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Abstract

This paper examines the extent to which homeownership had an independent effect on the ability of low- and moderate income (LMI) households to accumulate wealth during the mid to late 1990s. Using household data from the PSID, we generate a panel of households whose homeownership we observe over a 15 year period and whose wealth accumulation we observe at three points in time: 1994, 1999 and 2001. We investigate the extent to which homeownership has an independent impact on the wealth accumulation of LMI households, controlling for a host of other variables and unobserved heterogeneity. Accounting for the skewed nature of the wealth distribution, we find that each additional year of homeownership increases total net wealth by $13.7 K on average for the full sample. Interacting income status with years of homeownership indicates that the impact of homeownership varies by income status, with each additional year of homeownership being associated with $15 K more in wealth holdings for high-income households and roughly $6 to 10 K more in wealth holdings for LMI households.

JEL Classification: R20, D12, D31

Keywords: homeownership, low-income, wealth accumulation.

1. Introduction

This paper examines the extent to which homeownership had an independent effect on the ability of low- and moderate income (LMI) households to accumulate wealth during the mid to late 1990s, a period of unprecedented wealth accumulation in the United States. In addition to the strong stock market gains, real house price appreciation accelerated during this time period, with nominal house prices up 27.3% for the U.S. as a whole, versus 12.4% for the CPI, from 1996 to 2001 (Case and Marynchenko, 2002). Examining the wealth accumulation of households during this time period provides an important glimpse into the role homeownership can play in increasing wealth in a healthy economy without strong national house-price volatility. The recent house price cycle which added $10 trillion in value to residential real estate on the way up between 2000 and 2005 (Case and Quigley, 2008) and the subsequent housing downturn represent an extraordinary time period in housing markets. We propose that the relatively stable housing markets of the mid-to-late 1990s is a good starting point for examining homeownership and wealth accumulation.

Among other things, homeownership has been promoted as a means to enable LMI households to build assets (see Retsinas and Belsky, 2002), and policy initiatives contributed to the growth in low-income homeownership during the 1990s, making the topic of LMI homeownership and wealth accumulation timely and important.[1] We know that the median net wealth of homeowners is higher than that of renters (see Carasso and McKernan, 2007, 2008), even when they are compared across age groups, race, ethnicity and annual income (Di, 2001, 2003). Even after the dramatic stock market gains of the late 1990s, by 2001 home equity remained the primary source of wealth for most households, especially for lower income homeowners, with home equity comprising 42% of the total household net

[1] Using Current Population Survey data, Bostic and Surette (2001) find that from 1989 to 1998 homeownership rates for the lowest and second lowest income quintiles increased by one and three percent, respectively, and attribute these increases to federal policy initiatives. Can, Bogdan, and Tong (1999) find that from 1993 to 1997, mortgage originations in predominately minority neighborhoods increased by 40 percent, and rose by 31 percent in low-income neighborhoods, as compared to a 20 percent increase in metropolitan areas nationwide.

wealth of all homeowners and 77% of the total net wealth of lower income homeowners (Di, 2003). Indeed, several papers have documented the importance of home equity as a source of savings for lower income households.[2]

As a mechanism to force households to save, homeownership may independently serve to increase wealth. Households must save (or receive a gift) for a down payment and make monthly payments toward the purchase of the asset.[3] There is strong incentive to meet the contracted monthly payments, as failure to do so results in serious financial and other consequences. As Quigley (2006) opines, "It is hard to imagine another contract savings program which threatens low savers with eviction" (p. 171). The process of purchasing the asset may enable LMI households to save who might not otherwise do so due to the pressures of subsistence, day-to-day living that leaves little room in the budget for saving. In addition, homeowners accumulate real wealth to the extent that the home experiences real increases in value. Moreover, Thaler (1990) maintains that the various forms of wealth are not close substitutes and that individuals have a low marginal propensity to consume home equity, suggesting that increases in equity translate into greater net wealth.

However, there are reasons why homeownership may not enable a LMI household to increase its net wealth. LMI households may spend down the equity in their homes either directly, through the various mortgage products offered, or indirectly by reducing non-housing savings or increasing non-mortgage debt. In this way, homeownership may facilitate consumption smoothing, but not increase net wealth. In addition, LMI households are more likely to experience income instability than high income households, and the mortgage commitment and potentially higher real housing costs of owning relative to renting, especially in the early years of homeownership, may generate significant dissaving for LMI households. Households suffering a permanent income shock cannot easily get out from under the

[2] For example, see Boehm and Schlottmann (2004), Carney and Gale (2001) and Haveman and Wolff (2001).
[3] Several papers have documented the importance of financial gifts to help first-time home buyers purchase a home, for example, see Engelhardt and Mayer (1994) and a more recent examination by Luea (2008).

financial commitment of homeownership as the process of selling a home can be time consuming and costly. Moreover, LMI homeowners are substantially more likely to exit homeownership than other households (Turner and Smith, 2009), and housing instability will tend to mitigate the wealth creation effects of homeownership (Boehm and Schlottmann, 2004). Finally, as we note in section 2, it is not clear that LMI households are reaping the gains of real house-price appreciation on their homes.

An empirical examination of the independent impact of homeownership on wealth accumulation is complicated by issues of endogeneity and unobserved heterogeneity.[4] Consider a regression of current wealth holdings on the household's current homeownership state as well as other controls to test whether homeownership causes wealth. The requirement of a down payment means that households must acquire some wealth before purchasing a home, thus wealth is necessary for homeownership.[5] In such a wealth regression, therefore, a control for homeownership state would be endogenous. A two-stage least squares approach would be burdened by identification issues: finding a control that determines homeownership, for example, but not wealth holdings. In a study of the impact of homeownership on child outcomes, Haurin, Parcel and Haurin (2002) use the relative price of homeownership as the key identifying variable. This variable would not be adequate in the present study, however, as the user cost of housing is likely to be correlated with wealth accumulation. We propose an alternative approach to two-stage least squares that controls for homeownership in a wealth equation, which we present in section 4. In addition to endogeneity, there are likely to be unobservable characteristics that cause some individuals to have high rates of saving and a high likelihood of homeownership. In this case, wealth and homeownership are jointly determined, but the omission of key explanatory variables in the wealth equation would result in the appearance that homeownership creates wealth. Indeed, economists have

[4] See Dietz and Haurin (2003) for a thorough discussion of the econometric issues that may arise when estimating the consequences of homeownership.

[5] Numerous studies have documented the importance of wealth as a determinant of homeownership (e.g., Henderson and Ioannides (1987), Linneman and Wachter (1989), Haurin (1991), Haurin, Hendershott and Kim (1994), Engelhardt and Mayer (1994), Gyourko, Linneman and Wachter, 1999; Charles and Hurst, 2002; Gyourko, 2003, Turner and Smith; Hilber and Liu, 2008).

long recognized that savers may differ in some unobservable and fundamental way from non-savers (see Engen, Gale and Scholz, 1996), suggesting the importance of controlling for unobserved heterogeneity.

Using data from the Panel Study of Income Dynamics (PSID) and the PSID wealth supplements, we follow households over a 15 year time period, from 1987 to 2001, and provide a first look at the consequences of homeownership for the wealth accumulation of LMI households. We estimate the determinants of household wealth using a panel of households whose wealth we observe at three points in time: 1994, 1999 and 2001, and an approach that controls for homeownership and unobserved heterogeneity. We focus on pre-retirement households and provide a careful definition of income groups that identifies those with low and moderate lifetime income. As a preview of our findings: The prognosis is good. Indeed, after controlling for a number of important variables and unobserved heterogeneity, we find that each additional year of homeownership has a substantial impact on the total net wealth of LMI households, increasing total net wealth by roughly $10 K per year on average. With average LMI wealth holdings at $89 K in 2001, such an increase in wealth represents a sizeable amount, at a roughly 11% increase in net wealth per year. The remainder of this paper is organized as follows. Section 2 discusses related literature. Section 3 presents the determinants of household wealth framed in a discussion of economic theory. Section 4 discusses our data and econometric approach. Section 5 presents our empirical results, and section 6 concludes.

2. Literature on housing wealth and savings behavior

To our knowledge, there is just one study to date that examines the causal effect of homeownership on wealth accumulation. Di, Belsky and Liu (2007) use the PSID to follow a sample of renters in 1989 over time and model the impact of homeownership duration on wealth holdings in 2001. In contrast to our random effects analysis, Di et al. is a cross-sectional analysis of wealth holdings; however, they attempt to control for unobserved differences across households in the propensity to save

by including in their regression analysis a control for household wealth as a share of cumulative household income in the five years leading up to 1989. Similar to our findings, Di et al. find that homeownership duration has a positive and significant effect on wealth accumulation. They do not examine LMI households.

There is an extensive literature on the extent, determinants and consequences of house-price appreciation (see Dietz and Haurin for a review). However, there are only a few studies to date that directly examine the house price appreciation experienced by LMI homeowners. Di (2001) and Duda and Belsky (2001) find that metropolitan-area homes that are affordable to low-income households appreciate at rates as good as those experienced by higher income households.[6] Case and Marynchenko examine house price appreciation in Boston, Chicago and Los Angeles and find mixed results however: the appreciation experienced in low-income zip codes depends on the time of purchase and local and regional economic conditions. Moreover, although the potential for gains exist, house prices can be volatile, and homeowners in many cities (and nationally at present) have experienced declining home prices in the last twenty years.[7] In addition, the investment returns to homeownership depend on the timing of home purchase and subsequent sale, factors which lower income households may have less ability to affect, and Duda and Belsky find that losses at the time of sale are common.[8] Thus, from this literature, it is not evident that LMI households are experiencing rising net wealth from their homeownership investment.

The literature examining the consequences of house-price appreciation for savings behavior is voluminous. The macro literature finds strong evidence that that household consumption increases in

[6] Duda and Belsky indicate that their results must be interpreted with some caution, however, as their sample includes all residential housing units, both owner occupied and rental, and they are unable to distinguish the owner-occupied units. Their results are in part capturing the returns to landlords of low-income units.

[7] Numerous studies have examined volatility in house prices, for example, see Tracy et al. (1999), Case and Shiller (1994), Caplin et al. (1997), Sheffrin and Turner (2001), Turner (2003), Quigley (2006), Turner and Seo (2007) and Case and Quigley (2008).

[8] Based on a sample of repeat sales in four metropolitan areas, Duda and Belsky find, "…homeowners frequently sell homes for less than they bought them for in nominal terms and that especially large shares of them resell after experiencing real house-price appreciation insufficient to even cover the transaction costs" (p. 22).

response to rising housing market wealth (Case, Quigley and Shiller, 2005; Cambell and Cocco, 2007; Smith and Searle, 2008), suggesting that increases in house value are not translating fully into greater net wealth. The micro literature is less conclusive. Several papers have empirically examined the impact of housing wealth on savings behavior using household level data, such as Skinner (1989, 1993), Hoynes and McFadden (1994) and Engelhardt (1996). Consistent with Thaler, Skinner (1989) finds little effect of house value on household savings behavior, and Hoynes and McFadden find that increases in housing wealth do not cause offsetting reductions in savings. Skinner (1993) finds that the relationship between saving and housing wealth depends on age: an inverse relationship between housing wealth and savings exists for young homeowners; using micro data, a one dollar increase in housing wealth reduces saving by 1 to 2 cents (p. 41). However, the elderly are unresponsive to housing wealth windfalls unless facing adverse economic events. Engelhardt finds that the relationship between real savings and house price appreciation is asymmetric: households that experience real housing capital gains do not change their active saving. However, for every dollar of real housing capital losses, the household increases its saving by 35 cents (p. 22). Taken as a whole, although these micro studies do not have as their stated goal identifying the independent effect of homeownership on net wealth, they do suggest that households respond to increases in housing wealth by maintaining non-housing saving (except for Skinner, 1993), providing evidence that homeownership contributes to wealth accumulation.

3. Determinants of wealth accumulation

As laid out in the life-cycle model, an individual's consumption and savings decisions in a given year depend upon the individual's expected economic circumstances over his or her lifetime (Modigliani and Brumberg, 1954). Equivalently, individuals make consumption and therefore savings decisions based on their permanent income, which reflects the individual's permanent or long-term consumption opportunities (Friedman, 1957). Receipt of income, whether realized such as earned income or

unrealized such as housing capital gains, is but one factor shaping the lifelong consumption opportunities of the individual and is saved to the extent that it generates consumption possibilities that deviate from permanent income. An individual's permanent income depends upon their human capital endowment or ability to earn and may be proxied by the individual's highest education level attained; it also depends on an individual's initial endowment such as family financial support, which we proxy by controlling for receipt of an inheritance or lump-sum payment.

In the life-cycle model, expected income growth during the working years and the desire to smooth consumption implies that age plays an important role in asset accumulation, with individuals dissaving when young and saving at increasing rates as they approach retirement. Alternatively, the impact of age on asset accumulation may be minimal until the individual is close to retirement, according to buffer stock models (i.e., see Samwick, 2006). "Buffer-stock savers" (Samwick, p. 22) have a high preference for current consumption, maintaining a minimal stock of assets during their working lives in order to achieve some desired wealth-to-income ratio, until they near retirement, at which time they increase their asset accumulation above this ratio. These models suggest that the impact of age on wealth accumulation may not be the inverted U shaped predicted by the life-cycle model. We consider this possibility econometrically by comparing models that control for age using a set of dummy variables versus age and age squared.

In addition to consumption smoothing, motives for accumulation assets include bequest and, in an uncertain world, precautionary savings (Modigliani and Brumberg), suggesting that wealth accumulation will depend upon factors such as whether the individual is married, has children, and has job stability. Imperfect credit markets may mean that asset accumulation also depends upon race. Indeed, Charles and Hurst (2002) find differential treatment of mortgage applicants by race, all else equal, and an extensive literature finds substantial racial differences in wealth accumulation (for example, see Hurst, Luoh and Stafford, 1998; Carney and Gale; and Carasso and McKernan, 2008). In

addition to controlling for age, (non-asset) income, education, receipt of an inheritance or other monetary gift, marital status, children, job stability, and race, we control for homeownership status and unobserved heterogeneity, as described below.

4. Data and econometric approach

The data are from the Panel Study of Income Dynamics (PSID), which is a longitudinal survey of families that has been carried out since 1968 and provides a unique opportunity to follow households over time. The PSID collects data annually through 1997 and biennially after that. We select all households headed by a person age 65 or younger in 2001, for which we observe continuous homeownership data over a 15 year time period: from 1987 to 2001. Note that although the survey is biennial after 1997, the PSID collects data regarding off survey years allowing us to construct continuous, annual data on homeownership status. In addition to the core survey data, we use the PSID wealth supplements, available in 1994, 1999 and 2001.

Total net wealth 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 other debts such as credit card and student loan debt. The data in the PSID do not include either expected social security wealth or private pensions (see the PSID webpage and Hurst, Luoh and Stafford (1998) for more details). For the years we are examining, although the PSID top codes total net wealth at $999 million, no households hit the top code in our sample. Nonetheless, the wealth distribution is skewed, as we note later, and we take this into account in our estimations. After data preparation and cleaning, the sample includes 1,876 households whose wealth accumulation (as well as other characteristics) we observe at three points in time: 1994, 1999 and 2001, generating a panel of 5,628 observations.

To control for homeownership in the wealth estimations, we undertake the following steps. First, we create a variable that equals that number of years the household has been in the homeownership state

as of 1988. This variable varies across households and within households over time, at three points in time: 1994, 1999 and 2001. For example, suppose person A becomes a homeowner in 1990 and remains a homeowner during the observation period. Then the homeownership variable for person A takes on the values of 5, 10 and 12 in years 1994, 1999 and 2001, respectively. The maximum values the homeownership variable can take on for any household are 7, 12 and 14 in 1994, 1999 and 2001, respectively. The minimum values are zero in each observation year, indicating a continuous renter. Second, we run specifications that control for homeownership in excess of 14 years; the control variable equals 1 if we observe the household as an owner in 1987 through 2001, and zero otherwise. Third, we control for unobserved heterogeneity to isolate the impacts of homeownership on net wealth independent of the unobserved characteristics that might make a household both a high saver and have a high probability of homeownership. We model this household specific constant term to be randomly distributed across households because the PSID sample is drawn from a larger population, thus making a random effects model appropriate (Greene, 1997, p. 623).

Finally, to examine wealth accumulation by income status, we separate the sample into two groups: (1) high-income households, those with a total family income in excess of 120% of state median income in at least one of three observation years, and (2) LMI households, those households with a total family income less than or equal to 120% of state median income in all three observation years.[9] Note that the PSID reports households' states of residence, but not their MSAs, thus we use state median income to

[9] It turns out that 2/3 of the sample is high-income under this definition, which is a higher fraction than one would expect. In any given year, high income households comprise roughly 50% of our sample, whether the sample is weighted or unweighted. We checked to see if there is substantial attrition of LMI households in our sample. There is not. Instead, one reason why we might have a disproportionate number of higher income households is that in this study we select households whose head is 65 or younger in 2001; working age adults will have a higher income than retirees. Nonetheless, we consider an alternative measure of LMI whereby we define a household to be high income if total family income exceeds 120% of the state median income in all three years of observation. LMI households are thus those with income less than or equal to 120% of the state median income in at least one of the three observation years. This definition generates a larger fraction of the sample to be LMI, at 61%, but has virtually no effect on the coefficient estimates. The results are available from the authors upon request.

define income groups.[10] Of the 1,876 households whose wealth we observe in 1994, 1999 and 2001: 1,203 are high income, and 673 are LMI households.

To examine the household's propensity to accumulate wealth controlling for unobserved heterogeneity, we estimate several versions of the following random effects model:

$$W_{it} = \beta_0 + \beta_1 YRSOWN_{it} + X_{it}'\gamma + u_i + \varepsilon_{it} \qquad (1)$$

Where W_{it} is the total net wealth of household *i* at time *t*, and $YRSOWN_{it}$ is the number of years household *i* has owned their home by time *t*. X_{it} is a vector of household- and time-specific controls and includes non-asset income, education, family status, age, race, employment status, and receipt of a monetary gift or other lump-sum payment. We control for education by use of four dummy variables indicating the head of household's highest education level attained: a high school diploma or GED, some college but no degree, and a college degree, with no high school diploma being the excluded group. Family status controls include marital status and number of children. Age of the household head is controlled for with categorical variables: age 35 to 50, and age 50 and older, relative to the excluded control of less than 35 years old.[11] We control for head employment status with indicator variable that equals 1 if the head is in the labor force and experiences unemployment in a given year, and zero otherwise. We control for spouse (if present) unemployment in the same way. We also control for the household's regional location: Northeast, Midwest, South or West. Each of these controls varies across households and within a household over three points in time: 1994, 1999 and 2001. u_i is a random disturbance characterizing the i^{th} household.

[10] To do this, we use PSID state-location indicators to link to each household the median state income data reported by the Census Bureau. We use the 1980, 1990 and 2000 census data, apply a linear function to impute annual estimates of state median income and, as we do with the other price and income variables in the dataset, adjust the resulting series to 2004 dollars using the urban Consumer Price Index.

[11] We also run specifications controlling for age and age squared. We report the estimations run with the categorical age variables as these specifications give the best fit.

We estimate equation (1) with total net wealth in thousands of dollars as the dependent variable, for all households as well as households with positive net wealth holdings only, for which we implement a Heckman (1979) sample selection correction, as discussed below. To allow for the skewed nature of the wealth distribution, we also estimate equation (1) with the natural logarithm of total net wealth as the dependent variable, and we run estimations on a trimmed distribution that excludes the upper and lower 2.5% of the wealth distribution. We run the aforementioned estimations for households of all income levels, controlling for whether the household is a LMI household, and separately for LMI households. In the full sample estimation, we also control for an interaction variable between LMI status and years of homeownership, to examine the extent to which the impact of homeownership varies by LMI status. For the LMI estimations, LMI households may be receiving government assistance, and receipt of welfare may impact wealth accumulation: government assistance programs may discourage wealth accumulation by providing an expected consumption floor and, in addition, wealth holdings may reduce welfare eligibility (Orszag, 2001).[12] A control for receipt of welfare may thus be endogenous in a wealth equation. We account for this by running estimations that alternately control for observed receipt of welfare and predicted receipt of welfare, generated from a two-stage least squares model not reported here, but available upon request.[13] It turns out that both measures are negative and statistically significant in the wealth estimations and use of either welfare control has little impact on the other results. However, the random effects models controlling for the predicted measure have an overall better fit, based on the Akaike's information criterion (AIC), as we note below, thus we report the estimations run with the predicted measure of welfare participation.

[12] These programs include Aid For Dependent Children, the Federal Food Stamp program, state Medicaid programs, and Supplemental Security Income (Orszag).

[13] We estimate a probit model of the likelihood of welfare participation for LMI households where welfare receipt is modeled to be a function of total household income, marital status, female head status, education, number of children, race, age and employment status. We select the probit specification that maximizes the log likelihood and use this model to generate a measure of predicted welfare participation for each household.

As noted above, we consider estimations based on the sub-sample of households having positive net wealth, and we correct for sample selection. We do this because total net wealth is a latent dependent variable: positive values of wealth are not censored, but negative values are. That is, households are able to accumulate wealth with no upper bound according to the household's preferences and abilities. However, credit markets will impact the extent to which households can dissave: a household may have a low propensity to accumulate wealth that is not realized because the household is limited in the extent to which it can borrow against future income. To correct for the potential sample selection bias that may arise due to selecting households with positive net wealth only, we control for the inverse of the Mill's ratio, *MR*, which we calculate based on a secondary probit equation of the likelihood of having positive net wealth (Heckman). Doing so means that homeownership will have direct effects on wealth accumulation and indirect effects through the inverse Mills ratio control.

The probit model to control for sample selection needs to include at least one variable that is correlated with the likelihood of having positive net wealth, but not correlated with the household's level of net wealth holdings. We check several variables, including female head of household, number of children, marital status, and region of residence. Of these, only the household head's sex is a match: we find that the head's sex is weakly correlated with the household's level of net wealth holdings, by strongly correlated with the household's likelihood of having positive net wealth. Thus, we include female head in the probit estimations, and not equation (1). We estimate various specifications of the probit model and select the best fitting specification; the one that maximizes the log likelihood includes female head, age, education, marital status, race, total family income, years of homeownership and employment status. All analysis is weighted using the 2001 PSID combined family weight.

5. Empirical results

Table 1 reports the weighted mean and median total net wealth of households in each year of observation in 2004 dollars. There is a dramatic difference in wealth holdings by income status. The median wealth of high income households is roughly eight times higher in each of the three years of observation than the median wealth of LMI households. Table 1 also reports the wealth holdings of LMI households by cumulative housing status through 2001. Doing so suggests a strong positive association between homeownership and wealth holdings: the greater the length of homeownership, the greater the wealth holdings. Table 2 reports the 2001 weighted sample means for all households and by income status. Relative to high-income households, we see that LMI households have substantially lower wealth holdings and non-asset income, own their homes for fewer years by 2001, are less likely to be married, have a college degree or receive a lump sum payment such as an inheritance, and are more likely to be black and have experienced unemployment of the household head.

Table 3 reports the random effects model estimates for the full sample. Model (1) has total net wealth in thousands of dollars as the dependent variable. The other models have positive total net wealth as the dependent variable, either linearly in thousands of dollars or in log form, as indicated, and control for the inverse Mills ratio. Model (3) is run on the trimmed distribution, which excludes households in the upper and lower 2.5% of the sample wealth distribution. Model (6) includes a variable that interacts LMI status with the number of years of homeownership variable. Model (7) controls for income using three indicator variables, capturing whether or not the household is in each of the first three quartiles of the income distribution, and interacting these variables with the number of years of homeownership variable.[14]

[14] We use the total family income quartiles for 2001 derived from the Current Population Survey by the U.S. Census Bureau to categorize households into quartiles. We also run model (7) using the weekly earnings quartiles from the same source. The results are nearly identical.

We see that the key variable of interest, number of years of homeownership, is positive and statistically significant across models. To determine whether the linear or log models fit the data best, we use a Box-Cox specification test (Griffiths, Hill and Judge, 1993, p. 345), and find that the log models provide a superior fit to the linear models. To interpret the magnitude of the homeownership variable, referring to model (5) and using the sample mean of $325 K in (positive) net wealth holdings, we see that the coefficient estimate of 0.042 suggests that each additional year of homeownership is associated with $13.7 K more in wealth holdings, after controlling for a host of other factors including unobserved heterogeneity. This is less than the $18.4 K and $23.8 K implied by models (1) and (2), respectively; however, it is similar to the result for model (3), which is model (2) run on the trimmed distribution, implies a marginal effect of $13.8 K and is the more appropriate comparison to the logged model, given the skewed nature of the wealth distribution.[15] Referring to the AIC, we see that including the interaction terms improves the fit and suggests that the impact of homeownership varies by income status. Referring to model (6), the coefficient values of 0.037 and 0.031 on the years of homeownership and interaction variables, respectively, suggest that each additional year of homeownership is associated with $15.2 K more in wealth holdings for high-income households (evaluated at the mean of $411 K for these households) versus $6 K more in wealth holdings for LMI households (evaluated at the LMI sample mean of $88.6 K). Referring to model (7), which is the preferred log model according to the AIC, we see that the impact of homeownership varies by income status only for the first quartile relative to the fourth quartile. The coefficient estimates of 0.032 and 0.058 for the years of homeownership variable and the first quartile interaction term, respectively, indicate that each additional year of homeownership is associated with $13.1 K more in wealth holdings for high-income households (evaluated at the mean of $411 K for

[15] The results of running model (1) on the trimmed distribution include a coefficient estimate of $10,670 for the years of homeownership variable and are available from the authors upon request.

these households) versus $5.5 K more in wealth holdings for households in the lowest income quartile (evaluated at a sample mean of $61.2 K in wealth holdings for the lowest income quartile).

In comparing models (4) and (5) in table 3, notice that households that are homeowners for more than 14 years have significantly higher wealth accumulation than other homeowners, with roughly $175 K more in wealth holdings on average, depending on the model, controlling for other factors. Note as well that controlling for this group of homeowners lessens the impact of an additional year of homeownership on wealth accumulation from the $19 K in model (4) to the $13.7 K found in model (5). To discuss the other results from table 3 that are robust across models, we focus on the best fitting models, models (4) through (7), and we find the following. Black and LMI households accumulate significantly less wealth than other groups. The effects are sizable. Referring to model (5), for example, black households hold $113 K less in wealth than white households, controlling for a host of other factors, including non-asset income, age, education, unemployment status as well as unobserved heterogeneity; LMI households accumulate $299.6 K less in wealth than high income households, all else equal. Households in the South accumulate less wealth than households in the West. Wealth holdings increase with age, education, non-asset income, and receipt of a lump sum payment. Age and having a college degree (relative to no high school diploma) have especially sizable effects with heads age 50 or older accumulating $260 K more in wealth on average, all else equal, relative to heads age 30 and under, and college degree holders accumulating $291 K more in wealth on average, all else equal, relative to heads without a high school diploma. Because we control for the LMI indicator variable, interpreting the magnitude of the impact of non-asset income is complicated: the coefficient of 0.0018 in model (5) implies each additional $1000 in non-asset income is associated with $585 more in wealth holdings; however, for low-levels of non-asset income, the LMI indicator will be equal to 1, all else equal. As non-asset income rises, it will research the threshold where the LMI indicator switches to a value of zero. Married heads have more

wealth than single heads of household. The inverse Mills ratio is statistically significant and indicates that sample selection needs to be controlled for. Factors that not consistent across models include number of children, head/spouse unemployment, and residing in the Northeast relative to the West, all else equal.

Table 4 reports the random effects model estimates for LMI households. Model (1) has total net wealth in thousands of dollars as the dependent variable. The other models have positive total net wealth as the dependent variable, either linearly in thousands of dollars or in log form, as indicated. For the positive net wealth models, we test for sample selection bias due to running the models on only those LMI household with positive net wealth, and, unlike the results in table 3, we find none. We also run LMI estimations on the trimmed distribution, but, unlike the full sample results above, we find little difference between the LMI trimmed and full distribution estimates, which makes sense given that few LMI households have wealth holdings in the upper 2.5 percentile. Thus, we do not report estimates from the trimmed distribution.

Referring to table 4, we see that homeownership plays a role in the wealth accumulation of LMI households as well: the coefficient estimate on the number of years of homeownership variable is positive and statistically significant across models. A Box-Cox test indicates that the log models are the best fitting models, and the AIC indicates that, among the log models, model (5) is the preferred model. To interpret the magnitude of the homeownership variable, using the sample mean of $ 104.8 K in (positive) net wealth holdings of LMI households, we see that the coefficient estimate of 0.092 in model (5) suggests that each additional year of homeownership increases the wealth holdings of LMI households by $9.6 K, after controlling for a host of other factors. A marginal effect of $9.6 K in the best fitting model is more than the roughly $5 K implied by models (1) and (2), and less than the $17.9 K and $11.7 K implied by models (3) and (4), respectively. Comparing models (3) through (5), we see that controlling for predicted welfare receipt and owning 15 or more years

lowers the impact of the number of years of homeownership variable by nearly a half.[16] In comparing models (4) and (5), notice that households that are homeowners for more than 14 years have significantly higher wealth accumulation than other homeowners, with $83 K more in wealth holdings on average, controlling for other factors.

Other results from the LMI wealth estimations include the following. Focusing on models (3) through (5), table 4 indicates that, unlike in the full sample estimation, interestingly, race has no impact on the wealth holdings of LMI households. Wealth holdings increase with age, education and non-asset income. Age 50 or older and having a college degree relative to no high school diploma have particularly large effects, increasing wealth holdings by $104.8 K and $109.7 K, respectively. Non-asset income has a sizeable impact: an additional $1000 in non-asset income increases the average wealth holdings of the LMI households by $1,268. Married heads have on average $69 K more in wealth holdings than single heads. Welfare receipt has a large impact on wealth holdings: those receiving welfare hold $169 K less in wealth than other LMI households. Referring to model (5), those residing in the South (relative to those in the West) accumulate less wealth. Interestingly, unlike the full sample estimations, receipt of a lump sum does not appear impact the wealth accumulation of LMI households. Similar to the full sample estimations, the coefficients of number of children, head/spouse unemployment and residing in the Northeast are not statistically significant in the LMI estimations.

6. Conclusion

Using household data from the PSID, we generate a panel of households whose homeownership we observe over a 15 year period and whose wealth accumulation we observe at three points in time:

[16] Since the standard errors are not significantly affected by the inclusion of the predicted welfare measure rather than the actual, we did not correct them.

1994, 1999 and 2001. We investigate the extent to which homeownership has an independent impact on the wealth accumulation of LMI households, controlling for a host of other variables and unobserved heterogeneity. Accounting for the skewed nature of the wealth distribution, we find that each additional year of homeownership increases total net wealth by $13.7 K on average for the full sample. Interacting income status with years of homeownership indicates that the impact of homeownership varies by income status, with each additional year of homeownership being associated with $15 K more in wealth holdings for high-income households and roughly $6 K more in wealth holdings for LMI households. Estimating a separate equation for LMI households indicates that an additional year of homeownership increases wealth holdings by $9.6 K. With average LMI wealth holdings of $89 K in 2001, this roughly $10 K increase in wealth for each year of homeownership represents a sizeable amount, at a roughly 11% increase in net wealth per year.

There are various reasons why we might expect lower income households to have less success in accumulating wealth through homeownership than other households. Given the focus of federal housing policy on boosting the homeownership rates of low-income households during the 1990s, determining how LMI households have fared presents an important policy question. The evidence found here suggests that homeownership enables wealth accumulation for LMI households. At least during a period of national wealth accumulation, LMI households, like high-income households, benefited from the wealth creation effects of homeownership too. This should be reassuring for those advocating homeownership as a means to increase the wealth and financial stability of poor households. How LMI households have fared more recently as house prices plummet and home foreclosure rates spike remains to be seen as new data become available.

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