To check for this, we first note that owner-occupied housing provides consumption and investment. The housing stock provides shelter and housing services that would otherwise have to be rented from the market. On the investment side, housing stock price appreciation creates a capital gain. The PSID asks respondents at the time of a move, the reason for the household move. In Appendix Table A3, Panel A, we see that vast majority of movers report consumption reasons as the motivation for moving. Only a small percentage report job related reasons (6%) or ambiguous or mixed reasons (15.6%). As can be seen from Appendix Table A3, Panel B, the majority of household heads reside in the state in which they grew up, suggesting that household inter-state sorting is less common than not and supporting the idea that housing that is subsequently high performing has a fortuitous element it; households tend to buy for consumption reasons and in the state in which the household head was born.

Next we test for whether the effect of regulation stringency on wealth accumulation via homeownership reflects a sorting effect. To generate a total effect, we compute the weighted average predicted wealth change of residents in MSAs above and below the median level of regulatory restrictiveness. To compute a housing market effect, we ask, what would the average American gain in wealth if, all else equal, she owned in an MSA with above/below median regulation; we compute this as the weighted average prediction at sample values of x_i and setting z_i characteristics to reflect MSA_j regulatory status. The sorting effect is the total effect minus the housing market effect.

4 Empirical results

Table 1 reports the sample means. Dollar amounts are nominal and expressed in 1000s of dollars. Over the twenty-year time-period, the average growth in net wealth is 364 thousand dollars and MSA-level house-price, predicted employment and local earnings grew on average at 77%, 17% and 131% respectively. Referring to the 1999 characteristics of households, we observe that 59% of households own their home, 54% are married, the average age is 42, 28% of household heads have at least a four- year college degree, 25% owned stock and the average total net wealth is 134 thousand dollars. The family change indicators show that over the twenty-year period, 28% of the household heads changed from married to single status, due to divorce or deceased status of the spouse, and 11% shifted the other direction from single to married.

The first three columns of Table 2A reports OLS, IV with MSA controls and IV with MSA fixed effects results using the trimmed sample of homeowners and renters. Interestingly, the coefficient estimate for *OWN* is statistically insignificant in the OLS estimation. We see that *OWN* interacted with the house price growth rate yields a coefficient estimate that is positive and statistically significant, indicating that the impact of *OWN* on the change in total net wealth is increasing in house price growth. Also interesting: the coefficient estimate for house price growth is statistically insignificant except when the variable is interacted with *OWN* status. Col. 4 and col. 5 report the IV results by homeownership status. As expected, house price growth is statistically significant in the homeowner but not renter regression. Other results look sensible across models. College degree and stock ownership yield large, positive statistically significant coefficient estimates. The head's age appears in three variables and has an individually statistically significant coefficient estimate when interacted with total net wealth. Specifically, the coefficient estimate for *TNW*years-to-retirement* implies that the effect of initial wealth is increasing in the head's years to retirement.

Panel B of Table 2 reports the IV first stage results. We see that the Bartik shift-share labor demand measure interacted with the Saks regulatory index is a statistically significant predictor of house price growth and the association is positive, as expected. Similarly, the triple interaction of *OWN*EMPg*SAKS* is the statistically significant predictor of the endogenous *OWN*HPIg* variable. Furthermore, the Sanderson-Windmeijer F-statistics are acceptable and large enough to rule out a weak instrument problem.[15] Table 3 reports the OLS and IV regression results using the untrimmed sample as well as IV estimates generated using a Winsorized total net wealth (at the 1%). Panel A reports second-stage results. Panel B documents the corresponding first-stage results. The results are qualitatively and quantitively very similar to those reported in Table 2. This is also the case for the first stage IV results, with meaningfully statistically significant coefficients and acceptable Sanderson-Windmeijer F-statistics.

Our baseline model includes household homeownership status in 1999 to explain future wealth accumulation between 1999 and 2019. The homeownership variable thus predates our outcome variable. One might nevertheless be concerned that household expectations about future wealth accumulation may affect the decision in 1999 whether to become a homeowner or stay a renter. For example, households may anticipate a future gift/inheritance or an increase in future earnings in the near term that is not controlled by their 1999 characteristics but may impact the tenure choice decision. We therefore explore in a housing tenure choice model whether, other determinants held constant, homeownership in 1999 can be explained by future gifts (including inheritance) and/or future earnings. That is, we estimate a 1999 tenure choice model which controls for whether or not a household receives a gift/inheritance by 2005, the size of the gift/inheritance payments, and future household earnings measured as the sum of future labor earnings (from 2001 to 2005) of the household head (and spouse if present). We also control for household characteristics, and the MSA fixed effects capture the relative cost of homeownership across locations.[16] We report the results in Panel A of Appendix Table A4. We see that, controlling for contemporaneous household characteristics and location, we find no statistically significant effects of near-term gifts/inheritances nor of near-term future earnings on the homeownership choice. We view this as an additional validation of the baseline model reported in Table 2A. We next re-estimate the baseline specification IV-model with MSA fixed effects, reported in Table 2A, adding in the future gift/inheritance receipt/size and future earnings controls. We find that the baseline findings are robust to adding these controls and report the marginal effects in Panel B, Appendix Table A4.

Identification in the baseline specifications requires that the composition of the stock portfolio and the earnings-premium attached to human capital attainment, conditional on socio-economic and demographic characteristics of the household, are independent of household location. That is, a household's equity value and college premium may vary overtime but not by location. If this assumption holds, year fixed effects capture the change in the stock value and the value of human capital over time for a predetermined level of investment. One concern is that if either the college premium or stock return have a local and time-varying component that correlates with local house price growth, we may be attributing too much importance to the role of homeownership and tight land use regulation in determining household wealth. The local college premium may be positively correlated with local house price growth: places with

[15] The Sanderson and Windmeijer (2016, *Journal of Econometrics*) first-stage F-statistic is used for assessing instrument strength in the case of two endogenous variables; it equals the Kleibergen-Paap (KP) statistic in the case of one endogenous variable.

[16] Note that

strong house price growth may also have a rising education premium. We identify two channels by which local house price growth and the contribution of stock ownership to wealth growth may be correlated. First, corporate equity investment behaviour may differ due to a household's bias for or against local industry investment (i.e., households may have a portfolio-investment bias driven by their location). This may matter because local industry performance can be expected to be positively correlated with local house price growth. That is, local economic shocks are likely to drive the local industries' stock performance as well as house price growth. If local residents either over- or underinvest in local industry shares, their portfolio may over- or underperform the market as a whole and this over- or underperformance could relate to house price growth. Second, investment behaviour may vary by location due to house price behaviour. In places with volatile house prices, homeowners may mitigate total portfolio risk by choosing less risky stocks, stocks that pay dividends and/or bonds.

To test this potential threat to identification, we conduct a falsification test. We generate two interaction terms: house price growth interacted with the college education indicator variable and house price growth interacted with the stock participation variable. If our results are driven by locally varying college premiums or by locally varying stock performance over time being correlated with local house price growth, including these two interaction terms should explain changes in wealth accumulation between 1999 and 2019 rather than homeownership in 1999 interacted with house price growth during the 20-year period. Put differently, we would expect the 'house price growth x own' coefficient estimate to lessen in magnitude or become statistically insignificant once we control for the two interaction terms. We would also expect the house price growth-interaction terms for stock market participation and college degree to be statistically significant.

The results are reported in Table 3C. We find that the house price growth by own coefficient estimate is not lessened in magnitude nor statistical significance by the additional interact terms. The college interaction term is statistically insignificant thus we can rule out that local house price growth is correlated with a locally varying college premium over time. We cannot rule out that local house price growth is correlated with locally varying stock investment performance: the interaction term for stock by house price growth is negative and statistically significant. This finding is consistent with both of the two channels of possible localized stock investment we describe above. However, the inclusion of the stock by house price growth interaction term does not alter the results pertaining to regulation induced house price growth, wealth accumulation and homeownership presented in Table 2A. In fact, in Table 3C, our coefficient of interest increases somewhat in magnitude. Our baseline finding would appear to be a lower bound of the magnitude of the housing market channel driving differences in wealth accumulation across locations and between homeowners and renters.

To assess the magnitude and statistical significance of the interaction terms, we compute the marginal effects of *OWN* and *HPIg* and report these in Table 4. For the binary variable *OWN*, we use the finite-difference method for binary regressors and compute the average marginal effects (i.e., the weighted sample average of the household marginal effects) with delta-method standard errors. Examining the *OWN* impact, we see the wealth accumulation impact of homeownership varies by location. For the household experiencing median or less house price growth, homeownership is not associated with greater wealth accumulation. Referring to the trimmed sample, we see a precisely estimated marginal effects present only for households residing in the top 75 percentile for house price growth. The effect is sizable and comparable to the effect of stock ownership but limited to the upper tails of the house price growth distribution.

Table 5 Panel A reports the estimated total, housing market and sorting effects based on our preferred specification, Table 2A, IV model with MSA fixed effects. Referring to Table 5 col. 1, we see that the homeowner (renter) residing in a high-regulation location (top 15%) experienced a wealth increase of 766.1 (372.5) thousand dollars. At $393.6 thousand, the difference in wealth accumulation of owners versus renters is nearly a half a million dollars. In col. 2, if the average American had resided in a high-regulation location (top 15%) and owned (rented), her predicted wealth increase is 642.1 (410.8) thousand dollars. The rent-own TNW gap due to the housing market is statistically significant and equals 231.3 thousand dollars in high-regulation places (top 15%); note that the housing market gap (231.3) explains 59% of the total gap (393.6) in wealth accumulation between owners and renters in the top 15% most highly regulated cities. In low regulation places, the gap is not statistically different from zero. In col. 3, the sorting effect is positive for owners and negative for renters in high regulation places. This suggests that the characteristics of people who reside in high-regulation locations in part explains the higher (lower) wealth of owners (renters) in these locations. We check the robustness of these findings by re-estimating the Table 2A, IV model with MSA fixed effects using the WRLURI regulatory index measure (Gyourko et al., 2008) instead of the Saks (2008) regulatory restrictiveness measure. The results are reported in Appendix Table A5 and are qualitatively similar to the Saks (2008) index results: An owner/renter wealth gap caused by a housing market effect only exists in high regulation locations. According to the WRLURI index, the housing market gap (181.3) explains 31% of the total gap (597.7) in wealth accumulation between owners and renters in the top 15% most highly regulated cities.

Table 5 Panel B reports the decomposition of the total regulatory wealth effect into housing market and sorting effects for the homeowner specification (based on the estimation reported in Table 2A col. 4). The results for homeowners is qualitatively and quantitatively similar to the full sample results. Homeowners in the highest regulatory environments accumulate the greatest wealth, controlling for a rich set of explanatory variables. Homeowners residing in a top 15% (bottom 15%) regulatory locations, experience a wealth increase of 747.7 (560.9) thousand dollars. At $186.8 thousand, the total effect yields a difference in wealth accumulation that is statistically significant and sizeable. Isolating the housing market effect, if the average US homeowner resided in a top 15% (bottom 15%) regulatory-restrictiveness location, their predicted wealth increase would be $640.21 ($488.6) thousand dollars. The gap in wealth accumulation due to the housing market regulatory effects is statistically significant and large at $151.6 thousand. Comparing the total and housing market effect, nearly all of the difference in wealth accumulation by regulatory restrictiveness is attributable to the housing market. At 151.8/186.8, the housing market equates to 81%.

Table 6 reports the purchase timing results in a panel setting of renters and new homeowners observed at three points in time. The analysis examines six-year wealth accumulation increments that reflect the housing boom, bust and post-financial-crisis recovery. The we control for the boom (2000 to 2007) and bust (2007 to 2013) periods when house prices moved in a synchronized fashion and interact house price growth with the Saks regulatory measure; the comparison is relative to the post-financial crisis period (2013 to 2019) when house prices were less synchronized. The coefficient estimates are consistent with the notion that timing matters, and we establish that is matters by regulatory restrictiveness. Referring to *new owners in 2001*, the fixed effect model generates a large average effect of 135.5 thousand dollars acquired by new homeowners in 2001 relative to renters over the housing boom period (relative to the post-financial crisis period) at the median level of regulatory restrictiveness (Saks = zero). That effect is increasing in regulatory restrictiveness. The interaction terms suggest that a one standard deviation the Saks index is associated with an additional $228 thousand in wealth accumulation. In the fixed effects model, gains during the boom are offset during the bust at the median level of regulatory restrictiveness. The six-year loss from becoming a homeowner in 2007 is not altered by location in a high-regulation city. This is theoretically sensible since the impacts of regulation are asymmetric: it fuels house price in booms, but housing stock is durable and does not contract in either type of city during a bust. Rather, house prices fall. A qualitatively similar though smaller-in-magnitude pattern of effects are revealed in the quantile regression, which is sensible since quantile regression measure impacts at the median and is not influenced by outliers.

Table 7 reports household refinancing behavior modelled in equation (3) and estimated from a PSID panel of homeowners observed during the time-period 1999 to 2019. IV1 controls for the employment shock using the predicted employment growth rate interacted with the Saks index to instrument for the house price growth rate. IV2 controls for the employment shock using predicted employment in millions interacted with the Saks index to instrument for the house price index. IV3 adds an interaction term between house prices and stock market participation to capture financial savvy. The excluded instruments are predicted employment in millions interacted with the Saks index and predicted employment in millions interacted with the Saks index and stock market participation. The time-varying household controls include head age, presence of children, marital status and head and spouse employment status and labor income. We control for household and year fixed effects. Across models, we see no evidence that house price growth holding mortgage debt and other factors constant increases the likelihood that a household withdraws home equity. Referring to Figure 2, the lack of a cash out effect due to house price movements is not surprising. Panel A shows the PSID weighed cash out rate, which, although higher during the housing boom, is not elevated during the housing market peak nor post-housing-bust recovery period, as we would expect if cash out propensity was positively correlated with house price growth. Panel B is derived from HMDA data and includes the universe refinances as a fraction of total loan originations; it shows a striking inverse relationship between interest rates and refinance activity.[17]

The sizable role of owner-occupied housing in household wealth combined with the house price dynamics of highly regulated places raise the possibility that regulatory restrictiveness contributes to rising wealth inequality. To check for this, we compute weighted Gini coefficients of wealth inequality in 1999 and 2019 using the PSID nationally representative cross-sections. We report the estimates in Table 8. Evidence suggests that wealth inequality has risen in the last twenty years but only in the most heavily regulated MSAs.

We conduct a final robustness check on equation (1). We examine a first difference model to account for unobserved heterogeneity. Investor behaviors such as propensity to save or willingness to take risks may increase the likelihood of human capital attainment, homeownership, stock ownership, current wealth, and future wealth simultaneously. If homeowners have different discount factors or risk preferences than renters, for example, this will bias upward the estimates of the impact of current homeownership on future wealth holdings. To illustrate how we account for unobserved heterogeneity, consider eight-year wealth accumulation from 1999 to 2007 of renter i as a function of initial characteristics and local earnings growth from 1999 to 2007:

$$TNWg_{i20} \quad = \beta_0 + \beta_1 INCg_{j200} \quad + X'_{i,1999}\delta + v_i + e_t \tag{1a}$$

Next, we write down the eight-year wealth accumulation of household i from 2011 to 2019 as a function of local earnings growth from 2011 to 2019, household initial conditions, whether the renter became a homeowner by 2011, and if so, the interaction of homeownership with house price growth from 2011 to 2019:

$$TNWg_{i2019} = \beta_0 + \beta_1 INCg_{j2019} + X'_{i,2011}\delta + \beta_2 HPIg_{j2019} + \\ \beta_3[HPIg_{j2019}\ OWN_{i,2011}] + \beta_4 OWN_{i,1999} + + v_i + e_t \tag{1b}$$

Subtracting (1a) from (1b), the individual-specific effect, v_i, is differenced out, and we estimate:

$$\textit{Change in savings} = \beta_0 + \beta_1[INCg_{j201} \quad - INCg_{j2019}] + [X_{i,2011} - X_{i,2011}]'\delta + \\ \beta_2 HPIg_{j2019t} + \beta_3[HPIg_{j2019t} OWN_{i,2011}] + \beta_4 OWN_{i,2011} + e_t \tag{1c}$$

[17] Mian and Sufi (2011) and Bhutta and Keys (2016) find evidence of home equity cashout behavior during the time period 2002-2006 using the New York Federal Reserve Bank Consumer Credit Panel data in a cross-section setting. For example, Mian and Sufi (2011) associate a measure of past homeownership to identify the effect of future house price growth on home equity extraction. Mian and Sufi identify heterogeneous effects with cash-out concentrated among low-credit score and high-credit-card usage homeowners. The difference in our results plausibly stems from our usage of a household panel fixed effects model which accounts for unobserved heterogeneity. We re-estimate equation (3) over a similar time period as Mian and Sufi, and we do not find cash-out effects (results are available by request). This is important for the analysis herein, to determine whether the growth in net wealth observed in tightly regulated cities is due to the housing market or household cash-out-reinvest behaviour.

In equation (1c), the first term is the percentage point change in earnings growth in location *j* the second term is the change in household characteristics from 1999 to 2011, the third term is the percentage increase in house prices in location *j* from 2011 to 2019 and the fourth term interacts house price growth (2011 to 2019) with ownership status in 2011. If the household changes metropolitan areas between 1999 and 2011, we use the 2011 location to identify the relevant house price appreciation from 2011 to 2019. Appendix Table A6 reports the results of the first-difference model. We see that, our key finding, the wealth creation effects of homeownership depend on location, is robust to this alternative specification.

5 Conclusion

In this paper, we use twenty years of household panel wealth data to examine the role that housing market regulatory restrictiveness plays in differentially impacting over time the net wealth of homeowners versus renters in stringently regulated housing markets. We further examine the wealth impacts for homeowners in high versus low regulation places. We find that those homeowners living in regulatory-restrictive locations experience the largest increases in net wealth compared to similarly situated renters or homeowners living in less regulated locations. Accounting for sorting, we isolate the wealth increase as deriving predominantly from the housing market effect, which explains 59% (81%) of the difference in net wealth accumulation between owners/renters in highly regulated places (owners across tightly/little regulated places). In less regulated cities, we do not find a difference in wealth accumulation by tenure status. We examine the role of timing purchase in wealth creation in a panel fixed effects setting, and the coefficient estimates are consistent with the notion that house purchase timing matters (i.e., Newman and Holupka, 2016). We establish that it matters by regulatory restrictiveness. During the early 2000s housing boom, homeowners acquire more wealth than renters; that difference was increasing in regulatory restrictiveness. On average, households that bought at the peak of the housing boom experienced a decrease in their net wealth over the subsequent 6 years, but this was not impacted by regulatory status. That the housing boom yielded net wealth changes that varied by regulatory status but the housing bust did not is theoretically sensible. The impacts of inelastic housing supply on wealth are expected to be asymmetric: the strength of house price growth varies by location in a boom; but housing stock is durable and does not easily contract in either type of location (high/low regulated) during a bust. House prices fall across locations.

We conduct a number of robustness checks. We consider alternative model specifications to account for the positive skew in the empirical wealth distribution. We check if households experiencing sizable increases in home equity "cash out" the equity (i.e. Mian and Sufi, 2011), which, if profitably reinvested, may cause us to attribute too much importance to house price growth as a driver of net wealth increases. Using a panel IV fixed effects approach to examine cash out behavior, we in fact do not find evidence that homeowners tap into home equity as house prices rise. Additionally, we conduct a falsification test to determine if correlations between house price growth, a rising college premium and local variations in stock investment behaviour explain the main findings of the paper rather than homeownership in highly regulated locations. We find that the 'house price growth by own' coefficient estimate is not lessened in magnitude nor statistical significance by the additional interaction terms that test for the possibility of such correlations. In total, these exercises lead us to attribute the growth in net wealth to the regulatory restrictiveness that generates the house price growth.

By constraining housing supply, local land use regulations amplify house price growth and volatility and exacerbate housing unaffordability. We document steep house price increases occurring predominantly in highly regulated locations. Generated by the interaction of labor-demand shocks and regulatory stringency, the house price growth in these locations over time generate wealth for existing homeowners but make it increasingly difficult for low-wealth households to participate in the purchase market. Our findings provide evidence of a sizeable difference in wealth accumulation over time depending on household location and homeownership status and suggest an unexamined channel by which wealth inequality may be rising.

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TABLES

TABLE 1
Weighted sample means (trimmed sample)

Panel A: All variables		
	Mean	Std. dev.
Increase in net wealth	364.44	829.83
House price growth	0.77	0.25
Homeownership (1=yes)	0.59	0.49
Age of household head	41.94	10.81
College degree (1=yes)	0.28	0.45
Married (1=yes)	0.54	0.50
Head employed (1=yes)	0.84	0.37
Head labor income	36.72	35.47
Head pension or employer-sponsored retirement contributions (1=yes)	0.50	0.50
Stock market participation (1=yes)	0.25	0.43
Total new wealth (TNW)	134.18	255.36
Spouse employed (1=yes)	0.39	0.49
Spouse labor income	12.60	19.51
Spouse pension or employer-sponsored retirement contributions (1=yes)	0.22	0.42
Change in family status: married to single (1=yes)	0.28	0.45
Change in family status: single to married (1=yes)	0.11	0.32
MSA employment shock	0.17	0.02
County earnings growth	1.31	4.94

Panel B: Growth in total net wealth by house price growth and homeowner status		
House price growth	Homeowner Increase in net wealth	Renter Increase in net wealth
25 percentile	429.570	113.082
50 percentile	503.411	134.401
75 percentile	774.880	316.20
90 percentile	919.737	479.555

Notes: Sample includes 1299 PSID households observed in 1999 and 2019 located in 81 MSAs. All variables are initial (1999) values, except where noted. All dollar amounts are expressed in 1000s of dollars.

TABLE 2A

Impact of house price growth on long-run total household net wealth (trimmed sample)

	(1) OLS	(2) IV	(3) IV FE	(4) IV Owners	(5) IV Renters
House price growth	65.888	-33.673			84.15
	(116.003)	(208.392)			(191.83)
House price growth *OWN	363.278***	519.293**	937.865**	455.44*	
	(137.143)	(246.584)	(451.743)	(261.24)	
Homeownership	-221.578*	-345.260	-665.617*		
	(130.507)	(214.888)	(371.892)		
Age of household head	4.106	3.881	0.076	4.56	12.53
	(13.104)	(12.986)	(12.701)	(23.63)	(10.38)
Age squared	-0.082	-0.079	-0.023	-0.11	-0.17
	(0.150)	(0.149)	(0.144)	(0.26)	(0.12)
College degree	288.652***	289.312***	309.896***	380.31***	79.38
	(63.730)	(62.786)	(72.547)	(82.36)	(62.06)
Married	15.180	18.201	30.328	-38.60	32.22
	(77.455)	(77.549)	(85.170)	(112.34)	(83.91)
Head employed	-46.918	-46.06	-41.243	-113.28	-3.38
	(85.405)	(82.798)	(91.374)	(149.57)	(54.15)
Head labor income	3.289*	3.295*	3.190*	3.20	3.38
	(1.806)	(1.794)	(1.925)	(2.02)	(2.40)
Head pension	20.475	20.877	53.069	41.04	-12.85
	(65.074)	(66.304)	(70.887)	(95.37)	(53.25)
Stock market participation	236.771***	239.128***	206.047**	220.05**	281.46**
	(83.179)	(80.859)	(81.677)	(92.78)	(126.28)
Total net wealth (TNW)	0.004	-0.004	-0.065	0.07	0.09
	(0.186)	(0.180)	(0.202)	(0.18)	(0.68)
TNW*yrs-to-retire	0.065***	0.065***	0.068***	0.06***	0.03
	(0.019)	(0.019)	(0.020)	(0.02)	(0.04)
Spouse employed	4.371	1.098	3.747	31.88	-88.11
	(87.753)	(86.731)	(91.887)	(105.34)	(102.35)
Spouse labor income	-2.763*	-2.764*	-2.610*	-3.65**	3.27
	(1.497)	(1.476)	(1.579)	(1.76)	(5.31)
Spouse pension	144.621	146.889*	134.128	139.25	163.98
	(89.858)	(88.628)	(84.764)	(103.01)	(192.04)
Married to single	-95.526**	-95.304**	-96.202**	-	10.14
	(41.558)	(41.974)	(45.208)	187.09***	(74.18)
				(59.08)	
Single to married	52.638	51.151	75.494	82.76	19.31
	(56.014)	(54.495)	(57.990)	(108.60)	(52.67)
MSA predicted employment shock	-1.862	31.189		537.66	-1709.40**
	(952.420)	(930.097)		(1653.80)	(687.65)
Constant	-74.394	1.153		-305.80	16.07
	(316.470)	(324.365)		(572.31)	(252.43)
MSA FE	No	No	Yes	No	No
Sample size	1299	1299	1299	775	524

Notes. Dependent variable is the change in total net wealth (TNW) from 1999 to 2019. **Bold** variables are instrumented in columns (2)-(4). All control variables are initial (1999) values, except where noted. Sample includes 1299 PSID households observed 1999 to 2019. All dollar amounts are expressed in 1000s of dollars. The standard errors are heteroscedastic-robust and clustered on MSA (reported in parentheses). ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

TABLE 2B

First stage results corresponding to Table 2A

	(2) IV		(3) IV FE	(4) IV Owners	(5) IV Renters
	House price growth	**House price growth* own**	**House price growth* own**	**House price growth* own**	**House price growth* own**
MSA predicted employment shock *Saks	0.735*** (0.187)	(0.007) (0.040)		0.823*** (0.196)	0.725*** (0.180)
MSA predicted employment shock *Saks*own	0.091 (0.091)	0.850*** (0.185)	0.767*** 0.190		
Other controls ('included instruments')	Yes	Yes	Yes	Yes	Yes
Sanderson-Windmeijer	16.77	21.68	16.17	17.61	16.20

Notes: **Bold** variables are instrumented right-hand side variables in second stage. ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

TABLE 3A

Impact of local house price growth and homeownership on the change in total net wealth 1999 to 2019 (untrimmed sample)

	(1) IV	(2) IV MSA FE	(3) IV Owners	(4) IV Renters	(5) IV Winsorize	(6) IV FE Winsorize	(7) IV Winsorize Owners	(8) IV FE Winsorize Renters
Price growth	-126.09		562.16**	99.02	0.60		538.89**	82.31
	(278.21)		(271.98)	(198.31)	(216.53)		(219.49)	(197.55)
Price growth* Homeownership	694.90**	924.92***			544.04**	716.85***		
	(311.58)	(321.03)			(255.73)	(260.84)		
Homeownership	-572.76**	-784.45***			-328.82	-477.34**		
	(253.06)	(279.66)			(208.72)	(230.17)		
College degree	349.28***	367.37***	409.62***	114.76*	325.31***	338.25***	423.85***	109.26*
	(62.98)	(69.75)	(88.03)	(60.08)	(61.06)	(70.08)	(78.37)	(57.04)
Stock market participation	238.22***	212.10**	211.62**	231.48*	273.66***	255.50***	270.62***	234.98*
	(88.28)	(84.18)	(101.16)	(127.08)	(74.69)	(73.72)	(85.05)	(126.14)
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA employment shock	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	1327	1327	794	533	1327	1327	794	533

Notes: Dependent variable is the change in total net wealth (TNW) from 1999 to 2019. **Bold** variables are instrumented in columns (2) and 3). All control variables are initial (1999) values, except where noted. Sample includes 1327 PSID households observed 1999 to 2019. All dollar amounts are expressed in 1000s of dollars. The standard errors are heteroscedastic-robust and clustered on MSA (reported in parentheses). ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

TABLE 3B
First stage results corresponding to TABLE 3A

	(1) IV		(2) IV FE	(3) IV Owners	(4) IV Renters	(5) IV Winsorize		(6) IV FE Winsorize	(7) IV Winsorize Owners	(8) IV Winsorize Renters
	House price growth	**House price growth* own**	**House price growth* own**	**House price growth**	**House price growth**	**House price growth**	**House price growth* own**	**House price growth* own**	**House price growth**	**House price growth**
MSA employment shock *Saks	0.731*** (0.192)	-0.010 (0.041)		0.844*** (0.196)	0.718*** (0.183)	0.733*** (0.191)	-0.008 (0.041)		0.841*** (0.196)	0.716*** (0.184)
MSA employment shock *Saks*own	0.116 (0.089)	0.869*** (0.182)	0.787*** (0.193)			0.111** (0.893)	0.865*** (0.183)	0.786*** (0.193)		
Sanderson Windmeijer	16.09	23.04	16.65	18.46	15.45	22.94	16.19	16.62	18.39	15.20

Notes: **Bold** variables are instrumented right-hand side variables in second stage. ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

TABLE 3C
Falsification test: correlations between local house price growth,
a rising college premium and local variation in stock investment behaviour
(trimmed sample)

Panel A. Second stage estimates	(1) IV FE
Price growth * OWN	1111.323*** (350.991)
Price growth * college	362.884 (423.293)
Price growth * stocks	-858.900** (473.027)
Homeownership	-806.464*** (291.722)
College degree	19.278 (359.547)
Stock market	887.713*** (394.783)
Household controls	YES
MSA employment shock	YES
Sample size	1299

Panel. B. First stage estimates	(1a) **Price growth * OWN**	(1b) **Price growth * college**	(1c) **Price growth * stocks**
MSA predicted employment shock *Saks*own	0.758*** (0.192)	-.002 (0.033)	-0.005 (0.027)
MSA predicted employment shock *Saks*college	0.020 (0.029)	0.813*** (0.186)	0.016 (0.026)
MSA predicted employment shock *Saks*stocks	0.019 (0.026)	0.025 (0.038)	0.843*** (0.202)
Other controls (‘included instruments’)	Yes	Yes	Yes
Sanderson Windmeijer	18.53	21.00	21.36

Notes. Dependent variable is the change in total net wealth (TNW) from 1999 to 2019. All control variables are initial (1999) values, except where noted. Sample includes 1299 PSID households observed 1999 to 2019. All dollar amounts are expressed in 1000s of dollars. The standard errors are heteroscedastic-robust and clustered on MSA (reported in parentheses). ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

TABLE 4

Marginal effects of local house price growth on long-run total net wealth by percentile of the HPI growth distribution

	IV	IV FE
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 25th	-45.11	-123.44
	(93.85)	(127.98)
$\frac{dTNWchg}{dOWN}$ evaluated at hPIg 50th	76.92	94.05
	(72.33)	(76.18)
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 75th	160.22**	247.30**
	(81.53)	(107.39)
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 90th	221.29**	356.66**
	(98.35)	(149.28)
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 95th	262.31**	431.68**
	(112.47)	(181.30)
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 99th	298.61**	487.96**
	(126.16)	(206.21)
Sample size	1299	1299

Notes. Trimmed sample. The marginal effects are computed using the finite-difference method for binary regressors and as the weighted sample average of the ME for each household (with delta-method standard errors reported in parentheses). ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

TABLE 5

Total, housing market and sorting effect (in $1,000)

Panel A. Homeowners and renters						
	Total effect		Housing market effect		Sorting	
	SAKS >0	top 15%	SAKS >0	top 15%	SAKS >0	top 15%
Own	677.6	766.1	541.7	642.1	135.9	124.0
Rent	199.6	372.5	410.8	410.8	-211.2	-38.3
Own - Rent	478.0	393.6	130.9	231.3	347.1	162.3
P-values	(.000)	(.000)	(.096)	(.041)		
	SAKS<0	bottom 15%	SAKS<0	bottom 15%	SAKS<0	bottom 15%
Own	495.6	624.7	341.9	285.7	153.7	339.0
Rent	174.4	227.9	410.8	410.8	-236.4	-182.9
Own - Rent	321.2	396.8	-68.9	-125.1	390.1	521.9
P-values	(.000)	(.000)	(.524)	(.331)		
Panel B. Homeowners only						
	SAKS >0	top 15%	SAKS >0	top 15%	SAKS >0	top 15%
Own	670.6	747.7	628.93	640.2	41.67	107.5
	SAKS<0	bottom 15%	SAKS<0	bottom 15%	SAKS<0	bottom 15%
Own	500.0	560.9	527.4	488.62	-27.4	72.28
Difference	170.6	186.8	101.5	151.8		
P-values	(0.037)	(0.089)	(0.076)	(0.076)		

Notes. Panel A reports the estimated total, housing market and sorting effects based on all household and our preferred specification reported in Table 2A, col. 3, IV with MSA fixed effects. Panel B reports for homeowners only using the IV specification reported in Table 2A, col. 4. The total effect is the weighted average household predicted wealth change of actual residents. The housing market effect is computed as the weighted average household predicted wealth at actual household characteristics and setting MSA characteristics to reflect MSA regulatory status. The sorting effect is the total effect minus the housing market effect. P-Value of indicated difference is reported in parentheses.

TABLE 6
Impact of home purchase timing on future household total net wealth
(panel regression trimmed sample)

	(1) FE model	(2) Quantile
2001 new owner	135.5**	109.59***
	(63.97)	(14.33)
2007 new owner	-139.10**	-15.37**
	(70.41)	(7.19)
2001 new owner*SAKS	228.01***	100.81***
	(68.60)	(20.22)
2007 new owner*SAKS	78.92	-7.64
	(82.32)	(9.90)
Household time-varying controls	Yes	Yes
Individual FE	Yes	Yes
Year FE	Yes	Yes
Sample size	3952	3952

Notes: The data are a three-period panel of all PSID renters and new homeowners observed at time *t*, *t*=2001, 2007 and 2013. The dependent variable is the six-year change in net wealth (in thousands of dollars). ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

TABLE 7
Homeowner home equity cash-out behavior 1999 to 2019

	IV1	IV2	IV3
House price growth rate	-.2719		
	(.6785)		
House price index in levels		-.0002	-.0000
		(.0021)	(.0020)
House price index in levels *stocks			-.0001
			(.0002)
Household time-varying controls	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Sample size	24637	24637	24637

Notes: The dependent variable is "Cash out," which equals 1 if the homeowner has not moved in the prior 12 month period, has not purchased additional real estate such as a second home in the prior 12 month period and total mortgage has increase by $1000 or more in the last 12 month period, and zero otherwise. ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively.

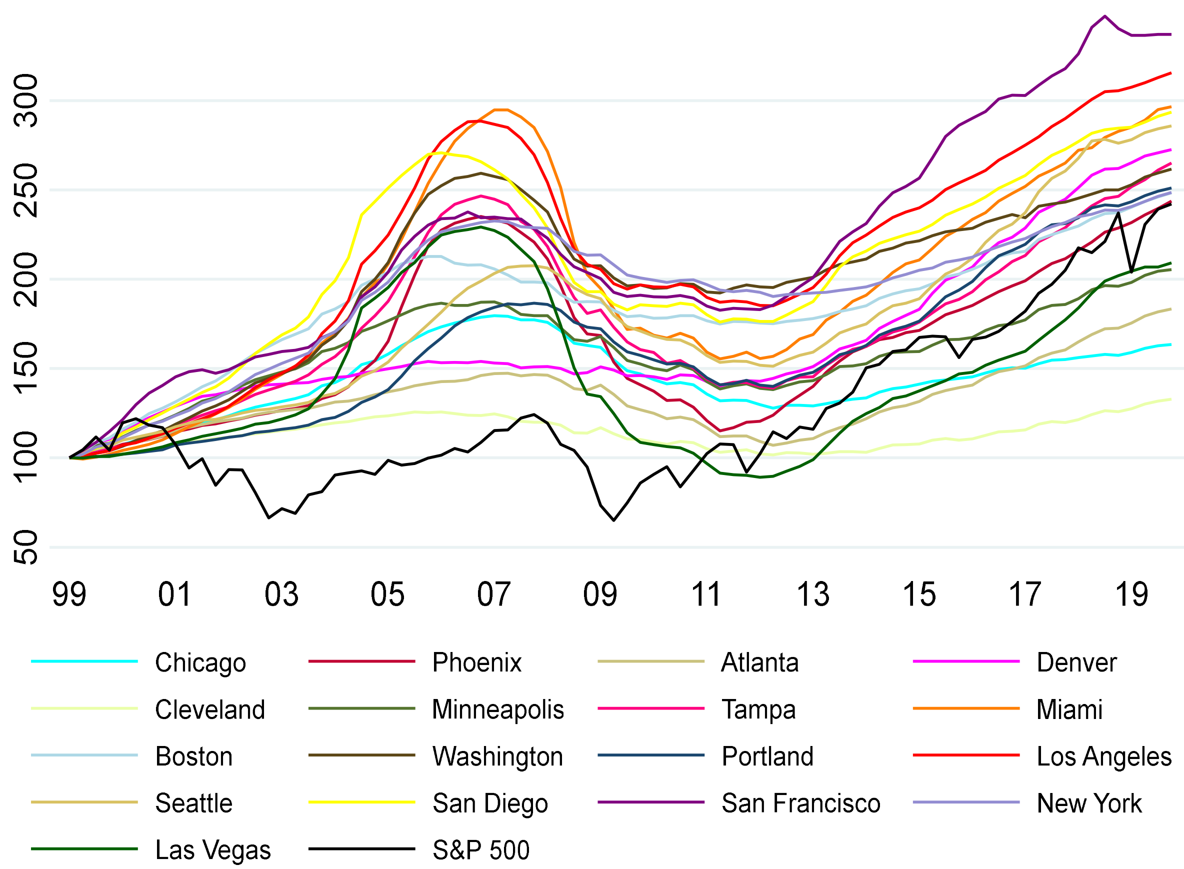
TABLE 8
Gini coefficient measuring wealth inequality

Household Total Net Wealth	1999 Gini	2019 Gini	% Change by year
PSID cross sections	0.741	0.754	1.8%
SAKS above median	0.776	0.779	0.3%
SAKS below median	0.721	0.716	-0.7%
top 15% SAKS	0.703	0.795	13.1%
bottom 15% SAKS	0.738	0.748	1.4%
top 20% SAKS	0.685	0.783	14.2%
bottom 20% SAKS	0.713	0.738	3.5%

Notes: The Gini coefficient is computed for household total net wealth using the weight 1999 and 2019 PSID cross sections. We compute the Gini for the full sample and by MSA status. We categorize MSAs based on regulatory restrictiveness and Census 2000 population. For example, the “Top/bottom 15% SAKS” are most/least regulated MSAs comprising a cumulative top 15%/bottom 15% of the 2000 census population.

FIGURES

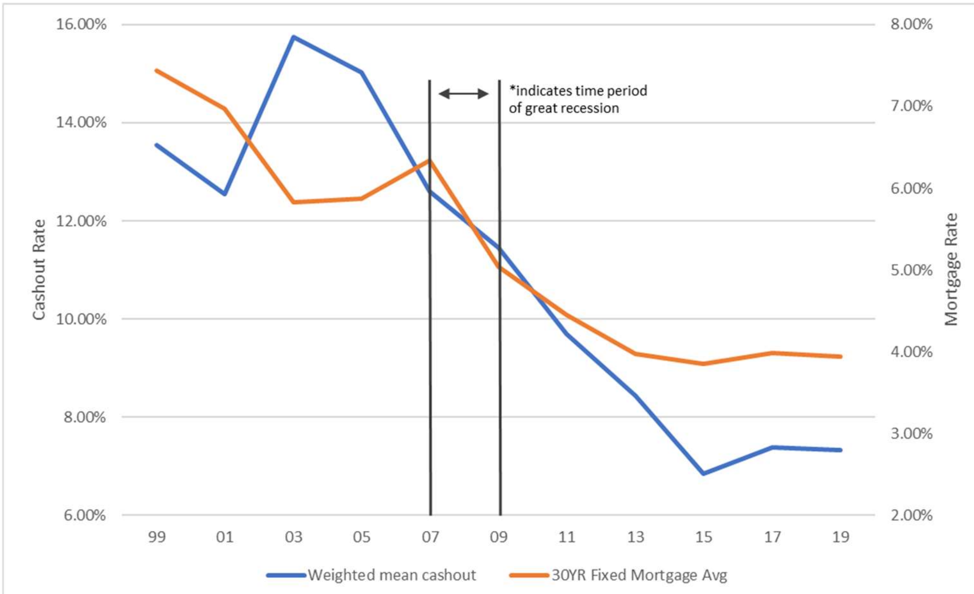
FIGURE 1
House price movements for selected metro areas and S&P 500 index from 1999 to 2019
(1999 = 100)



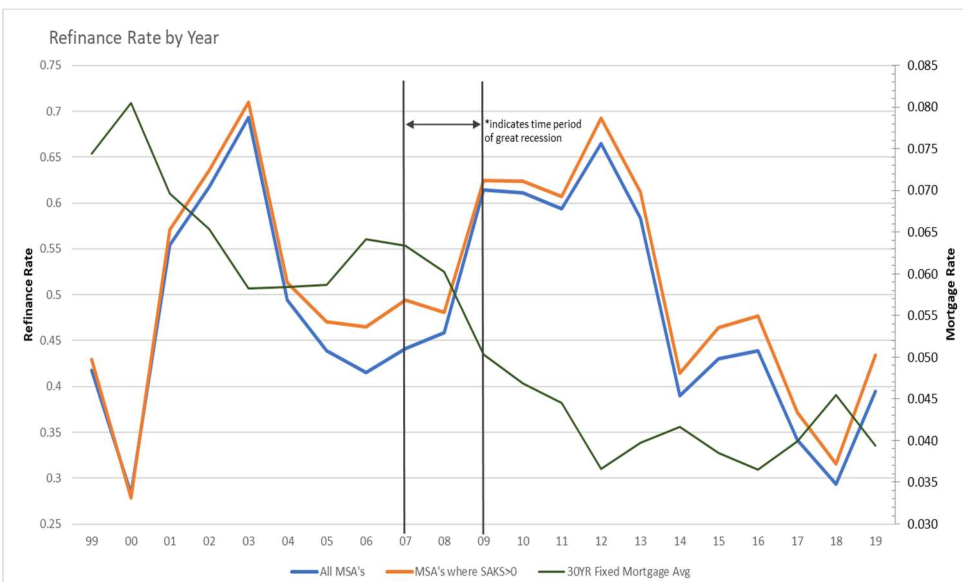
Notes: Data: FHFA metropolitan all-transactions house price indexes. The S&P 500 index value is end-of-the month adjusted-close share price.

FIGURE 2
Household refinancing behavior, interest rates and the business cycle

Panel A. Percent of US households cashing-out home equity.



Panel B. Refinancing behavior as a share of mortgage originations by regulatory restrictiveness and annual average 30-year fixed mortgage rate.



Notes: Panel A data are estimated from PSID households. Panel B is derived from HMDA data and includes the universe refinances as a fraction of total loan originations.

Appendix TABLES

Appendix TABLE A1
PSID wealth data

PSID wealth component	PSID survey question
Business assets (S803)	Do you (or anyone living there) own part or all of a farm or business? If you sold all that and paid off any debts on it, how much would you realize on it?
Checking/savings (S805)	Do you (or anyone living there) have any money in checking or savings accounts, money market funds, certificates of deposit, governmental savings bonds, or treasury bills -- not including assets held in employer-based pensions or IRAs? If you added up all such accounts (for all of your family living there), about how much would they amount to right now?
Stocks (S811)	Do you (or anyone living there) have any shares of stock in publicly held corporations, mutual funds, or investment trusts -- not including stocks in employer-based pensions or IRAs? If you sold all that and paid off anything you owed on it, how much would you have?
IRA/private annuities (S819)	Do you (or anyone living there) have any money in private annuities or Individual Retirement Accounts (IRAs)? How much would they be wealth?
Net wealth of vehicles (S813)	What about the value of what you (or anyone in your family living there) own on wheels? Including personal vehicles you may have already told me about and any cars, trucks, a motor home, a trailer, or a boat -- what are they wealth all together, minus anything you still owe on them?
House value (A20)	Could you tell me what the present value of your [house/apartment] is — I mean about how much would it bring if you sold it today?
Mortgage balances (A24 - 2 mentions)	About how much is the remaining principal on this mortgage? (includes land contract, loan from seller, home equity loans, home improvement loans, line of credit loans)
Net wealth of real estate excluding primary residence (S809)	Do you (or anyone living there) have any real estate other than your main home, such as a scond home, land, rental real estate, or money oved to you on a land contract? If you sold all that and paid off any debts on it, how much would you realise on it?
Other assets (S815)	Do you (or anyone living there) have any other savings or assets, such as bond funds, cash value in a life insurance policy, a valuable collection for investment purposes, or rights in a trust or estate that you haven't already told us about? If you sold that and paid off any debts on it, how much would you have?
Other debt (S807)	Aside from the debts that we have already talked about, like any mortgage on your main home or vehicle loans -- do you [or anyone in your family living here] currently have any other debts such as credit card charges, student loans, medical or legal bills, or loans from relatives? If you added up all these debts [for all of your family living here], about how much would they amount to right now?

Note: Excerpt from Pfeffer et al. (2015), Table A1, pp. 22.

Appendix TABLE A2
Industry Composition of Employment, 1994

Industry	Share of total employment
Agriculture	1.0%
Mining	0.5%
Construction	4.7%
Manufacturing	15.6%
Transportation; Utilities	5.1%
Wholesale Trade	4.6%
Retail Trade	12.4%
Finance, Insurance, and Real Estate	6.3%
Services	43.9%
Public Administration	5.9%
Total	**100%**

TABLE A3

Household mobility and cross-state relocation

Panel A. Reasons why households move	Percent
Purposive productive reasons: i.e., to take another job; transfer	6.0%
To get nearer to work	4.3%
Purposive consumptive reasons--expansion of housing, i.e., more space; better place	17.4%
Purposive consumptive reasons--contraction of housing: i.e., less space	7.2%
Purposive consumptive--other house-related: want to own home; got married	25.2%
Purposive consumptive--neighborhood-related: better neighborhood; go to school; to be closer to friends and/or relatives	9.6%
Response to outside events (involuntary reasons): HU coming down; being evicted; armed services, etc.; health reasons; divorce; retiring because of health	14.8%
Ambiguous or mixed reasons: to save money; all my old neighbors moved away; retiring	15.6%
Panel B. Fraction of household heads that reside in their home state	
All MSAs	62%
MSAs above with median regulatory restrictiveness	60%

Notes: Panel A data are PSID households that moved and responded to the survey question, "Why did you move?" The data are 32651 movers in the US during the time period 1999 to 2019. Panel B examines the weight average percent of household heads residing in the state in which they grew up. Panel B includes a subset of 21435 households residing in 81 Saks MSAs during the time period 1999 to 2019.

TABLE A4
Robustness check: potential endogeneity of homeownership
to future wealth accumulation

Panel A. Tenure choice model

	(1)	(2)	(3)	(4)	(5)
Future gift receipt	-0.0513	-0.0291		-0.0526	-0.0293
	(0.0511)	(0.0916)		(0.0518)	(0.0923)
Future gift amount	0.0011			0.0011	
	(0.0009)			(0.0009)	
Future gift 25th percentile		0.0197			0.0196
		(0.1126)			(0.1124)
Future gift 50^{th} percentile		0.0603			0.0596
		(0.1686)			(0.1665)
Future gift 75^{th} percentile		0.0112			0.0108
		(0.1741)			(0.1728)
Future earnings			0.0000	0.0001	0.0000
			(0.0002)	(0.0002)	(0.0001)
Household controls	YES	YES	YES	YES	YES
MSA FE	YES	YES	YES	YES	YES

Panel B. Baseline marginal effects: impact on household total net wealth accumulation

	(1)	(2)	(5)
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 25^{th}	-105.26	-118.08	-119.38
	(127.26)	(127.38)	(128.44)
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 50^{th}	98.55	91.40	91.14
	(76.20)	(76.98)	(76.98)
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 75^{th}	**242.15****	**239.00****	**239.47****
	(109.00)	**(110.23)**	**(110.16)**
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 90^{th}	**344.63****	**344.32****	**345.32****
	(151.61)	**(152.99)**	**(153.21)**
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 95^{th}	**414.94****	**416.58****	**417.95****
	(184.03)	**(185.50)**	**(185.94)**
$\frac{dTNWchg}{dOWN}$ evaluated at HPIg 99^{th}	**467.67****	**470.78****	**472.42****
	(209.21)	**(210.76)**	**(211.37)**

Notes. Dependent variable in Panel A is *Homeownership*, equal to 1 if the household is an owner-occupier and zero if the household rents in 1999. In Panel B, the marginal effects correspond to Table 4 in the text. The dependent variable is the change in total net wealth (*TNWchg*) from 1999 to 2019 using the baseline model IV with MSA FE. All control variables are initial (1999) values, except where noted. Sample includes 1299 PSID households observed 1999 to 2019. All dollar amounts are expressed in 1000s of dollars. The standard errors are heteroscedastic-robust and clustered on MSA (reported in parentheses). ***, **, * denotes individual statistical significance at the 99%, 95% and 90% level of confidence, respectively

TABLE A5

Robustness check: WRLURI Total, housing market and sorting effect (in $1,000)

	Total effect		Housing market effect		Sorting	
	WRLURI >0	top 15%	WRLURI >0	top 15%	WRLURI >0	top 15%
Own	638.4	699.4	531.4	554.4	106.6	145.0
Rent	201.5	119.7	373.1	373.1	-171.6	-253.3
Own- Rent	437.0	579.7	158.8	181.3	278.2	398.4
(p-value)	(.000)	(.000)	(.026)	(.021)		
	WRLURI<0	bottom 15%	WRLURI<0	bottom 15%	WRLURI<0	bottom 15%
Own	464.1	395.5	386.8	354.3	77.2	41.2
Rent	143.2	113.3	373.1	373.1	-230.0	-259.7
Own-Rent	436.9	282.2	13.8	-18.8	423.2	301.0
(p-values)	(.000)	(.000)	(.387)	(.850)		

Note: P-Values of Own-Rent difference are reported in parentheses.

TABLE A6

Fixed effects model of eight-year net wealth impact

	Coefficient estimate
House price growth 2011 to 2019	5.96 (31.39)
HPI*homeownership	113.04** (53.00)
Homeownership (yes = 1)	-54.82*** (20.86)
Change in household labor income (head and spouse if present) from 1999 to 2011 in 1000s of dollars	0.09 (0.09)
Head has no employer-sponsored pension in 1999 but acquires an employer sponsored pension 2011 (yes = 1)	-4.23 (12.15)
Head hold no stock in 1999 but acquires stock by 2011 (yes = 1)	-33.03* (17.57)
Household has no kids in 1999 but has children by 2011 (yes = 1)	13.23 (12.19)
Household head is age 55 or less in 2011 (yes = 1)	2.65 (9.48)
Household is single in 1999 but marries by 2011 (yes = 1)	14.61 (12.51)
Constant	-2.59 (14.04)

Notes: Dependent variable is the change in net savings from the period 1999 to 2007 to the period 2011 to 2019. Sample includes 674 PSID renter households observed in 1999. All dollar amounts are expressed in 1000s of dollars. ***, **, * denotes statistical significance at the 99%, 95% and 90% level of confidence, respectively. Standard errors are in parentheses.

Appendix FIGURES

Appendix FIGURE A1
US national employment index by industry